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THE PENNY CYCLOPAEDIA

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VOLUME XXV.

TITLES OF HONOUR—UNGULA.

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TITLES OF HONOUR are words or phrases which certain persons are entitled to claim as their right, in consequence of certain dignities being inherent in them. They vary in a manner corresponding to the variety of the dignities, or, in other words, with the rank of the possessor. Thus Emperor, King, Czar, Prince, are titles of honour, and the possessors of the high dignities represented by these words are, by the common consent of the civilized world, entitled to be so denominated, and to be addressed by such terms as Your Majesty and Your Royal Highness. These are the terms used in England, and the phrases in use in other countries of Europe do not much differ from them. In fact one European nation seems to have borrowed from another, or all to have taken their titles of honour for this exalted rank from a common original; so that little of the peculiar genius of the European nations can be traced in the terms by which they show their respect for the persons of highest dignity. But it is different when we come to compare them with the Oriental nations. In those seats of ancient civilization the most extravagant terms of compliment are in use, and a little sovereign of a wandering tribe rejoices in titles of honour numerous and inflated in the highest degree. In the series of Roman emperors, the word Caesar, originally the name of a family, became a title of honour; Augustus was another; and Pater Patriae a third.

The five orders of nobility in England are distinguished by the titles of honour, Duke, Marquis, Earl, Viscount, and Baron: and the persons in whom the dignity of the peerage inheres are entitled to be designated by these words; and if in any legal proceedings they should be otherwise designated, there would be a misnomer by which the proceedings would be vitiated, just as when a private person is wrongly described in an indictment; that is, the law or the custom of the realm guarantees to them the possession of these terms of honour, as it does of the dignities to which they correspond. They are also entitled to be addressed by such phrases as My Lord, My Lord Marquis, My Lord Duke, and they have usually prefixed to their titles, properly so called, certain phrases, as High and Mighty Prince, Most Noble, Right Honourable, varying with the kind and degree of the dignity possessed by them. The other members of the families of peers have also their titles of honour. Thus the lady of a peer has rank and titles corresponding with those of the husband. All the sons and daughters of peers are Honourable, but the daughters of earls and peers of a higher dignity are entitled to the distinction of being called Lady, and the younger sons of dukes and marquises are by custom addressed as My Lord.

The orders of nobility in other European countries differ little from our own. They have their Dukes, Marquises, Counts, Viscounts, and Barons. We cannot enter into the nice distinctions in the dignities of foreign nations, or in the titles of honour which correspond to them.

Another dignity which brings with it the right to a title of honour is that of knighthood. This dignity is of very antient origin, and, in the form in which we now see it, may be traced far into the depths of the middle ages, if it be not, as some suppose, a continuation of the Equites of Rome. Persons on whom this honour is conferred take rank above the gentlemen and esquires, and are entitled to the prefix Sir to their former name and surname. Their wives also are entitled to prefix the word Dame, and to be addressed by the compellation Your Ladyship or My Lady. The Knights of particular Orders, as of the Garter, the Thistle, St. Patrick, the Bath, are a kind of select number of the body of the knighthood, and the name of the Order to which they belong is ordinarily used by and of them, and thus becomes of the nature of a title of honour. The Bannerets of former ages were a class of knights superior to the ordinary knight-bachelor, forming in fact an Order intermediate between the knight, its ordinary sense, and the baron. The Baronet, which is quite a new dignity, not having been known before the reign of James I., has, besides its name, which is placed after the name and surname of the person spoken of, the privilege of prefixing Sir; and their wives are entitled to the prefix of Dame, and to be addressed as My Lady and Your Ladyship.

Besides these, there are the ecclesiastical dignities of Bishop and Archbishop, which bring with them the right to certain titles of honour besides the phrases by which the dignity itself is designated. And custom seems to have sanctioned the claim of the persons who possess inferior dignities in the church to certain honourable titles or compellations, and it is usual to bestow on all persons who are admitted into the clerical order the title of Reverend.

There are also academical distinctions which are of the nature of titles of honour, although they are not usually considered to fall under the denomination. Municipal offices have also titles accompanying them; and in the law there are very eminent offices the names of which become titles of honour to the possessors of them, and which bring with them the right to certain terms of distinction.

All titles of honour appear to have been originally names of office. The earl in England had in former ages substantial duties to perform in his county, as the sheriff (the Vice-Comes or Vice-Earl) has now; but the name has remained now that the peculiar duties are gone, and so it is with respect to other dignities. The emperor or king, the highest dignity known in Europe, still performs the duties which originally belonged to the office, or at least the most important of them, as well as enjoys the rank, dignity, and honours; and on the Continent there are dukes and earls who have still an important political character.

Some of these dignities and the titles correspondent to them are hereditary. So were the eminent offices to which they designate in the remote ages, when there were duties to be performed. Hence hereditary titles.

The distinction which the possession of titles of honour gives in society has always made them objects of

P. C., No. 1852.
ambition; and it may be questioned whether, as far as there has been any feeling in operation besides that of a sense of duty, the great exertions which are made in the service of emoluments and preferments will not largely exceed by the peculation of pecuniary reward, than by the hope of receiving one of these titles of honour which shall descend to a man’s posterity. They cost nothing; and hence it is that titles of honour have been called ‘the cheap defense of nations.’

Whoever wishes to study this subject in all its details will do well to resort to two great works: one, the late Report of the Lords’ Committee on the dignity of the Peers; the other, the large but thin ‘Titles of Honour,’ by the learned Selden. The latter was first printed in 4to., 1614; again, with large additions, folio, 1631.

TTIMCS, Paradis, a natural family of Perching Birds.

Latham, in his last edition of the Systema Naturae, placed the genus Parus between Piplra and Hirundo, in his order Passeres.

Latham arrange it at the end of the same order.

Pentan too gives it a place in the Passerine section, between the Warblers and the Swallows.

M. de Lacépède places it immediately before the Larks; M. Percheron, between the families Perisciidae, or Rhiprotornae, in company with the Manakins, Larks, and Bec-fins; M. Meyer, in the third suborder (Subulatae) of his fifth order (Ocinia), between Alauda and Regulus; Illiger, at the head of the Passerini, among the Artedi.

The group of which the Viviparae is a part is certainly too large, to be admitted into the present family, lead us on to the more typical groups of the Linnaean Pipra, with which they bear an acknowledged affinity in manners and general appearance.

The genus Parusolus, Vieill., which is the representative genus of the family within Australasia, contains two allied groups of the Old and the New World, by exhibiting the nearly divided foot of the one, and the partially curled bill of the other. Here come in the Rupicola, Briss., and Pseudura, Vieill. And here, as I have already observed, when speaking of the Thrushes [Merulide, vol. xv., p. 121]. I apprehend that all those groups will be found to assemble, which, connected with Amsels, Lian., and the like, is called the subfamily Dicrurinae, or Dicrurinae, in the genera such as Bombycilla, Briss., the true Amplia of authors, Casmanicibus, Temm., and Proctis, Ill. To these the genus Querula of M. Vieillot may, I think, be added. This group, the type of which is the Muscicapae, rubricollis of Vieillot, is generally placed by all naturalists among the Mimicaria, with its habits and manners, and which, in the order Mimicae, which follows, the interval between the present groups and those of the Pari, where we entered on the order, appears to me so near, that I think, I have already observed for when I spoke of the separation of the broad-billed Chatterers from the Thrushes. And thus equally, as in the former tribe, we may recognise the completion of a circular succession of affinities between all the families of the Dicrurinae.

The uncharacterized group above alluded to was afterwards formed into the genus Pachyphala, Sw.

Mr. Swainson (Classification of Birds) enters the Thraupidae under Passeres, and flatters his two groups, more or less, with the motion of its tail. One species, Scirca aquamanta, Sw., frequents the sides of streams and runs upon the ground, whilst another, S. atricapilla, Sw., is, he observes, confined to damp woods and runs along the low branches of trees. The former is, he says, a very graceful bird, to which, he adds, he gives the name of a new form; and as the habit of running along branches of trees is the chief faculty of the Scornalorial birds, or of their representatives, so, he remarks, we may suppose that the group next in succession to the Motacilline would possess something of the same characters. These he finds manifested in the genus Accenior, and he adverted to an unpublished notice which he heard read at a meeting of the Linnean Society of London, relating to the habits of an Accenior which was killed near one of the public buildings at Oxford, and which was seen to climb so adroitly round the steep abutments of those buildings as to suffice for a considerable time the aim of the person who shot it. He also states that he has seen the common Hedge-sparrow frequently hop along the whole length of a strong oblique branch, pecking into the crevices of the bark so as to re- model the beak of a scoopsman’s creeper, or of a Woodpecker: and he makes the Titmouse a subfamily of the Simililide, with the general and subgenera which will be found in that article. [Vol. xvii., p. 441.]

The same author refers to the question of the subfamilies, and he said to come with the genus Accenior, which stands at the confines of that group which contains the most scorpion-fishers in the family of the Simililide. The short stout, and nearly conic bills of these active little climbers, which the Author Mr. Swainson has so ably described, are admirably placed into the barb of buds, and thus extracting the small insects
that there is concealed. — The five types of form, or subgenera, proposed by the genus Parus, by which Mr. Swainson formerly named Parusoma, is, he thinks, the connecting link to Accentor. It is, he observes, one of those small birds of South Africa figured by Le Vaillant, but of which the greater part are known only by his plates: the formation of subgenera is the ordinariness of Tit-mice (Parus), the Hangnest Titmice (Aegithalus, Vig.), the Brazilian Titmice (Hylophilus, Temm.), and Aegithina, Vicill. Parus and Aegithina, he remarks, are distinguished by pointed beaks, while the three aberrant types have that organ notched; but he points out that in all five the feet, so constantly employed in the great exertion of climbing, are peculiarly strong and muscular; and that the hind-toe also, upon which they are so much dependent, is of great assistance, and large and powerful. The discovery of the five subgenera of Parus, says Mr. Swainson in continuation, independent of the verification they afford by their perfect analogy to the correspondence of the subgenera of the genus Sylveola, subsequently detailed, is of much importance, since this discovery enables us to prove beyond all reasonable doubt, that neither the long-tailed nor the Bearded Tits are types either of genera or subgenera. We have already alluded to the station in which, after the most minute analysis, we have placed the Parus biarmicus, which is only an aberrant species of the restricted subgenus Parus, and which, from the fact of the vivacity of the vixil of water, it becomes that species which represents the natatorial type; while in the greatly developed tail of Parus candidatus it is easy to perceive another aberrant species, which has not the extremity of the eye so strongly marked that groups preeminently typical in their own circle, almost invariably present us with these variations in the form of their aberrant species. The restricted genus Parus is precisely of this description: it is the pre- eminently typical subfamily; and hence, the Corvus, Lanius, Sylveo, and a great number of other genera holding the same rank in their own circles, it contains a greater variety of modifications in the form of its species than any other. In the corresponding group, that is, the whole of the subgenera of Parus are distinguished from those of Sylveola by characters the most simple and beautiful. They all have that peculiar strength of foot so conspicuous in our native examples, and their wings are invariably rounded; that is to say, the first quill is short, and the second and third so graduated that the fourth becomes the longest. The bill also is short and thick, generally more or less com, and sometimes (as in the types) very strong; the underparts may be entirely white, as in the only genus (Parusoma) which has the culmen arched, the notch so small that it may be termed obsolete. Mr. Swainson then remarks that we are thus enabled to distinguish the the Gallery group, Sylveola, which lie then enters upon.

Notwithstanding the discovery here claimed, and the assumed proof that neither the Long-tailed nor the Bearded Tits are types either of genera or subgenera, we shall presently find that ornithologists, in their publications subsequent to that of Mr. Swainson, are not convinced; but, on the contrary, still regard these two interesting forms as generic types.

Mr. Yarrell compared the Paride, or True Tits, between the Wablers, Sylveola, and the Aspetidae, the latter being represented by the Bohemian Waxwing. [Bonniucta.] The Prince of Canino (Birds of Europe and North America, 1838) arranges the Paridae as the seventh subfamily of the Triuridae, placing it between the Motacillidae (Wagtails) and the Sylveola. The following genera are included, by him, according to the Paridae:

*Regulus, Ray (Wren, including Gold-Crest); Parus, Long-tailed Tit, Great Tit, Blue Tit, Bearded Tit, Sylveola; Cacicus, Leach (Mynas); Carpodophila, Brehm—Bearded Titmouse; Aegithalid, Vig. (Pendulina, Cuv.—Penduline Titmouse.)

The list of the Genus of Birds, 1811, makes the Parina the fifth subfamily of his Linnean, and places it between the Accentorina and the Sylveolina: the Parina, according to him, consist of the following genera:


**In this article we shall confine ourselves to those cognate forms which are vermillionally known as Titmice.

**European Titmice.**

The following species are found in Europe:

The Great Tit, Parus major, the Sombrero Tit, Parus lugubris; the Siberian Tit, Parus Sibericus; the Toupet Tit, Parus bicoel; the Azure Tit, Parus cyanus; the Blue Tit, Parus coeruleus; the Coal Tit, Parus ater; the Marsh Tit, Parus palustris; the Crested Tit, Parus cristatus; the Long-tailed Tit, Parus ater; the Birds of passage, (genus Ortes); the Bearded Tit, Parus biarmedus (genus Calomophila); the Penduline Tit, Parus pendulilus of author (genus Aegithalid).

Of these, the Great Tit, the Blue Tit, the Crested Tit, the Cool Tit, the Marsh Tit, the Long-tailed Tit, and the Bearded Tit are British.

There is little doubt that the Tittare are the Aegithalid (Aegithalid) of Aristotle. The Great Tit, the Blue Tit, and the Blue Tit are referred by Belon to the aegithalid, the aegithalid grex, and the aegithalid of that author, and, we think, with good reason.

The Great Tit, the Blue Tit, the Coal Tit, and the Marsh Tit are too well known to require description; but a sketch of their habits may not be unacceptable. White, speaking of the English Tit, says:—Every species of titmouse winters with us: they have what I call a kind of intermediate between the hard seed of birds and the soft, between the Linnaean genera of Fringilla and Moletsia. One species alone spends its whole time in the woods and fields, never retiring for succour in the severest seasons to houses and small gardens; this is the Great Titmouse, which is almost certainly the Golden-crowned Wren; but the Blue Titmouse or Nun (Parus coeruleus), the Coal-Titmouse (Parus ater), the Great Black-headed Titmouse (Fringilla), and the Marsh Titmouse (Parus palustris), all hard at times to buildings, and in hard weather particularly. The Great Titmouse, driven by stress of weather, much frequents houses; and, in deep snows, I have seen this bird, while it hung with its back downwards (to my no small delight and admiration), draw straws lengthwise from out the eaves of thatched houses, in order to pull out the flies that were concealed between them, and that in such numbers that they quite filled the space that it arrogated to them. The Blue Titmouse, or Nun, is a great summer of houses, and a general devourer. Besides insects, it is very fond of flesh; for it frequently picks bones on dunghills: it is a vast admirer of suet, and haunts butchers' shops. When a nest is made, I have seen its owner put its eggs in snap-mouse-traps baited with tallow or suet. It will also pick holes in apples left on the ground, and be well entertained with the seeds on the head of a sunflower. The Blue, Marsh, and Great Titmouse will, in very severe weather, carry away barley and oat straws from the sides of ricks. (Selborne.)

We can confirm, if confirmation was needed, the account of this edible observer relative to the straw-extirpatating labour of the Great Tit. The bird of a root-house in Gloucestershire was nearly destroyed by those fly-seekers; but they have more to answer for than fly-catching: they are small-bird murderers, and frequently kill their victims by repeated blows on the head with their strong, sharp, and hard beak, for the sake of feeding on the brains.

The Great Tit, without any compe to speak of, is a songster, not unadmired by some for its few but lively notes heralding the approach of spring. The contrain in the Portraits of Gypsies is loud in its praise:—

* Au temps d'Autoïle il y a des mesanges, En grand rome, qui vont des vaches, 13. Vives grises ou qui sont sur l' AUTON, Petit et qui disent comme anges.*

The habits of the Blue Tit are recorded by White with equal truth: this is the bird that flies so stoutly per filament, and per filos, and per albo, and per filos, and her nest in the hollow of some decayed tree is inside.

*But see post, description of that species.*
the school-boy, who, if not deterred by the ominous sounds, often uses his temerity and draws back his hand with more celebrity than he stretched it forth, well packed by the irritated matron. Hence he calls it 'Billy Biter,' by the way Montagu gives 'Willow Biter' as one of its names. The latter name does not convey much meaning to any one acquainted with the habits of the bird; the former does: may not Montagu have heard it imperfectly?

The gardener, who sees this little bird busy about the buds, likes it not, and in some parishes a reward has been set upon its head. Mr. Knapp, in his interesting Journal of a Naturalist, notices such a case where the stimulus appears to have operated to some purpose against these innocent little birds, for one item passed in the churchwardens' account was 'for seventeen dozen of Tomtits' heads.' They may, now and then, knock off a bud in their busy search for insects; but the great good they do in riddling the plants of these, far outweighs any casual harm that may result from their industry.

The song of the Tomtit has but little variety: the vivacity of the bird seems however to have found favour for its song with our neighbours, for the Portraits d'oiseaux notices it with applause:—

'L'Ent et bole le message libre; set.
Et sonner sonner en hyver et en terme,
La dua chante d'oeilie plaidon donne
Et qu'il est joyeux ce Poen.'

We proceed to illustrate the present article by the less familiar Long-tailed Titmouse, Bearded Titmouse, and Penduline Titmouse.

Long-tailed Titmouse.

Description.—Male.—Head, neck, throat, and breast pure white; upper part and centre of the back, rump, and the six middle tail-feathers deep black; scapulars reddish; belly, sides, and abdomen reddish white; quills black; greater wing-coverts bordered with pure white; lateral tail-feathers white on their external bars and at their end; tail very long and wedge-shaped. Length five inches seven or eight lines.

Female.—A large black band above the eyes, which is prolonged upon the nape, and proceeds to unite itself with the black of the upper part of the back.

Young.—Small black spots on the cheeks and brown spots on the breast: black of the back not so decided. (Tennm.)

Mr. Gould remarks that the female does not differ from the male in colouring, and in the Birds of Europe both are represented with the black band above the eyes.

This is the Pendolino, Paronzino, Codubnolo, and Paglia in culo of the Italians; Mésange à la longue queue and Perd à queue longue of the French; Langenheirach of the Danes; Meite, Schianmeite, and Belmeite Pfannenkeil of the Germans; Steartmees of the Dutch; Alkitty of the Swedes; Jenaga of the Japanese; Bottle Tit, Bottle Tom, Long-tailed Farmer, Long-tail Mog, Long-tail Fr, Poke Pudding, Huckmuck, and Mungraff of the modern British; and Y Benloum graffonhir of the ancient British.

Geographical Distribution.—Siberia, Russia, Japan. The rest of Europe, England, Scotland (near Edinburgh at least), and Ireland.

Habits, Food, &c.—Insects, their larvae and eggs, form the food of these pretty little birds. When White says that the Long-tailed Titmouse never retires for succour in the severest seasons to houses and their neighbourhood, he must not be supposed to mean that the bird avoids the haunts of men. We have seen in a nursery-garden in Middlesex a whole family of them within a few yards of the nursery-man's cottage, and close to his greenhouse, which visitors were constantly entering, and we have found its exquisitely wrought nest in a Silver Fir about eight feet high, in a pleasure-ground in the same county, little more than a hundred yards from the house. Pen- nant well describes its appearance in flight when, after stating that the young follow the parents the whole winter, he says, 'from the slimmness of their bodies, and great length of tail, they appear, while flying, like so many arrowheads cutting the air. They are often seen passing through our gardens, going progressively from tree to tree, as if on their road to some other place, never making any halt.' Habi-Yarrell is equally happy in describing the nest and with them of this interesting little bird. The nest of this

structure, combining beauty of appearance with security and warmth. In shape it is nearly oval, with one small hole in the upper part of the side by which the bird enters. I have never seen more than one hole. The outside of this nest sparkles with silver-coloured lichens adhering to a firm texture of moss and wool, the inside profusely lined with soft feathers. The nest is generally placed in the middle of a thick bush, and so firmly fixed, that it is mostly found necessary to cut out the portion of the bush containing it, if desirous of preserving the natural appearance and form of the nest. In this species, the female is known to be the nest-maker, and to have been occupied for a fortnight to three weeks in completing her habitation. In this she deposits from ten to twelve eggs; but a larger number are occasionally found: they are small and white, with a few pale red spots, frequently quite plain, measuring seven lines in length, and five lines in breadth. The young family of the year keep company with the parent birds during their first autumn and winter, and generally crowd close together on the same branch at roosting-time, looking, when thus huddled up, like a shapeless lump of feathers only. These birds have several notes, on the sound of which they assemble and keep together; one of these call-notes is soft and scarcely
The Bearded Titmouse.

Description.—**Male.**—Black between the bill and the eye, and these black feathers are very long and prolonged on each side of the head and neck, as far as the eye. Occiput bluish ash; throat and front of the neck pure white, which blends on the breast and the middle of the belly into a rose hue; nape, back, rump, feathers of the middle of the tail and sides fine rust-colour; great coverts of tail deep black, some bordered with rusty, some with external barb, and reddish white on the internal barb; quills bordered with white; feathers of the under part of the tail deep black; lateral tail-feathers bordered and terminated with grey; tail long, much graduated; bill and iris fine yellow. Length 6 inches and 2 or 3 lines.

**Female.**—No black moustachus; throat and front of the neck tarnished white; upper parts of the head and body rusty, shaded with brown; on the middle of the back some longitudinal black spots; under tail-coverts bright rusty.

Young at their leaving the nest, and before their first moult, with nearly the whole of the plumage of very bright reddish; a good deal of down on the external bars of the quills and tail-feathers; on the middle of the back a very large space of deep black. After the first moult nothing of the deep black of the back remains but some longitudinal spots.

Varieties.—More or less marked with white or whist; the colours of the plumage often feebly developed. (Temm.)

This is the *Mesange Barbote* on Moustache of the French; *Bartmeise* of the Germans; *Least Bittern-Bird of Edwards*; *Red Phoebus* (provincial) of the modern British, and *Y Barbos* of the Welsh.

N. h. M. Temminck remarks that the *Zwischäbitige Bartmeise* of Brehm is a species or subspecies founded only on individuals which have been long caged such as may be seen in the Dutch markets, where numbers are sold. Some of these captives come to London, where they may be bought for some four or five shillings a pair. The iris and bill in the living bird are of a delicate orange-colour.

Geographical Distribution.—The north of Europe, England, Sweden; Asia, on the shores of the Caspian Sea; nowhere so abundant as in Holland; accidentally on passage, in France. (Temm.) In the third part of the second edition of his *Manuel*, M. Temminck says, that in Italy it is as common in the marshes of Ostia, as in those of Holland near Amsterdam. As to Sweden, Pennant also states that it is rarely found there; but neither Müller, Bisson, nor Nilson notices it in that locality. Mr. Yarrell gives the best summary known to us of the recorded distribution of the species in the British Islands;—South and west of London the Bearded Tit has been found in Surrey about some ponds near Godalming; in Sussex near Witley; and on the banks of the Thames from London upwards as far as Oxford. Pennant says it has been taken near Gloucester. In Cornwall, as I learn from Mr. Rodd, it is considered very rare; a single specimen was obtained in the neighbourhood of Helston, which is now in the collection made by the late Humphry Grills, Esq. It is not included in the catalogue of the *Birds of Shropshire and North Wales*, most likely published in the "Annals of Natural History" by Mr. S. Eton; but roads crossing the country north of the Hurme; and single specimen is recorded as Irish, by Thompson, on the authority of Mr. W. S. Wall, a birder in Dublin, which example was received from the banks of the Shannon. Eastward from London the Bearded Tit inhabits the various reed-beds on the banks of the Thames, both in Kent and Essex. It is found also in Essex, Suffolk, Norfolk, and Lincolnshire, but has been traced in this country north of the Humberside.

Habits.**—**Dr. Leach had observed the fondness of the species to muddy and reedy spots, the shape of its nest placed on the ground, and the nature of its food—Insects and their larvae, and small-}

shelled snails. He had also remarked that the sides of the stomach in this bird were muscular and much thickened, forming a gizzard which the true tits do not possess; and that this structure of the stomach afforded the power of breaking down the shells of the testaceous mollusks—*Succinea amphibita* and *Pupa mucorum*—many of which had been found comminuted therein. Still, from the comparative rarity of this bird in Britain, and the impervious nature of its haunts, its habits were comparatively little known. Mr. Hey and Mr. Dykes have supplied much interesting information on this head.

The former states that the Bearded Tit begins building towards the end of April, and that the nest is composed on the outside of dead leaves of the reed and sedge, intermixed with a few pieces of grass, and lined with the top of the reed. He describes it as generally placed in a tuft of coarse grass or rushes near the ground, on the margin of the dikes, in the fens; and sometimes as fixed among the reeds that are broken down, but never suspended between the stems. Their food, he says, is principally the seed of the reed, and so intent were they on their search for it, that he had taken them with a bird-lined twig attached to a fishing-rod. When alarmed by any sudden noise, or the passing of a hawk, they uttered their shrill musical notes, and concealed themselves among the thick bottoms of the reeds, but they soon resumed their station, climbing the upright stems with the greatest facility.

Mr. Dykes had an opportunity of examining three specimens, and he found their crops completely filled with the *Succinea amphibita* in a perfect state, the shells unbroken and singularly closely packed together. The crop of one, not larger than a hazel nut, contained twenty *Succinea*, some of them of a good size, and four *Pupa mucorum*, with the shells almost entire. The stomach was full of small fragments of shell, in a greater or less degree of decomposition. Numerous sharp angular fragments of quartz which had been swallowed had with the action of the stomach effected the comminution of the shells.

Two nests obtained by Mr. Yarrell from the parish of Horsey, were sustained only an inch or two above the ground by the strength of the stems of the coarse grass on which they were fixed. Each was composed entirely of dried bents, the finer ones forming the lining; others increasing in substance made up the exterior. Mr. Yarrell states the number of eggs at from four to six, rather smaller than those of the Great Titmouse, and less pointed; eight lines and a half long by six lines and a half in breadth, white, and sparingly marked with pale red lines or scatches. (British Birds.)

David B. Leach.
**TIT**

**TIT**

**Penduline Titmouse.**

**Description.—Male.**—Bill black, straight, a little elongated, and pointed; tail short; top of the head and nape pure ash-colour; forehead, space between the eye and the bill, region of the eyes, and feathers of the orifices of the ears dark black; back and scapulars reddish grey; rump ash-colour; throat white, the other lower parts whitish, with rosy tints; coverts of the wings chestnut, bordered and terminated with whitish rusty and white; wings and tail blackish, bordered with whitish rusty; tail-feathers terminated with white; iris yellow. Length 4 inches or 4½ lines.

**Female.**—Rather less than the male; the black on the forehead not so large nor so pure; the band which passes over the eyes and terminates at the ears, bluish black; ash-colour of the head less pure; upper parts more clouded with rusty, but there is a yellowish tinge on the middle of the belly. The young up to their first moult have the colours brighter; they have not the forehead black.

This is the *Rimin* or *Mésange de Pologne* of the French, and *Beutel Meise* of the Germans.

**Geographical Distribution.**—Southern and eastern provinces of Europe principally, Russia, Poland, Hungary, Austria, along the banks of the Danube, where it breeds, south of France and Italy.

**Habits, Food, &c.**—M. Temminck has placed this species together with the Bearded Tit in his second Section of Titmice, the *Riverains*; and indeed the Penduline Titmouse, both in habits and in the choice of its food, has many points in common with the other species above described. Like the Bearded Tit, the Penduline Titmouse haunts the reedy banks of rivers, or the marquis of wide-watered shores, and its food consists not only of the seeds of the reeds, but of aquatic insects and mollusks. It derives its name from its pen-like purselike or flask-like nest, generally suspended at the end of some willow twig or other flexible branch of an aquatic tree. This skilfully-wrought cradle is woven from the cotton-like wool or down of the willow or poplar, with an opening in the side for the ingress and egress of the artificers and their young, and mostly overhangs the water; sometimes however it is interwoven among the reed-stems. The eggs, which are pure white marked with some red spots or blotches, are generally six in number.

**Aasiatic Titmice.**

**Example.—Parus Xanthogenys.**

**Description.**—Head with a full crest of black feathers; occiput, supraoccipital stripe, and cheeks yellow; ear-coverts black; back olive; wings and tail black, the former spotted, and the latter tipped with white; a broad black line passing down the throat, and extending along the middle of the abdomen; sides of the chest and flanks pale yellow; bill and feet black; size rather less than that of the Greater Tit, *Parus major*. (Gould.)

**Locality, Habits, &c.**—The Himalaya Mountains; figured and described, in his 'Century of Birds,' by Mr. Gould, who remarks that the species bears a close resemblance to our *Parus major*, from which it differs principally in its crested head. He further observes that the brilliancy of its colouring is not surpassed by that of any of its congener, and that its mode of life strictly assimilates to that of the *Paru* in general.

**Parus Xanthogenys.** (Gould.)

**American Titmice.**

**Example.—Parus atricapillus**, Black-capped Titmouse.

**Description.**—Male.—Upper aspect of the head, nape, chin, and throat velvet-black. A white line from the nostrils through the eye, spreads out on the side of the neck; back lead-coloured, glossed with yellowish grey, quill and tail feathers blackish grey, edged with greyish white; under-plumage brownish white, deepening in some specimens to yellowish grey; bill pitch black; legs bluish; total length five inches six lines. (Panna Borelli-Americana.)

Some ornithologists have considered this bird identical with the Marsh Titmouse, *Parus palustris*, of Europe. M. Temminck in the first part of his *Manuel* declares that individuals sent to him from North America had absolutely the same distribution of colours on their plumage as those killed in Europe, only the hues of the American individuals were much more pure. In the third part, where he notices *Parus palustris*, and adds to its synonyms, he says nothing to contradict his original observation; and in the first part he gives *Parus atricapillus*, *La Mésange à tête noire du Canada* (Bris.), and the Black-capped Canada Titmouse (Lath.), as synonyms of *Parus palustris*.

Mr. Swainson and Dr. Richardson however, after referring to the opinions of those who have considered the European and the American bird as the same, state that the two species appear to them to be sufficiently distinct. According to them this tit is the *Parus atricapillus*, Linm., who by the way gives Canada as its habitat; *Mésange à tête noire du Canada*, Buff.; Black-capped Titmouse, *Parus atricapillus*, Wil.; *Parus atricapillus*, Bonap.; *Panthèr.*
by members of the Cree Indians; and the **Munsing** of the Canadian voyageurs: and they observe that its loose plumage, like that of the Canadian jay, is well qualified for its protection in the severe climate to which it is habituated, according to Nuttall, "**Chicadee**" is the familiar name for this bird.

**Geographical Distribution.**—Supposing the bird to be a distinct species. The whole width of the American continent is probably occupied by the **Chicadee**, with a possible extension into the United States, throughout the year: one of the most common birds in the far-countries, a small family inhabiting almost every thickset. (**Pica borealis-american**) In winter resident among Hudson's Bay, it has been met with at 62° on the north-west coast. Difficult to say in what part of the United States it is most common, so generally and equally has it colonized the temperate parts. In winter abundant in the forests of the southern states to Florida, and probably extending in the extreme north-west. The small, overworn, familiar **Chicadee** is very common in the small country.

**Habits. Food. Etc.**—The author last quoted gives a graphic description of the manners of this titmouse, which would suffer by an attempt to lay it before the reader in any other terms than his own.

In all these countries," says the observing author of the Electric of the Ornithology of the United States and of Canada," in autumn families of them are seen chattering, skimming through the woods, busily engaged in gathering their materials for their nest, and in providing food, among other objects, for the winter season. The various species, (**Pica bicolor**), Nuthatches, and Creepers, the whole forming a busy, active, and noisy group, whose manners, food, and habits bring them together in a common genus, are feeding on the trees, running over the sides insects, their larvae and eggs, of which they are more particularly fond, in the mount of September they leave the woods and assemble familiarly in our orchards and gardens, and begin to enter the strong cities in quest of that support which their native forests now deny them. Large seeds of many kinds, particularly those which are oily, as the sunflower, and pine, and spruce-kernels, are now sought after. These seeds, in the usual manner of the genus, are stored up in the trees and held against the branch until picked open by the bill to obtain their contents. Fat of various kinds is also greedily eaten, and they regularly watch the retreat of the hog-killer, in the country, to clean up the fragments of meat which adhere to the places where the carcases have been suspended. At times they feed upon the wax of the candle-berry myrtle (**Myrica cerifera**); they likewise pick up crumbs near the houses, and search the weather-boards and even the window-sills familiarly for their lurking prey, and are particularly fond of spiders and the eggs of destructive moths, especially those of the canker-worm, which they greedily destroy in all its stages of existence. It is said that they sometimes attack their own species when the individual is sickly, and aim their blows at the skull with a view to eat the brain; but this barbarity I have never witnessed. In winter, when satisfied, they will descend to the snow-bank beneath, and quench their thirst by swallowing small pieces; in this way, their various and frugal meal is always supplied; and hardly, and warmly clad in light and very downy feathers, they suffer very little inconvenience from the inclemency of the seasons. Indeed in the winter, or about the close of October, they at times appear so enlivened as already to show their amorous attachment, like our domestic cock, the male approaching his mate with fluttering and vibrating wings; and in the spring season the male has oblate ongencements, darting after each other with great velocity and anger. Their roost, I suspect, is in the hollows of decayed trees, where they also breed, laying their eggs merely in the dry rotten wood, without any attempt at a nest;* these are from 0 to 12 in number, white with specks of brown-red. They begin to lay about the middle or close of April, and though they commonly make use of natural or deserted holes of the woodpecker, yet at times they are said to excavate a nest by themselves with much labour. The first brood take wing about the 7th or 10th of June, and they have sometimes a second towards the end of July. The young, as soon as fledged, have all the external marks of the adult, the head is black, and they are altogether about with all the agility and self-possession of their parents, who appear, nevertheless, very solicitous for their safety. From this time the whole family continue to associate together through the autumn and winter. They seem to move by concert from tree to tree, keeping up a continual *'tse-de-de-de-de and 'tse-de-de-de-dall', proceeded by a shrill whistle, all the while busily engaged picking round the buds and branches, hanging from their extremities and proceeding often in reversed postures, head downwards, like so many tumblers, prying into every crevice of the bark, and searching around the roots and in every possible retreat of their insect prey or its larvae. If the Chicadee is to fall, they industriously descend to the ground and gian it up with the utmost economy.

* On seeing a cat, or other object of natural antipathy, the Chicadee, like the peevish jay, secludes in a loud, angry, and hoarse note, like *'tse, aligl, daigl, daigl*. Among the other notes of this species, I have heard a call-like *tse-de-jay, tse-de-jay*, the two first syllables being a slender chirp, with the jay strongly pronounced. The only note of this bird which may be called a song, is one which is frequently heard at intervals in the depth of the forest, at times of the day, usually, when other birds are silent. We then may sometimes hear in the midst of this solitude several feebly, drawing, clearly whistled, and rather melancholy notes, like *te-deery, and sometimes ye-perry*, and, occasionally, but much more rarely, in the same way, whispering, solemn tone, *jebi*. The young, in winter, also sometimes draw out these contemplative strains. In all cases the first syllable is very high and clear, the second word drops low, and ends like a feebly plaint. This is nearly all the quaint song ever attempted by the Chicadee; and is perhaps the two notes sounding like the whetting of a saw, remarked of this bird* in England by Mr. White, in his Natural History of Selborne (vol. i.). On fine days about the commencement of October, I have heard the Chicadee sometimes for half an hour at a time, attempt a lively, petulant warble, very different from his ordinary notes. On these occasions he appears to flirt about, still hunting for his prey, but almost in an ecstasy of delight and vigour. But after a while the usual drawing note again occurs. These birds, like many others, are very subject to the attacks of vermin, and they accumulate in great numbers around that part of the head and front which is least accessible to their feet.

The European bird is supposed to be partial to marshy places. Ours has no such predilection, nor does the American bird, that I can learn, even lay up or hide any store

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**N.B. Mr. Nutall has, here, the following note:**—"In Europe however this kind, if the same thing, as ascribed to Tommasi, is said to die out on an excision in decayed willows, in which it makes a nest of moss, thread- down, and sometimes a little wood and feathers."
of seeds for provision—a habit reported of the foreign family.

The Prince of Casino, a valuable authority at all times, but especially in this case, for he has enjoyed opportunities of comparing the American and European birds and their habits, notes Parus palustris and Parus atricapillus as distinct species, in his Birds of Europe and North America.

AFRICAN TITMICE.

Example, Parus niger, Vieill. (Parus leucoparius, white-winged Tit, Sw.).

Description.—Deep uniform glossy black with slight bluish reflection in certain lights, except the wings, on which the black is relieved by the snowy white of the lesser and greater coverts and of the quills. Total length nearly six inches.

Locality.—Abundant in the Caffre country, South Africa. Mr. Swainson (Birds of Western Africa) observes that Le Vaillant states that this species was never met with by him, either on the west coasts or near the Cape of Good Hope, but that this is very singular, since two specimens received from Senegal perfectly agree both with Le Vaillant's figure and description. Mr. Swainson remarks that the size of this bird is exactly that of Parus major, and that the structure is nearly the same, except that the bill is rather shorter and the culmen more arched; the feet also, he adds, are somewhat smaller, and their claws shorter, broader, and more curved.

Habits, &c.—Le Vaillant describes the note of this species, his Mésange noire, as the same with that of Parus major. The nest, he says, is made in the trunks of trees, where the bird also roosts. The pure white eggs, he adds, are from six to eight in number.

was in consequence detained there for several years. He did not return to Canton till 1794. After his return to Batavia, he was appointed governor of the Dutch factory in the vicinity of Chendamagore: how long he filled this office is uncertain.

In 1794 Titsingh was appointed by the government at Batavia, chief of the embassy which Van Braam, hoping to be himself appointed ambassador, had persuaded them to send to the court of Pekin. The mission left Canton on the 22nd of November, 1794, and reached that city on its return at the beginning of May, 1795. The ill-health of his predecessor, during the greater part of his residence in Pekin caused the discharge of the functions of ambassador to devolve in a great measure upon Van Braam. Not long after the termination of the mission Titsingh acquired a residence of about thirty-one years in the East. The involuntary prolongation of his residence in Japan had enabled him to obtain a greater amount of information relative to those islands than his predecessors, and the friendships he had contrived with several of the nobles enabled him to procure, at a later date, by their good offices, material additions to the collections he had made himself. He was acknowledged both by the Japanese and Chinese to possess a knowledge of the customs and manners rare in a European. He was esteemed by his colleagues for his business talents; and the literati of Europe who had applied to him for information had found in him a courtier courteous to strangers, and an gentle: consequently great additions to our knowledge of Japan were anticipated on his return to Europe. These expectations have been in a great measure disappointed. With the exception of information which he supplied to Bunsen, Japanese and others, nothing appeared during his life; and after his death, by a fever which he neglected, in February, 1812, his collections were dispersed; only a portion of his manuscripts, maps, and curiosities were ultimately recovered by M. Neven, who had become his purchaser of the fragments, published in 1819, in two vols. 8vo.: Cérémonies usitées au Japon pour les Mariages et les Funérailles, suivies de Détails sur la Poudre Doxia, et de la Préface d'un livre de Confounfe sur la Petit Filiale, traduit par M. de Doxias par feu M. Titsingh. In the introduction to these Memoirs the author states that many of the most distinguished Japanese are fully aware of the advantage their country would derive from an extended intercourse with foreigners. In 1829 M. Abel Rémusat published in 8vo., from the MSS. of Titsingh, Mémoires et Anecdotes de la Dynastie régnante des Djougons, souverains du Japon, avec la Description des Fêtes et Cérémonies observées aux différentes époques de l'année à la cour de ces Princes, et un Appendice contenant des Détails sur la Poésie des Japonais, leur Manière de dîner l'Année, &c. An English translation of these two works, by Frederic Shepperd, was published in 1823. The volumes edited by M. Rémusat, and the English translation, contain a catalogue of the books, printed and in MS., the maps, plans, coins, &c., collected by Titsingh. Among the MSS. are his journal of travels from Canton to Pekin; copies of letters addressed by him to various persons during the years 1790 to 1797; forty-six autograph letters addressed to him by Japanese functionaries and Roman Catholic missionaries; thirty-five autograph letters addressed to him by Volney, De Guignes, senior, and other eminent literary characters; and a letter of the official conduct of M. Titsingh. The publication of this report, the most important of these documents is very desirable; they are printed in such a manner that the character of the Japanese and the conduct of Europeans in these distant regions. The account of Titsingh's official conduct, and his journal while ambassador in China, might supply what is last untold by De Guignes and misstated by Van Braam in their respective publications. The twenty-fourth volume of the 'Annales des Voyages' contains an account of the island of Yesso, translated from the Japanese by Titsingh, and a Notice sur Japon, in Charpentier Casseigny's 'Journey to Bengal,' contains a rather inaccurate report of the Chinese mission. A meeting of the British and Dutch nation. The important work the Japanese Encylopaedia, in the 'Bibliothèque du Roi,' at Paris, was obtained from Titsingh. De l'Empire des Indes à Pekin, &c.; Mémoires, published at Paris, in 1819 and 1820; Van Braam's Account of the Dutch Embassy to the Emperor of
Titus fell dangerously ill after the death of his unfortunate friend, it was said and believed that he had drunk at part of that deadly potion by which Britannicus perished. Titus afterwards erected two statues to the memory of the companion of his youth. Possessed of uncommon beauty and vigour, and extraordinary talents, Titus distinguished himself at an early age. The first campaigns which he made as tribune militum were in Britannia and Germany. He first married Aricia Tertulla, the daughter of a Roman knight, and had two daughters. Later, in 1804, he married the proconsul of Syria, but they were beaten by M. L. Mic anus, the new proconsul of Syria, and T. Vespasianus, the father of Titus, who was the commander of the Roman army, which consisted of three legions. One of these legions was commanded by Titus, who, as much military skill as personal courage, especially in the siege and capture of the towns of Taricheae and Gamala (67 a.d.). During his sojourn in Palestine he loved Berenice, the daughter of Herod Agrippa.

[BERENCE (6).]

In the mean time the emperor Nero was murdered, and Galba succeeded (69 a.d.). In consequence of this event, T. Vespasianus, who at this time Titus was commander of the army of the province of Judaea, again the favour of the new emperor. Perhaps also Vespasianus wished to be informed of Galba's intention with regard to the war in Palestine, the command of the forces employed there, the state of affairs, and the other acquired great influence in the East. (Tacitus, Hist., ii. 1, and the notes to this passage in the edition of Gronovius, ii., p. 127.) The people said that Titus had some hope of being adopted by Galba, and did not enquire at all whether this was true or false. But although the motive of his going to Rome is rejected by Tacitus, the mere existence of such a rumour proves that Titus had already attracted the public attention. When Titus arrived at Corinth he was informed that Galba had been murdered, and had been restored, under such conditions, as Titus, and the imperial power was disputed by Vitellius and Otho. This event perplexed him. His commission being to congratulate Galba, he could not expect to be well received by Vitellius, by whose instigation Galba had been assassinated; nor did he deem it prudent to adhere to either of the imperial rivals before he had taken the advice of his father. He therefore returned to Judæa. There was a rumour that his love for Berenice was the secret cause of his return; but however strong his passion was, it never prevented him from doing his duty. On his way from Greece to Syria he landed on Cyprus, and there consulted the oracles in the temple of Apollo. There he obtained the answer, that he should return to Judæa, with regard to his voyage, and highly flattering to his ambition: Sostratus, the priest of the temple and reporter of the oracle, promised him the empire. (Tacitus, Hist., ii. 2. 5.)

Titus was one of the leaders of the new revolution by which Vitellius lost his power a short time after his victory over his competitor Otho at Brixellum. Full of filial admiration for the character of his father, Titus endeavoured to remove the only obstacle to his accession, which might have frustrated their plans, notwithstanding Vespasianus was at the head of three legions and a strong body of auxiliaries. This obstacle was, a serious miscarriage that had occurred in a letter between Titus and the proconsul of Syria. Titus succeeded in reconciling them. Their difference had chiefly a political character, yet Titus, by the mildness of his manner and the benevolence of his heart, gained many of his enemies over to his side. (VESPASIANUS; TIBERIUS ALEXANDER; VITELLUS.) Vespasianus left Judæa in the year 69 a.d. and the continuation of the war decided upon Titus. Domitianus, the younger brother of Titus, having incurred the displeasure of his father, Titus interceded for him with benefactors and presided at Gaicus, the army in Judæa, of which Titus was now the commander, consisted of six legions, twenty cohorts of allies, and a vast number of allies. VOL. XXV.—C
eight corps of cavalry, the troops of the kings Agrippa and Sohemus, the auxiliaries of King Antiochus of Commagene, and a small body of Arama. After a long siege, Jerusalem was taken by storm; the whole population, more than 600,000 men, was massacred; and the remainder of the Jews were dispersed over the world (2nd of September, 70 A.D.).

[Jerusalem.] In this memorable siege Titus distinguished himself both as a general and as a soldier, and it is said that he killed twelve men of the garrison with his own hand. He was created Caesar by Vespasianus, whose colleague he was in his first consulship; and he was again consul in 72, 74, 75, 76, 77, and 79. Vespasianus however recalled his son from Judaea. A report that Titus showed his himself master of the East, and this rumour had reached Vespasianus.

So universally was Titus beloved, that the army implored him either to stay with them, or at least not to go without them; but he obeyed the command of his father, and by his speedy return proved that those rumours were entirely unfounded. He celebrated a triumph together with Vespasianus, for their victories over the Jews, in commemoration of which a triumphal arch was erected, which is still one of the finest monuments of that kind existing at Rome. Titus was likewise tribune with his father, who esteemed him so much, that he allowed him more power in his province than was allowed to the other Imperial princes. (Suetonius. Titus. 6.)

During the reign of Vespasianus, various high functions were successively conferred upon Titus, whose character however surprised the people by the indolence of which he was accused. But in the general corruption of the capital. He was charged with acting rashly; he subjected himself to the reproach of having ordered the murder of Caecina, which was an act of cruelty, for though Caecina was guilty of treason, he had not been legally sentenced (Suetonius, Titus, 6); and he was generally reproached for taking money from those who solicited his intercession with the emperor. Of the other side however he remembered his father on those measures, which this very economical prince adopted for the purpose of improving the finances, which were exhausted by the dissipation of Vellutius. He was also charged with loss of men. Even he ordered Burence, who had followed him to Rome, to go back to Judaea, and he thus proved once more that his passion for her did not prevent him from doing his duty. The consequence of all this was, that the Romans, who, by the example of Tibetius, Caligula, and Nero, knew that the virtue of exalted men is exposed to great temptations and strange changes, feared that Titus would become a new proof of the truth of their experience.

No sooner did Titus become emperor by the death of Vespasianus, in 79 A.D., than he showed that all these fears were unfounded. His virtuous conduct was the subject of general admiration. During his short reign the empire was submissive, the provinces of Vespasianus were restored, the towns of Herculanum, Stabiae, and Pompeii, and carried ruin over the fertile coast of Campania (August 79 A.D.) [Pliny]; in 80 A.D. a confederation broke out in Rome, which lasted three days, and destroyed a great part of this city; the buildings on the Campus Martius, the Capitol, the library of Octavianus, were laid in ruins, and the Pantheum was damaged [Rome]; and no sooner had the people recovered from their consternation than a plague broke out, of which 10,000 persons died every day. Titus supported his unhappy subjects with the greatest liberality; he exhausted his treasures, and he ordered the property and estates of those who had perished without leaving heirs, to be disbursed among the sufferers, although the property was persons belonged to the fiscus, or the emperor's private purse. His liberality was so great that his friends reproached him for it; he answered, that it was not just that a sole empire should be exercised. He punished severely and exiled to the small barren islands in the Mediterranean those who followed the profession of false accusers [Tiberius Claudius Nero]; and he disliked the praetors, and the emperors before them. He punished severely and exiled to the small barren islands in the Mediterranean those who followed the profession of false accusers [Tiberius Claudius Nero]; and he disliked the praetors, and the emperors before them. 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TITUS, EPISTLE OF ST. PAUL TO. Little is known of the personal history of Titus, to whom this Epistle is addressed. His name is not even mentioned in the Acts of the Apostles, and all authentic information about him is derived from this Epistle. From these it appears that Titus was converted by St. Paul, and he is called his own son after the common faith ('1, 4), but when and where is not recorded. Accordingly there are various conjectures on this subject. This we know for certain, that Titus was (Acts, xv.; Gal., ii.) with St. Paul in Antioch before the first Council was held at Jerusalem, and that he was one of the party sent by the church at Antioch to consult the Apostles at Jerusalem, on the question whether it was necessary for the Gentiles converts to submit to circumcision after the manner of Moses. To this rite the Judaizing Christians at Jerusalem were anxious that Titus should submit; but St. Paul (Gal., ii.) informs us that he firmly refused to do so. After the Council, it would seem that Titus returned with St. Paul to Antioch, and subsequently accompanied him on some of his travels. At any rate, from the expression in 2 Cor., vii. 23, it appears almost certain that Titus assisted St. Paul in preaching the Gospel at Corinth. From 1 Cor., xiv. 6, compared with 2 Cor., vii., it is not improbable that Titus was also with St. Paul during his long residence at Ephesus (Acts, xix. 10), and that he was selected to be the bearer of the first Epistle to the Corinthians, which was written by St. Paul at Ephesus. On his return from Corinth, whatever might be the occasion of the visit alluded to in 2 Cor., vii., Titus met St. Paul in Macedonia, and gave him such an account of the Corinthian church, and of the effect produced by his first letter to it, as gave
him in highest satisfaction. (2 Cor. vii. 9-13.) Titus also appears to have been the bearer of the Apostle's commission to the Corinthians, when he was authorized to require them to finish their collections for the poor converts in Judæa, which they had begun during his former visit. From a.d. 58, when we suppose him to have been the bearer of the epistle to the Corinthians, to a.d. 62, we hear nothing of him: in the latter year, in all probability he was left by St. Paul in Crete, 'to set in order the things that were wanting, and to ordain elders in every city; and to供给 them that wereapt thereunto.' Titus left Crete after St. Paul's release from his first confinement at Rome, when he is supposed to have touched at Crete, and made some converts there, on his way from Italy to Judæa. Subsequently to this, Titus was requested by St. Paul (Tit. 1:1-14) to visit the city of Nicopolis in Epirus, on the coast of Greece, and there he was to wait for St. Paul. The date of the Epistle has been a subject of much controversy, some placing it as early as a.d. 52, and others as late as a.d. 65. From the striking verbal resemblances between it and the first epistle to Timothy, it is not improbable that they were written about the same time, and while the same ideas and phrases were present to the author's mind.

The genuineness and authenticity of the Epistle have never been disputed.

St. Paul's design in writing it was to instruct Titus in the discharge of the duties of his ministry as head of the church in Crete. Accordingly in chap. i. he gives Titus instructions concerning the ordination of elders, who were to be appointed for every city, and describes what qualifications they should possess, and also directs him to oppose the Judaizing teachers of Christianity, who seem to have been numerous in that island. In chap. ii. St. Paul informs Titus what precepts he was to inculcate, according to the age and circumstances of those whom he had to teach, and admonishes him to show himself a pattern of all good works, and an example of the doctrines which he taught. In chap. iii., he teaches Titus that he should be sedentary, without reference to principalties and powers, in opposition to the Jews, who thought it an indignity to submit to idolatrous magistrates; and also that he should enforce gentleness and meekness towards all men. He then concludes with a request that Titus would inculcate the necessity of good works, and avoid foolish questions; an injunction of the same kind as St. Paul gave to Timothy.

The design and objects of the Epistles to Titus and the 'Acts of the Apostle,' see Paley, 'Horse Paulensis,' pp. 357-367. See also Horne's 'Introduction to the Critical Study of the Scriptures,' vol. iv. p. 387; Macrae's 'New Testament,' vol. iii.; Collyer's 'Sacred Interpreter.'

Tit-Warblers, Mr. Swainson's name for a sub-genus of his subfamily Paritana [Tyrannidae], and considered by him as the second or typical division of the whole group. The species of this subgenus (Sylvicola) are, he observes, the true Tit-Warblers of America, so closely resembling the Worm-eaters (Furnivora, Sw.), that many writers have placed both in the same genus; but they may, he remarks, be readily detected by a slightly-arched bill, notched near the end of the upper mandible. 'The slender structure of their feet, the pointed form of their wings, and the scattered weak bristles of the mouth,' says he, 'are the distinguishing characters. In the mode of catching their prey must not be unlike that adopted by the true flycatchers, and such accordingly turns out to be the fact: they are, in short, lively, active, gaily-coloured little birds, and their songs are not without melody, and even Wilson considers some as belonging to the third of these families. Nor was the great American ornithologist very far from the truth, since they actually pass into the true Warblers. They are generally found in the great forest and mountain regions, where they are numerous, and can be obtained in great numbers in a few days. (Classification of Birds.)

The following is Mr. Swainson's definition of the subgenus Sylvicola, placed by him between Dymnaea and Vermicola, under the genus Sylvicola (Fly-catching Warblers).

Bill very slender, acutely conic; the tip of the upper mandible with an obsolete notch; base with a few weak bristles. Wings lengthened, pointed; the three first quills nearly equal. Tail nearly even; the feathers ending in soft points. Feet as in Stiphegna.

Example, Sylvicola minutissima.'

Mr. Swainson refers for a figure and description of this species, to 'Zool. Ill.,' p. 139. At the place referred to we find the Grey-backed Warbler, Sylvia plumbea, with the following description and figure:

Description.—Blue-grey, beneath golden yellow; back olive; wing-coverts tipped with white.

Mr. Swainson states that this bird is a native of Brazil, from whence it was received by Mr. Leadbeater.
other farms in fee, and different undivided eightys of many other lands in the parish.

Tiverton is said to be one of the largest boroughs in the kingdom, being about eleven miles in length, and nearly ten in breadth: the area is 20,000 acres, and it contains, according to the census of 1841, 1830 inhabited and 109 uninhabited houses; having a population of 10,041 inhabitants, 4649 males and 5393 females. The country on the west and north sides is very hilly and well wooded. The town is pleasantly situated on rising ground between the Exe and Lugg, and also on a well wooded islet called the Town Leat, which rises about 5 miles north of the town, and was, given about 1290, by the then countess of Devon, for the use of the inhabitants. On the west side of the river Exe is a large suburb called Westex, very extensive, and still being principally inhabited by persons engaged in woollen manufacture. One of the greatest attractions of the town is the trout-fishing in the two rivers. On the east side of the town is the Tiverton branch of the Great Western Canal, by which limestone, coal, culm, coke, etc., are imported.

The parish church, or at least part of it, was first built in 1073; consecrated by Leofricus, first bishop of Exeter; and enlarged and improved at various times by the families of Rivers and Courtenays previous to the fifteenth century. Between 1517 and 1529 John Greenway, an eminent merchant, rebuilt and enlarged the whole of the south aisle and south front, together with the elegant chapel bearing his name which he erected: the chancel screen still separates the chancel from the body of the church. The south front and porch (of which an engraving appeared in the Gentleman's Magazine), together with Greenway's Chapel, have lately been rebuilt, and the whole of the chancel is a fine Gothic structure, 156 feet long and 82 feet wide; and the tower is 27 feet square at the base and 116 feet high. St. George's Chapel, which was finished in 1308, is of the Doric order, and situated in a large part of the town. The tithes of the town and whole parish were granted, in 1146, by Baldwin de Rivers to the Clinkan monks at Exeter; but the parish was afterwards divided; for in 1257, as appears by the episcopal registers, there were as many as 4648 tons, or ecclesiastical portions, viz., three rectories (Clare, Pitt, and Tidcombe), and an impropriation (Priors), which Henry VI. gave to the provost and fellows of King's College, Cambridge, who still hold the tithes, and appoint a stipendary curate to perform a fourth part of the duty, although they deny their liability to do so. The tithes have lately been commuted: Clare at 565l.; Pitt, 505l.; Tidcombe, 750l.; Priory, 400l.; and certain small detached pieces of land, technically called All Fours.

There are still many richly-endowed charities in Tiverton. Bundell's free grammar-school was founded by Peter Bampfylde, esq., of Bampfylde, in 1593; the revenue has increased owing to the rise in the value of land, from under 100l. to about 1200l. per annum. There is now a surplus income of 500l. or 600l. a year. There are several fellowships, schoolmasterships, and exhibitions connected with this school at Cambridge and Oxford. There is also a free English school, founded in 1609 by Robert Comyn, alias Chilcott, the nephew of Bundell. A blue-coat or charity school, where a number of poor children of both sexes are educated and clothed, has lately been erected in lieu of an old building, and it is supported by various bequests. There is also a national school, just built, which is supported by voluntary subscriptions; and an elegant school is now being erected in Westex, to be put under the direction of the British and Foreign School Society. Among the miscellaneous charities are Greenway's almshouses, founded in 1517, for the support of five poor men, with eightpence weekly each; but the revenues are now so much augmented that there are eleven houses the inmates of which receive five shillings per week each, and ten of which the inmates have four shillings, and four additional almshouses are now built. There is also a charitable church founded by Walter Tyrell in 1568, the proceeds of which are employed in repairing Exe bridge, and the overplus distributed weekly in bread. There are many others of less importance; but it has been proved that if all the charitable donations had been properly looked after, there would not at present be any need of a poor-rate.

The woolen trade of Tiverton was formerly very extensive. From 1690 to 1696 there were only 2500 inhabit-

ants, whereas in 1851 the population had increased to 5000; and Dunford states, on the authority of Rixdon and Crompton, that Tiverton was the principal place in Devon for the making of kerseys, which were known all over the kingdom as 'Tiverton Kerseys,' and generally sent to the London market. In 1812, 8000 persons were constantly employed in the manufacture of woollen cloth, and the annual returns of the trade exceeded 300,000l.: but an extensive fire shortly afterwards destroyed property to the amount of a quarter of a million, the operatives were dismissed, and the trade never recovered to the extent of its former prosperity. After this the trade in kerseys gradually declined; but in 1890 the manufacture of mixed worsted serges was established, and by 1715 there was again a population of 6700, with a trade returning 350,000l.

The town is situated on a chalk formation, and is principally inhabited by farmers and laborers. The woolen manufacture, and as serges were supplant ed in Holland by the Norwich stuffs, the manufacturers engaged in making common duros, etc., for the Spanish and Italian markets. In 1790 there were 88 fulling-mills regularly employed, but the French revolution, and the long war consequent upon it, put an end to the foreign trade, and the improvement of machinery in Yorkshire has taken away the woolen manufacture. In 1790 however a large building was erected in Westex for a cotton-mill, but finally converted into a manufactory for spinning wool, which was afterwards woven into coarse fabrics for the East India trade and for the lower market, and it was shut up in 1815. In 1616 Mr. Heathcoat of Leigh, in consequence of the Luddite disturbances in that neighbourhood, removed to it with his beautiful machinery for making bobbin-net, for which he had obtained a patent. The spinning and weaving machinery having been made on it, the trade is still carried on to the great benefit of the town. It gives permanent employment to above 900 persons, besides temporary employment to several hundred as weavers. The town has no newspaper, several dissenting chapels, a theatre, union workhouse, and badly, which is about to be pulled down, and a building on an improved plan erected in lieu of it.

Soon after the fire of 1812, James L. incorporated a Tiverton Act, by which the mayor and borough were granted the charter franchise then conferred was confined to the corporate body (25 in number), and continued in that state until the passing the Reform Bill in 1832, under which the corporation was completely disfranchised, and taken by General Fairfax in 1845, when Sir Gilbert Talbot was the governor.

Cosway the painter was a native of Tiverton, and was born in the town. Peter delivered out of Prison, which he presented to the parish, and it was placed in the church in 1777; the celebrated Bamplidy Moore Carey, the sage king, who lived a century ago, was a son of the rector of Bickleigh, an adjoining parish, and ran away from Bundell's school to join the gypsies. Although nearly related to the most respectable families of the western counties, nothing could induce him to give up his connection with this singular people, and his adventures, dictated that it was too dangerous, and taken by General Fairfax in 1845, when Sir Gilbert Talbot was the governor.

The principal market is on Tuesdays, and is very abundantly supplied with live cattle, corn, meat, poultry, vegetables, and fruit; there is also a market on Mondays, Wednesdays, Saturdays, and two fairs. There is an annual meeting of the stewards and other gentlemen at the grammar-school about the last week in August, and on the two following days there are races and sporting course, in the castle meadows adjoining the town. The borough is divided into three wards: Westex ward, Castle ward, and Lowen ward, and the municipal body consists of six aldermen and eighteen councillors, out of whom the mayor is chosen; the recorder is, as in other cases, nominated by the crown; he holds a session four times a year, and is the judge of the court of record for debts.
T I V

under 100°. The town is well lighted with gas, and the streets are under the control of commissioners empowered by act of parliament, who keep them very clean.

(Communication from Tiverton.)

OLL, the antiques of a town of the Papal State, 16 miles south of Rome, situated on the slope of a hill on the left bank of the Anio, or Teverone, just above the spot where that river falls by a succession of rapids into the lowlands of the Campagna. Tibur existed as a town before the inundation of 771, lost in the obscurity of fabulous times. Virgil, in relating the wars of the Latins and Rutuli against Æneas, speaks repeatedly of Tibur. According to the old tradition, Tibur, seat of Castra Gallorum, was abandoned by Evander to the shore of Latium previous to the Trojan war, founded or colonized Tibur. Coras and Catillus the younger, two brothers of Tibur, fought against Æneas and his Trojan followers.

*Tum genialis fratre Tiburtia mons inspexit, quod Tiburtium dictum cognominibus genitus.

Catillus sequitse Coras, Argo tristitiam.

(Enda, vi.)

Pliny (Hist. Nat. xvi. 67) mentions three old oak-trees, existing in his time, which were reported to be older than Tibur, the founder of Tibur, and were consecrated to him. According to a passage in Horace (Od. i. 7), they were called the Manfulness of Tibur. As well as Virgil in the seventh book of the Æneid, speaks of the bane and grove of the Sibyl Albunea at Tibur, the oracles of which were consulted from the oldest times.

The Roman poet Lucan referred a castle of Tibur mentioned as one of the principal towns of the Latin Confederation. It stood where it still stands, on the left bank of the Anio, which river divided the territory of the Latini from that of the Sabini, and it was strong by its situation being surrounded on three sides by the valley of the Anio; its subsequent vicissitudes of Tibur and the other Latin cities, till their final subjection by Rome, 337 B.C., are noticed under Lati.

Upon one occasion the militia of Tibur joined the Gauls in the expedition against the walls of Rome, and spread alarm into the city, but they were repulsed. (Livy, vii. 12.) After the final defeat of the Latins, Tibur was deprived of part of its territory, which was seized by the Romans. During the Samnite wars the Romans made a road from Tibur over the Apennines to the country of the Peligni, which was called Via Valeria. The aqueducts of the Anio vetus and Anio novus, and of the Aqua Marcia, which supplied Rome with wholesome water, passed through the territory of Tibur, where their remains are still seen. The healthy and romantic situation of this district induced the wealthy Romans to construct in it handsome country residences. Scipio Emiliani, Metellus Numidicus, and Manlius Vipsanius, had their Tiburtine villas. The families of the Munatii, the Coponii, and the Plautii, which flourished at Rome in the latter times of the republic and under the first emperors, were from Tibur. The mausoleum of the Plautii is still seen at Ponte Lucano, a few miles from the town on the road to Rome. It is in the shape of a massive round tower, like that of Cecilia Metella outside of Rome, with an inscription, which however is said to be of much later date, to M. Plautius Silvanus, who served under Titus in the Ilyrian war (A.D. 10). G. M. Zappi, who lived about the middle of the 19th century, describes, in his Annali di Titivoli, this monument, as it then was, in better preservation than it is at present.

Augustus used to visit his favourite Macenas at his villa at Tibur, and Suetonius (Octav., 72) mentions his holding the tribunal under the porticoes of the splendid temple of Hadrian at Tivoli, which is still seen behind the choir of the modern cathedral, which has been partly constructed with the materials of the antient temple. Gelius (xix. 5) mentions a public library as ancient at Tibur, said to have been a series of rooms or places of resort, and he had a country-house in the neighbourhood, distinct from his Sabine farm at Digentis.

The emperor Hadrian constructed near Tibur a magni-

ficient villa, of which extensive remains are still seen. It contained imitations of the works of art and of the beauties of nature which he had seen in his travels throughout the empire. Under his reign Gelius, a native of Tivoli, and his wife Simphoros, with their seven sons, being converts to the Christian doctrine, are said to have suffered martyrdom, according to Baronius, Tillemond, and other church historians. Under Aurelian, the famous Zenobia, queen of Palmyra, after having followed the triumphal procession of her conqueror, was by order of the senate banished to Tibur, where she is said to have lived many years in complete seclusion. In the reign of Pope Marcellus, who belongs to the fourth century, was a native of Tibur.

In the year 542 the Goths under Totila took Tibur by surprise, and almost annihilated most of the citizens, and threw the bishop. During the Longobard dominion in Italy, Tibur was included in the duchy of Rome, subject, at least nominally, to the emperors of Constantinople, and afterwards, to Charles the Great, and his successors of the Carlovingian dynasty, and while the crown of Italy was an object of contest between various pretenders, Tibur, like most other towns of central Italy, governed itself as a municipal community. Its territory, however, extended to the westward about half-way between Tibur and Rome, embraced in the opposite direction the whole valley of the Anio as far as the borders of Naples. But the abbots of the wealthy Benedictine monastery of Sublaqueum, now called Sibicasio, having assumed the civil jurisdiction over extensive domains, villages, and castles, in the upper part of the valley and the adjoining highlands, of which he had already, by various grants, the 'ulimum dominium,' the monks thereupon entered into a conflict with the Roman nobility and the people of the town. After a temporary compromise between the parties, effected through the mediation of the pope, the Tiburtines resorted to arms, about A.D. 1123, took several castles, from which they drove away the monks and their plain-at-arms, and all sort of feudal warfare was carried on for several years, until 1128, when the abbots of Sublaqueum surprised the castle and village of Poggio, which was colonized by the Tiburtines; and after a desperate stand, in the streets and houses, the place was taken and destroyed. After this a truce was concluded between Tibur and the abbots. In 1141, during the schism between Innocent II. and the anti-pope Anacletus, the Tiburtines, under the archbishop, and after the latter, the bishop, had had frequent border quarrels with their Tiburtine neighbours, seized this opportunity to assail their town with a considerable force. While they were trying to break open one of the gates of the town, the inhabitants turned off part of the waters of the Anio, and made them fall with overwhelming force down the declivity upon the assailants, part of whom were swept away; and the citizens, sallying out at the same time, routed the remainder of the besiegers, who ran away, having been driven behind the walls of Rome. It was due to the cause of that deadly animosity of the Romans against the Tiburtines, which continued for more than a century after. In the following year, 1142, the people of Tibur, being in the full possession of their town, which they had taken peace with Pope Innocent, and they swore allegiance to him, which so incensed the Romans, who were bent upon the destruction of Tibur, that they rose in arms against the pope, restored the senate, and proclaimed the republic. In 1145 Pope Eugenius III. took refuge at Tibur from the turbulence of the Roman people. During the subsequent dissections between the emperor Frederic L. and the pope, the people of Tibur seem to have remained faithful to the latter, and they joined the Roman nobility in an attack upon Tusculum, the inhabitants of which had taken part of the emperor, which ended in the total destruction of that antient city, A.D. 1191. The Tiburtines obtained a large share of the spoil. The movement was not hostile to the papacy, for in his wars against the pope, held for a time possession of Tibur. After a course of desultory warfare between Rome and Tibur, a treaty was concluded and signed by the masters of both towns, in August, 1220, entitled 'Capitulorum et Instrumenta inter Romanum Populum et Populum Tiburtinum,' by which the city of Rome secured the right of sending to Tibur a count, rector, or podesta, as political magistrate, who was to reside at a house in the town of Tibur, which was to serve to observe the municipal statutes of the town of Tibur; but the judges, the captain of the militia, and the councillors of the commune, continued to be chosen by the citizens of Tibur as heretofore. The town of Tibur was to pay to the see of Rome an annual tribute of a thousand 'libra' (about two hundred dollars). After this the people of Tibur, though often distracted by the factions of the Guelfs and the Guelphines, the Colonna and the Orsini, which desolated for more than a century the Campi-

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pagna and the neighbouring districts, remained upon the whole attached to the pope; and they even fought for Urban VI. against the Onini lords of Vicovaro and Tagliazucchi, whom they defeated in 1381. Pope Pius II. built a castle at Tivoli, which remains nearly on the head of a district of the comarca or province of Rome, which district, according to the last census, contained 55,825 inhabitants, and includes most of the old territory of Tibur. It is one of the few ancient towns of Latium which stands on its ancient site; and the modern representatives of Tusculum, Prenesti, and Albano are no longer on the spot of those ancient towns. The temple of Vesta, vulgarly called ' Della Sibilla,' with its Cyclopean pillars still occupies its commanding position; the temple of Hercules has been transformed into a cathedral; the Roman road, or Via Tiburtina, crosses the town; the Roman bridge called Ponte Celio, or Ponticelli, is still extant. There are considerable remains of the Villa of Massenzio near the Castellane. Remains of that of Quintilius Varus are shown near a church called Quin- tilio. Another round temple, vulgarly styled 'Della Tosse,' or of the goddess Tis sia, is outside of the Roman gate.

Tivoli is a bishop's see: it has a college, and a town library of about 6000 volumes, the gift of the Cavaliere Bischi, a native of the place; several manufactories of iron, leather, and leather goods; and about the open ground round the palace, which was built by the Persians, and from which the whole of the surrounding country could be seen, especially the plain of the Casitrus. (Strabo, xii. 262.) Tacitus (Annales, i. 47) speaks of a town Timolos, which was destroyed by an earthquake in the reign of Augustus. This town seems to have been situated either upon or near the mountain. Ernesti, in his note upon the above-mentioned passage of Tacitus, says that this town is also mentioned by Herodotus (i. 84); but Herodotus is speaking of the mountain, not of the town. The Mesomolitica, as the name indicates, inhabited the central part of the mountain. (Pliny, Nat. Hist., xii. 30.)

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Example, *Bubo vulgaris*, the common toad. (Europe—Japan.) [Frosos, vol. ii., pp. 490, 491, 493, 498.] MM. Duméril and Bibron (Ergän-

zungen) make the Buluniform family of the Anuros Plan- gregloss Batrachians (Anoura Planoglossae) consist of the following genera:

Dendrobates, Wag. (Hylacidia, part, Boie, Tschudi.)

Example, Dendrobates tinctorius (Cayenne).

Rhinoderma, Dum. and Bibr.

Example, Rhinoderma durincini (Chili).

Ateleopus, Dum. and Bibr.

Example, Ateleopus flavescens (Cayenne).

Buto, Laur.

Example, Buto vulgaris, the common toad. (Europe—Japan.) [Frosos, vol. ii., pp. 490, 491, 493, 498.]

MM. Duméril and Bibron (Zoologisches Journal) make a new Desmognathus (Montevideo.)

Example, Brachycephalus, Fitting. (Ephippifer, Cott.)

Example, Brachycephalus ephippium, Fitting. (Brazil, Guyana.)

Hyladactylus, Tschud.

Example, Hyladactylus balaenus (Java).

Electropus, Dum. and Bibr.

Example, Electropus pictus (Manilla).

Engystoma, Fitting. (Micops, Wagl.; Stenechopus, Tschud.)

Example, Engystoma ovolae (Surinam, Buenos Ayres).

* * *

Example, Uperodon, Dum. and Bibr.

Example, Uperodon marmoratus (Montevideo, Indian Peninsula).

Breviceps, Merrem (Engystoma, part, Fitting; Systema, Wagl., Tschud.).

Example, Breviceps gibus (South Africa, near the Cape of Good Hope).

Rhynophrynus, Dum. and Bibr.

Example, Rhynophrynus dorsalis (Mexico).

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Example, Dendrobates tinctorius (Cayenne).

Rhinoderma, Dum. and Bibr. Example, Rhinoderma durincini (Chili).

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Example, Hyladactylus balaenus (Java).

Electropus, Dum. and Bibr.

Example, Electropus pictus (Manilla).

Engystoma, Fitting. (Micops, Wagl.; Stenechopus, Tschud.)

Example, Engystoma ovolae (Surinam, Buenos Ayres).

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Example, Uperodon, Dum. and Bibr.

Example, Uperodon marmoratus (Montevideo, Indian Peninsula).

Breviceps, Merrem (Engystoma, part, Fitting; Systema, Wagl., Tschud.).

Example, Breviceps gibus (South Africa, near the Cape of Good Hope).

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species of this family exist in all the five parts of the world, where they are distributed in a manner not less unequal than the Raniform and Hyliform species, and, always, with a greater proportion for America, whilst the smallest portion of them belong to Europe, which has not even a single species peculiar to itself. For these two there found, the Common Toad and the Green Toad (Bufo viridis, Laur.), also inhabit Africa and Asia, which produce moreover, the one Bufo pantherius and Breviceps gibbosus, the other Electrophus pictus, Eugyntoma ornatum, Hylaecactylus basilus, Uperodon marmoratus, and Bufo crassatus, scaber, loboperculatus, toos, and asper.

Oceania, which, after America, is, they observe, best furnished with Hyliform species, and where two of the Raniform family are found, has not hitherto yielded more than a single Bufoniform species, viz. Phryinus Australia.

America, besides six species of Bufo, viz. stramosus, melamotis, muscians, America, margaritifer, d'Orbigny, and Lescanenti, furnishes Dendrobates tromicies, obscurus, and pictus; Rhinoderma Dumontii; Atelopus flavocanis; Phryinus nigricans; Brachycephalus ephippium; and Eugyntoma ossi, Carolineia, rugosum, and microaps.

Mr. Darwin, speaking of the Fauna of the Galapagos Archipelago, says, 'Of snakes there are several species, but all harmless. Of toads and frogs there are none. I was surprised at this, considering how well the temperate and damp woods in the elevated parts appeared adapted to their habits. It recalled to my mind the singular statement made by Bory St. Vincent, namely, that none of this family are to be found on the volcanic islands in the great ocean. There certainly appears to be some foundation for this observation; which is the more remarkable, when compared with the ease of lizards, which are generally among the earliest colonists of the smallest isles. It may be asked whether this is not owing to the different facilities of transport through salt-water, of the eggs of the latter, protected by a calcareous coat, and of the slimy spawn of the former.' (Journ.)

Fossil Toads.

Here may be noticed the fossil species from the (Eingan beds—Bomblimor Cimneyssel, Azzan. (Peleo- lagus Agassiz, Tschud.), and Palaeophysis Gessneri, Tschudi. (See Classification der Batrachien, von J. J. Tschudi, pp. 84, 89, tab. 1, ff. 2, 3.)

TOA.

TOAD, GIUSEPPE, a celebrated Italian geographer and meteorologist, was born in 1719 at a small village near Vicenza. After having received the usual rudiments of education, he was sent to the University of Padua, in order to qualify himself for the priesthood by the study of literature and theology; and while there, a taste for natural philosophy, and particularly for astronomy, induced him to devote a considerable portion of his time to the pursuit of those branches of science; this pursuit he continued, during the intervals which his pastoral duties afforded, after he had quitted the university and became the curate of a village in the neighbourhood.

In 1762 he was appointed professor of physical geography and astronomy in the same university, and immediately availed himself of the influence which his appointment gave him to obtain the grant of a building which might be occupied as an observatory; in this he succeeded, and he himself, as the owner of an antique tower, he placed in it all the instruments which he collected in his travels. In this building he made a series of astronomical observations, in continuation of those which had been made about forty years previously by Poleni; and the first thunder-rod erected in the Venetian dominions was one which Toaldo applied to the same building.

He died suddenly at Padua, in December, 1798, in consequence of a fit of apoplexy, which was supposed to have been brought on by excessive exertion.

The Abbé Toaldo applied himself to the study of mathematics only as far as this branch of science is applicable to geography. In 1769 he published at Padua a treatise on plane and spherical trigonometry, with a collection of tables; and at Venice, in 1773, a tract entitled 'Compendio della Storia e di Geographia.' In 1782 he published his Saggio di Studi Veneti nell'Astronomia e Geografia,' and a few years afterwards, his method of finding the longitude of a place by an observed transit of the moon; in 1783 appeared his Trattato di Gnomonica,' and in 1791 a work entitled 'Schedismata Astronomica.'

In 1776 he gave, in a letter to Mr. Strange, the British resident at Venice, an account of a great terrestrial magnet, which he drew from the observations of Signori Temanza, an Italian architect and engineer. From this account it appears that the tides in that sea are at their greatest height in winter; that the heights of the spring-tides amounts to between 3 and 4 feet, while the neap-tides scarcely exceed 3 inches. (Phil. Trans., vol. lvii.)

The attention of Toaldo was strongly directed to meteorology at a time when this branch of natural philosophy was but little studied; and he is the first who took notice of the supposed connexion of atmospheric phenomena with the movement of the moon in the orbit. Having observed that those phenomena appeared in nearly the same order at the end of every eighteen years, he drew up tables exhibiting the state of the weather during three such periods; and an account of his system was given in a paper entitled 'Le Saron Meteorologici,' etc., which is contained in the 'Journal de Rouvier' for 1782.

In 1779 Toaldo published a tract entitled 'Saggio Meteorologico sulla vera Influenza degli Astri,' and two years afterwards, a tract concerning the method of projecting buildings from the effects of lightning; he also published, in 1775, a work on the application of meteorology to agriculture.

Toaldo wrote a life of the Abbé Conti, which was prefixed to an edition of the works of that philosopher and poet, who had been his instructor.

TOBACCO, the common name of the plants belonging to the Monopetalous genus Nicotiana. Tobacco was the name used by the Caribees for the pipe in which they smoked; but this word was transferred by the Spaniards to the herb itself. The genus Nicotiana contains about forty species, most of them yielding tobacco for smoking, and many of them cultivated in the gardens of Europe. The name Nicotiana was given these plants after Nicholas, of Nimes, in Languedoc, who was an agent of the king of France at Portugal, and there procured the seeds of the tobacco from a Dutchman who had procured them in Florida. Nicot sent them to France in 1560.

The species of Nicotiana are most of them herbs, rarely undershrubs, and generally clothed with clammy hairs or downy terminal, much branched, 5-cleft, and of a white, green, or purplish colour. The calyx is rounded, permanent; corolla funnel- or salver-shaped, divs. 5, plicate and spreading; stamens 5, as long as the tube of the corolla; anthers dehiscing lengthwise; stigma glabrous; capsule 3-celled, 2-valved, valves lappated; seeds minute, numerous.

N. Tubarum, Common Virginian or Sweet-scented Tobacco, is an herbaceous plant, with acuminate, oblong, lanceolate, sessile leaves, lower ones dentate; throat of
The tobacco plant, a native of the West Indies, was first brought to Spain and Virginia, where it became acquainted with its properties. The species varies in size and form of their leaves, as well as the colour and form of their corollas. For an account of the properties of this species, see Nicotiana tabacum.

N. Macrophylla, Orinoco Tobacco, is an herbaceous garden plant as an ornament. It is also largely cultivated in Europe for the purpose of smoking. The other species are however in some cases preferred. Schrank has described a large number of varieties of the common tobacco, and has given names to many of them; through the corolla inflated, segments short, pointed. It is a larger plant than the last, the stem rising from five to seven feet high. It is a native of America, and is frequently used for smoking, under the name Orinoco tobacco; it is however inferior to the last; the milder Havana cigars are said to be made from it.

N. Rustica, English Tobacco, has an herbaceous square stem, with petiole ovate, quite entire leaves, tube of corolla cylindrical, longer than the calyx; segments of the limbs roundish, obtuse. This plant is a native of Europe, Asia, Africa, and America. It is called English tobacco because it was the first species that was introduced into this country; it was therefore cultivated from America. It grows very well in this climate, and in some places is almost naturalised. It is known in France as tabac pausse, in Germany as Bauer tabak, and in Spain as Tabaco cimarron. Tobacco grows on the coast of the Mediterranean, and thence finds its way into India, where it is highly valued. The tobacco of Salonica and Latakia, which are much esteemed, appear to be the produce of N. rustica. From the extensive range of climate and difference of situation which this plant occupies, its characters suffer considerable change; hence a number of varieties have been described. In the shops this tobacco is known as Turkish Tobacco.

N. Persica, Shiraz Tobacco, is an herbaceous plant, cultivated in Europe, its stem long, with very few leaves of the smaller size, and long, those of the stem acuminate and sessile; corolla salver-shaped, with long tube, and rather unequal segments. This plant is a native of Persia, and furnishes the famous Ceylon Tobacco. This tobacco is milder than that produced by the N. tabacum, and but a small quantity is consumed in this country. The English smoke more of the strongest tobacco than any nation in the world.

There are several other species of Nicotiana which are used in the places where they naturally grow for smoking. N. quadrivalvis has capsules with four valves; it grows on the Missouri river, and is there smoked by the natives. N. multivalvata has capsules with many valves; it is cultivated by the Indians of the Columbia river, and smoked. It is a small plant, and the calyx, the most valuable part, is selected by the Indians for smoking. N. sando, a small species of tobacco, is a native among the Indians of the coast of North-west America, by the Indians. N. repanda is a native of Cuba; and is said to furnish the tobacco for making the small cigars known as Queen’s.

Cultivation.—The cultivation of tobacco is most extensively carried on in the United States of North America. It requires considerable heat to come to perfection; but with care and attention, and by treating it as an exotic, it may be very extensively cultivated in many colder climates. The least frost injures it; but this is the case with many plants, which are nevertheless successfully cultivated in the northern part of Europe. The seeds of the tobacco are sown in a prepared bed, and be carefully protected from the least frost; for which purpose straw and fern are used, as is done by the market-gardeners who raise early culinary vegetables. When the danger of spring frosts is over, they may be safely transplanted; and if fully cultivated in a rich soil, they will arrive at maturity before the frosts of autumn, as is the case with potatoes, buckwheat, and many other plants which are natives of warmer climates. To accelerate the growth of the tobacoo plant, they should have been deeply trenched, and highly impregnated with manure for some time before; for fresh dung, especially that of horses, would impart a rank disagreeable flavour to the leaf. It is therefore by a preparatory course of high cultivation, and by bringing the soil to the state of a rich garden mould, that tobacco may be cultivated without much fear of damage. There can be no doubt that, if not for the fiscal restrictions arising from duties imposed upon tobacco by almost every government, the cultivation of this plant would be greatly extended, especially on a small scale, by cottagers and gardeners.

In Holland, of which the climate differs little from that of Great Britain, tobacco is cultivated to a very great extent, even in very poor soils, by great attention to manuring, and by accelerating its growth by the plant, which is sown in a well-prepared seed-bed in March, and protected by mats laid over hoops as long as the nights are cold and frost is dreaded. The ground in which the tobacco is to be, is ploughed up in March or early in April; the seed is sown between them, which are dug out deep, as is done with asparagus-beds, and richly manured with sheep’s dung. These beds are two feet wide at top, and two feet six inches at bottom, with sloping sides to keep the earth up; the intervals are only six or eight inches, and serve not only as drains to keep the beds dry, but as paths from which the surface of the beds may be stirred and weedless. Two rows of plants about eight inches high are planted at equal distances along the bed; the rows are sixteen or eighteen inches apart, and the plants at the same distance from each other. In warmer climates the plants are placed three feet apart, as there they grow to a much larger size than in England. It is essential that they be prepared for transplanting. The plants are taken up carefully with a small spade or trowel without shaking the earth much from the roots; they are placed slanting in a shallow basket, and thus carried to the prepared beds; they should be visited very frequently, and have a stem of at least eight inches high. They are inserted into holes made by a proper instrument, so that the fibres of the roots and the adhering earth may be completely buried up to the bottom of the stem; four or five plants are thus set in each of the holes, which may be pinched off. If the ground was sufficiently moist, and no great heat or strong sunshine with the plants, they will scarcely appear to have suffered from the removal; those which are thus transplanted will require no further care except pinching. The plants are left in the seed-bed for that purpose. Great attention must be paid to the beds all the time the tobacco is growing; weeds must be carefully eradicated, and the earth repeatedly stirred between the plants with hoes and narrow spades to accelerate the growth. When the leaves acquire a certain size, the lower leaves should be pinched off, to increase the bulk of the upper: for the former are apt earlier than the latter to have acquired their full growth. A fine tobacco plant should have from eight to twelve large succulent leaves, and a stem from three to six feet high; the top should then be pinched off to prevent its running and drawing the sap from the leaves. Every lateral shoot which may be formed should be removed, and thus the plant prevent branching. A few plants are left for seed, and of these the heads are allowed to shoot the full length. The seeds are small and so numerous on a plant, that a large proportion is taken away by the birds. The tobacco is an annual crop. The plantations of tobacco are continually examined, and every leaf injured by insects or otherwise is pulled off. Tobacco takes about four months from the time of planting to come to perfection; that is, from May to September, when the leaves are gathered before there is any danger from frost: one single white frost would spoil the whole crop and cause it to rot. As soon as the colour of the leaves becomes of a paler green inclined to yellow, and when the whole plant has assumed a dust-like appearance, and emit a stronger odour, and they feel rough and somewhat brittle to the touch. When the dew is evaporated and the sun shines, the leaves may be most advantageously gathered. The leaves are then laid on the ground, and if properly cured down, they may be spread over the ground, or even a little under the surface. They are left on the ground to dry till the evening, taking care to turn them often, that they may dry equally and more rapidly. Under the sun, which would injure them, and laid up under cover in heaps to sweat during the night: and some mats are thrown over the heaps to keep in the heat. If they are very full, they should be turned over and slightly spoiled, which would help them, and laid up under cover in heaps to dry in the sun; but most commonly they are left to sweat for three or four days, and then moved and hung up to dry in sheds or buildings made for the purpose, like those in which paper is dried in the paper-mills, which allow a thorough draught of air, but keep out the rain.
Every tobacco plantation has such buildings, proportioned to the extent of the cultivation. The floors are most commonly only the soil on which they stand; but it is much better if they are boarded, because on the earth the plants are more injuriously affected by moisture, and the tobacco is more liable to diseases. In some places the leaves are now stripped off the stems and strung on pickthatch to hang them up to dry. In others the whole plant is hung on pegs placed in rows extending across the building. All that is required is to place as many plants as possible without their being so near as to prevent the circulation of the air between them. When the plants are quite dry they are removed in moist or foggy weather; the manufacturers do not like to have the plants dry in the air or dust. They are laid in heaps on hurdles and covered over, that they may sweat again, which they do but slowly. The heaps are carefully examined from time to time to see that they do not get too much heat; and, according to the season and the nature of the plants, whether more or less filled with sap, they remain so a week or a fortnight. This part of the process requires much attention and experience; for whether they do not heat to the proper degree or too much, in either case the quality is impaired. An experienced tobacco grower will ascertain the proper degree of heat better with his hand, than the ablest chemist could do with his thermometer. If the leaves were not stripped off at first, while they were yet on the stalk, and not opened, is there no advantage to be gained now, when the proper fermentation is completed, and sorted; those which grow on the top of the stem, in the middle, and at the bottom, are laid separately, as being of different quality. The leaves tied together in bundles of ten or twelve leaves, and again in the rank order, where they are ranged in casks horizontally, and pressed in, by means of a round board, by lever or screw, as soon as a certain quantity has been laid in; the pressure is equal to that of a weight of several tons. This is essential to the safe transportation of the tobacco, and it is thus that the great bulk of it arrives from the places where its cultivation is most extensive, as in America.

The lever is hence made into rolls, which from their shape are called cattails. The leaves are placed together in large handfuls, and wound very tightly round by strips of fibrous wood or strong grass; at a time when the air is somewhat moist; they partially consolidate, and require only to be rapped to make the finest and most genuine stuff, or rapped, as it is called. The snuffs commonly sold however are manufactured and prepared in a much more complicated manner.

The refuse stems of the tobacco are sometimes burned; but it is best to let them rot in the ground, where they are converted into good manure for the next crop. From the high state of cultivation of the land, it is left very rich for any other crop after the tobacco; but as this is quite a guaranteed profit, and the labor force is readily available on the same ground; the abundant manuring and deep trenching prevent any bad effects from this frequent recurrence.

Manufacture.—Tobacco is packed in hogsheads for shipment; they carry their elastic reduction with them, and are laid separately. They are ranged side by side, and the direction of the points of the leaves is reversed with every alternate row. When the cask is about one-quarter filled, the tobacco is compressed by a powerful lever-press, which reduces the thickness of the layer from about twelve inches to three; and the pressure is continued several hours, that the tobacco may become so consolidated as not to spring up again when it is removed. In this way the cask is filled until it is filled. This is done alternately of the tobacco-leaves so dense and compact, that a hogshead forty-eight inches in length, and thirty or thirty-two inches in diameter, will contain one thousand pounds.

P. C. No. 1584.

If it be found that, from defective packing, from the action of sea-water, or from any other cause, part of the surface has become so injured as not to be worth preserving, such part is removed, with large powerful cutting instruments, called outlet-screw, which enables the outlet to acquire considerable power, owing to the intense compression of the tobacco, especially upon the cylindrical sides of the mass, where the cutters act across the direction of the stalks or leaves. The damaged tobacco thus removed is consumed in a furnace on the premises, its chimney, is jocularly termed the 'queen's tobacco-pipe.' The remainder of the mass is accurately weighed, and then returned into the hogshead.

The tobacco-leaves into the numerous varieties of tobacco for smoking in pipes—consisting of the leaf cut up into shreds or filaments, and usually divested of the stalk; into cigars, which are bundles of the tobacco-leaf rolled compactly together into a convenient form for smoking; and into snuff, which consists partly of the stalks of the leaves, and partly of the leaves themselves, cut and ground into the state of powder—is usually conducted by three distinct classes of individuals. The preparation of tobacco, properly so called, claims the first notice.

The first operation performed upon a hogshead of tobacco, after it has been removed to the manufactury and sorted out of the bundle, is the cutting of the tobacco with a cutting instrument. The pieces thus detached are then sprinkled with water, which facilitates the separation of the small bundles from each other, and also of the leaves composing each bundle. If the tobacco be of the kind called 'hand-cut,' that is, not cut into shreds or filaments, the leaves are rinsed, and pressed in casks horizontally, and pressed in, by means of a round board, by lever or screw, as soon as a certain quantity has been laid in; the pressure is equal to that of a weight of several tons. This is essential to the safe transportation of the tobacco, and it is thus that the great bulk of it arrives from the places where its cultivation is most extensive, as in America.

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blade, rather longer than the width of the cake, and is pivoted on a hinge or fulcrum at one end, the other rising and falling in proportion of the pressure. The depth of the cake is about two inches, and the thickness of the film taken off by each stroke, and consequently the fineness or coarseness of the filaments of tobacco, is regulated by alterations in a train of cog-wheels. Other machines have a revolving wheel which is turned by the motion of a revolving wheel to cut the tobacco in a similar manner to the action of a chaff-mill; but the writer is not aware that such have been brought into use.

The manner of compounding tobacco to color to account for the different qualities and appearance of the various numbers of tobacco used for smoking. Tobacconists raised in various places naturally present some points of difference; variations are known, appearing in different parts of the same crop; and the retention or rejection of the stalk, the nature and extent of the moistening, and the degree of fineness of the fibres, occasion still further differences. These varieties it is needless to notice further, unless the coarse variety called 'shag,' which is used both for chewing and smoking, be deemed a sufficient exception. It is formed of the darkest-coloured leaves, well liqueored, which darkens them still more.

The writer for 'The Tobacco' claims notice: it is that known as 'pigtail tobacco,' and consists of a rope or cord, about as large as the thicker end of a tobacco-pipe, and as long as the manufacturer can conveniently make it. It is produced by a process similar to spinning, and requires the labor of a man and several yards in length is made use of, with a spinning-wheel at one end, turned by one of the boys. The other boy arranges a number of dare leaves, with the stalks removed, and puts them on the bench, taking care to lay them smooth and open; and the man immediately follows him, and rolls up the leaves into the form of a cord by a peculiar motion of his hand. As fast as this is done, the finished roll is wound upon the spinning-wheel. It is then taken away and put on the other end of the machine, to a frame connected with it; and subsequently it is wound or twisted up into a hard close ball, and darkened by steeping in tobacco-water.

The business is exceedingly simple. One man and boy, with a quantity of unstrapped leaves before him, takes them one by one, strips them as before described, and then passes them to the cigar-maker, who is seated at a low stool in front of a low work-bench, which has raised ledges on every side excepting that nearest to him. He takes a leaf of tobacco, spreads it smoothly before him on the bench, and cuts it to a form resembling one of the oroles or stripes of a balloon. He then lays a few fragments on it, and puts it into a machine, and the whole goes into a form nearly resembling that of a cigar. The next operation is to place the partially filled cigar in an iron mold, which cuts it to a given length. The maker then lays down a leaf upon the mold, and rolls the cigar spirally in it. All this is done with great rapidity, a few seconds being sufficient for the production of a cigar. The cigars are finally dried for sale.

Snuff, which requires a higher degree of care in its manufacture than any other product of the tobacco-plant, is made either from stalks only, from leaves only, or from a mixture of the two. That known as Scotch snuff is made either wholly of stalks, or with a very small admixture of leaves; but-dried snuffs owe their peculiar qualities chiefly to a degree of drying which imparts a sorchell flavour to them; and innumerable varieties are produced by the choice, mixture, and preparation of different tobaccos. Most of the snuff made near London is of the latter kind. The machine used is often built upon the river Wandle, and in and near to the small town of Mitcham in Surrey. In these mills two kinds of grinding-machine are employed, one consisting of two cylindrical stones, set one above the other, and one more or less thick, set up on edge, side by side, upon a circular slab or bed. These stones have a two-fold motion imparted to them, resembling that of a carriage-wheel compelled to revolve in a small circle by the effect of the circular motion of the grinding action upon the bed where the snuff is laid, peculiarly adapted to the required purpose. Some kinds of snuff however are better ground by the other sort of machine, which consists of a kind of rolling pestle, set in motion by an ingenious train of wheels and set of jointed arms or levers. Little is done at the snuff-mills beyond a preparatory drying of the tobacco and the actual grinding; but the snuff undergoes some finishing operations from the maker after it leaves the mill.

(Forster's 'Tropical Agriculturist'; Penny Magazine, No. 623.)

The discoverers of the New World learned the habit of smoking tobacco from the natives, and on their return the practice was at first introduced into Spain and Portugal, and soon spread to other parts of the Continent. The settlers who accompanied Raleigh to Virginia in 1607, and to the Virginia islands, which returned unsuccessful in 1616, introduced the habit into England. Before the establishment of the colonies of Virginia in 1608, all tobacco imported into this country was raised by the Indians in the Western States and Islands. King James's inveigles against the use of this weed are now curious matters of history. In 1604 he took upon himself, without the consent of parliament, to raise the duty on tobacco from 2d. to 6s. 10d. lb. In the commission addressed on this occasion to the lord treasurer, he remarks that 'tobacco being a drug of late years found out and brought from foreign parts in small quantities, was taken and used by the better sort, both then and now, as a medicine, and it will advance the health of persons of mean condition now consumed their wages and time in smoking tobacco, to their great injury and to the general corruption. In his 'Counterblast to Tobacco' he inveighed still more strongly against this 'precious stink.' 6615, 6616, 6617. The attempts of the English to turn themselves to the cultivation of the tobacco-plant, abandoning the manufacture of ashes, soap, glass, tan, and the planting of vineyards, which they had already commenced. (Bancroft's 'History of the United States, i., p. 168.) James found the industry of the colony this proceeding of the planters must be tolerated, and without abating his well-known aversion to tobacco, he held, according to a proclamation, that it was 'one of the two more tolerable that the same should be imported; an useful and valuable article and the superflities which come from beyond seas, than to be permitted to be planted here within this realm, thereby to abuse and misemploy the soil of this fruitful kingdom.' In the first instance he has been justified in the right of importing the commodity to such persons as he should license for the purpose. In the last year of his reign the exclusive supply of the English market was given to the English plantations in America.

The duty of tobacco now yields a gross revenue of about 3,500,000. a year; only two articles of foreign production, sugar and tea, bring in a larger sum. Since 1825 the duty has been 3s. per lb., and 2s. 6d. if the produce of the foreign sugar be charged with the duty. The value of the article in bond varies from 24d. to 6s. 4d. per lb., and the duty is therefore from 600 to 1440 per cent.; the average rate is said to be 900 per cent. From 1815 to 1825 the duty was 4s. the lb. In 1786 the duty in Great Britain was only 10d. per lb., but in the following year it was increased to 1s. 3d.; in 1796 to 1s. 7d.; and it was successively increased at different times until it amounted to 4s. in 1815.

In 1794 to 1798, when the duty was 8d. the lb., the consumption of tobacco in Ireland averaged 8,000,000 lbs. yearly, but from 1825 to 1829, with a duty of 3s., the consumption was only 4,000,000 lbs. Had it kept pace with the population, it would have been 16,000,000 lbs. 6618. The consumption of tobacco used in England was considerable. The late Lord Sydenham, when president of the Board of Trade, stated that in one year seventy cargoes of tobacco had been smuggled beyond the customs, and that the quantity thus introduced was not less than 3,500,000 lbs. The consumption in Great Britain was as follows in each of the undermentioned years:—

<table>
<thead>
<tr>
<th>Year</th>
<th>Duty (lb.)</th>
<th>1st Qtr.</th>
<th>2nd Qtr.</th>
<th>3rd Qtr.</th>
<th>4th Qtr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1798</td>
<td>6,840,796</td>
<td>1,840,708</td>
<td>1,840,708</td>
<td>1,840,708</td>
<td>1,840,708</td>
</tr>
<tr>
<td>1799</td>
<td>9,340,708</td>
<td>2,340,708</td>
<td>2,340,708</td>
<td>2,340,708</td>
<td>2,340,708</td>
</tr>
<tr>
<td>1800</td>
<td>10,487,948</td>
<td>2,687,948</td>
<td>2,687,948</td>
<td>2,687,948</td>
<td>2,687,948</td>
</tr>
</tbody>
</table>

For the following years the population of each decennial period is added.—
Turkey 19

1801 10,942,646 10,514,998 lbs. 1s. 2d.
1811 12,600,894 14,235,243 2s. 2d.
1821 14,361,631 12,863,168 4s.
1831 15,633,318 15,300,000 3s.
1841 15,885,786 16,000,000 3s.

It thus appears that the consumption is now considerably less than one lb. per head: in Prussia it is three lbs. The allowance to British seamen for stores is two lbs. per month; and in 1828 the annual consumption in Ireland averaged two lbs. per head. It is impossible to believe that the use of tobacco has declined, or even been stationary, within the last few years: there is little doubt indeed of its having increased, though the returns give a different result. In 1826 only 8,000 lbs. of cigars paid duty at 18s. 6d. per lb., but in 1831, the duty having been increased in 1830, 66,400 lbs. were entered for consumption; and in 1841 there were entered 213,613 lbs. The following table shows the quantities of unmanufactured tobacco on which duty has been paid in the United Kingdom in the three years and a half ending July, 1842:

<table>
<thead>
<tr>
<th>Country</th>
<th>1839</th>
<th>1840</th>
<th>1841</th>
<th>Half-Year ending June 30th, 1842</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>13,221,111</td>
<td>11,926,695</td>
<td>593,071</td>
<td>1,181,014</td>
</tr>
<tr>
<td>Scotland</td>
<td>4,511</td>
<td>1,780,577</td>
<td>1,063</td>
<td>172</td>
</tr>
<tr>
<td>Ireland</td>
<td>2,565</td>
<td>3,575,313</td>
<td>1,482</td>
<td>2,007</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>13,277,927</td>
<td>6,470,985</td>
<td>540,433</td>
<td>1,212,393</td>
</tr>
</tbody>
</table>

The number of tobacco and snuff manufacturers in 1839 was—England, 300; Scotland, 130; Ireland, 227; total 660: of dealers—England, 188,383; Scotland, 13,432; Ireland, 13,659, total, 255,255.

Tobacco, as already stated, is not allowed to be grown in England. The acts prohibiting its cultivation did not until lately apply to Ireland. In Prussia 21,748 acres were planted with tobacco in 1833: in France, in 1840, the produce of 12,000 acres (of which tobacco is grown in tobacco) was entered for consumption: in 1842, on 19,662 acres: the duty on tobacco in France yields about 3,800,000 fr. per annum. Tobacco is extensively cultivated in Holland and Belgium, also in the southern provinces of France, and in Turkey and Syria. It has, as yet, made little progress in the British West Indies, and still less in Upper Canada, though encouraged by a small differential duty of 3d. in the lb. It is said that East India tobacco would be much more extensively introduced if a similar preference were shown to it. The tobacco of Cuba holds the highest rank for the excellence of its flavour. In 1833 the export of cigars was 3,231,217 lbs., and of leaf tobacco 2,416,545 lbs. Next in favour, perhaps, are the cigars of Mauritania. But the cultivation of tobacco is most extensive in the United States. In 1835 the value of the export was 10,000,000 dollars, being one-third of the value of the cotton exported; in 1836 the value of tobacco exported was 7,992,029 dollars; in 1839, 9,823,941 dollars; and in 1841 it was 12,576,703 dollars. The following table gives a general view of the trade of England in tobacco:

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut or Shag</td>
<td>13,221,111</td>
<td>593,071</td>
</tr>
<tr>
<td>Roll Tobacco</td>
<td>11,926,695</td>
<td>1,181,014</td>
</tr>
<tr>
<td>Cigars</td>
<td>5,911</td>
<td>1,063</td>
</tr>
<tr>
<td>Rolls</td>
<td>2,565</td>
<td>1,482</td>
</tr>
<tr>
<td>Total</td>
<td>13,277,927</td>
<td>1,212,393</td>
</tr>
</tbody>
</table>

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<td>Rolls</td>
<td>2,565</td>
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</tr>
<tr>
<td>Total</td>
<td>13,277,927</td>
<td>1,212,393</td>
</tr>
</tbody>
</table>

We give another table further illustrating the commercial intercourse created by the demand for tobacco: it shows the countries from which tobacco was imported in 1839:

<table>
<thead>
<tr>
<th>Country from which Imported</th>
<th>Tobacco in</th>
<th>Manufactured</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States of America</td>
<td>3,304,100</td>
<td>902,114</td>
<td>4,206,214</td>
</tr>
<tr>
<td>Mexico</td>
<td>239</td>
<td>421</td>
<td>660</td>
</tr>
<tr>
<td>Brazil</td>
<td>99,027</td>
<td>426,879</td>
<td>525,906</td>
</tr>
<tr>
<td>China</td>
<td>1,701</td>
<td>21,611</td>
<td>23,312</td>
</tr>
<tr>
<td>India</td>
<td>21,281</td>
<td>21,281</td>
<td>42,562</td>
</tr>
<tr>
<td>Japan</td>
<td>114</td>
<td>2,344</td>
<td>2,458</td>
</tr>
<tr>
<td>Turkey, Syria, and Egypt</td>
<td>154</td>
<td>322</td>
<td>476</td>
</tr>
<tr>
<td>Holland</td>
<td>2,491</td>
<td>47,108</td>
<td>49,599</td>
</tr>
<tr>
<td>Belgium</td>
<td>1,094</td>
<td>61,849</td>
<td>62,943</td>
</tr>
<tr>
<td>Germany</td>
<td>11,067</td>
<td>5,181</td>
<td>16,248</td>
</tr>
<tr>
<td>Other Countries</td>
<td>2,029</td>
<td>6,428</td>
<td>8,457</td>
</tr>
</tbody>
</table>

Total | 35,005,353 | 6,160,509 | 41,165,862 |

Tobacco is not allowed to be imported in vessels of less than 120 tons, nor exported in those under 70 tons. The places of import are limited to a few of the principal ports where it can be safely secured under the king's lock. A charge of 2s. per hhd. is made on its being placed in the warehouse, and the same sum is levied on its export; but no other payment as rent is due for five years. Of 37,000,000 lbs. imported in one year, 20,000,000 arrived in the port of London, and 14,700,000 lbs. at Liverpool. The tobacco exported is principally to Germany, Holland, Belgium, Spain, Italy, the West of Africa, and Portugal, and to other parts in smaller quantities.

TOBACCO-PIPE, a long slender tube, of very small bore, used for inhaling the fumes of a small quantity of burning tobacco. It is disposed in a bowl or cavity attached to one end of the tube. The materials of which tobacco-pipes are formed are very numerous. White and coloured earths, porcelain, metals, ivory, horn, shell, costly woods, agate, jasper, and amber, are among the materials which have been used for the purpose. The forms of tobacco-pipes admit of at least equal variety, but perhaps the most re...
markable is the oriental hookah, in which the smoke is purified by passing it through water. This is effected by having an air-tight vessel half filled with water. On the top of this vessel is the bowl to contain the burning tobacco, and a small tube descends from the bowl into the water in the lower vessel. The pipe is inserted into the upper part of the vessel, above the level of the water. When the smoke passes through this tube, it is produced in a partial vacuum in the vessel, and this occasions the pressure of the external air to force the smoke of the tobacco downwards, through the small tube before mentioned, into the water beneath. After losing its solid particles in the water, the smoke bubbles up through the vacant space above, and thence passes through the pipe to the smoker's mouth. The pipe or tube is usually made flexible, and is often of great length.

The tobacco-pipes most commonly used in this country are formed of a fine-grained plastic white clay, which is called, from this application, pipe-clay. It is procured chiefly from Purbeck in Dorsetshire, and it is purified from all foreign impurities by working it with water in a thin paste, and then either allowing it to settle in pits, or passing it through a sieve, to separate the siliceous or other stony matter. The water is subsequently evaporated until the clay becomes of a doughty consistence, when it must be worked until it is uniform. These long winding tubular masses of about one hundred pounds each, and from one of these the workman cuts off just enough to make one pipe. Each piece is kneaded thoroughly upon a board, and split to nearly equal pieces and dried. One piece, with a projecting bulb at one end for the formation of the bowl. These pieces are laid side by side for some time to dry, and when the clay is sufficiently firm, they are subjected to the curious process of boring. The workman takes the roll of clay in his left hand, and with his right hand inserts the end of an iron needle, previously oiled, in the small end of the roll, and by dexterous management thrusts the needle through the whole length of the roll, without penetrating the surface. The bulb is then bent into the proper position to form the bowl, and the piece of clay, with the needle remaining in it, is pressed into a mould to complete its form.

Top tobacco-moulds are formed either of copper, brass, or iron, and each consists of two precisely similar halves, with projecting pins in one half, and corresponding holes in the other, which ensure their exact union. On their inner surfaces, which are hollowed so as to fit the finished pipe, may be added any ornamental device or inscription. One half of the mould being laid flat, the pipe is placed in it, covered with the other half, and then firmly pressed. The bowl is partially hollowed by the finger, and completed by the blow of an oiled or un-oiled hammer. The wire should then be thrust backwards and forwards until it becomes visible in the bowl. The wires are now withdrawn, and the pipes are taken out of the moulds, slightly smoothed over, and laid aside to dry. After drying for a day or two, any remaining roughness is removed by means of an instrument of bone or hard wood, and then the pipes are sometimes moulded a second time, and polished with a piece of flint bored with holes, through which the stem is passed repeatedly. Hitherto the pipes are straight in the stem; but before going to the kiln they are slightly bent. It is said that a clever pipe-moulder will make three thousand five hundred in one day.

The tobacco-kiln consists of a large but very light cylindrical crucible, or saggar, with a dome-shaped top, and a circular opening in one side for the insertion of the pipes. This vessel is formed in the following curious manner.—The bottom is composed of fragments of pipe-stems, radiating from the center, and composed at the circumference with a layer of clay. A number of bowls of broken pipes are inserted in this clay, and in these bowls other fragments of pipe are placed upright to form the sides of the kiln. In this position of the pipes, which are glazed in manner to lath-and-plaster work, completes the solidity of the work; and in this way the whole of the vessel, including the domed roof, and a series of vertical projecting ribs on the outside of the cylinder, is completed. In like way, also, the aperture by which the charcoal is inserted, and the crucible or saggar is mounted in a brick furnace, lined with fire-brick, in such a manner as to leave a space of about four inches all round for the circulation of flame; and the effect of the before-mentioned fillets is to divide this space into a series of flues, between which however there is some communication through apertures in the fillets. The pipes are placed in the kiln with the stems down, and heated in a manner that the top is placed at a considerable elevation upon circular pieces of clay set up in the centre. Six small ribs project inwards round the interior of the crucible, at various elevations, and each of these is supported by a series of upright pipes, by means of which support are provided in the centre for the pipes. By this arrangement one furnace may contain fifty gross, or seven thousand two hundred pipes, which may all be baked within eight or nine hours. During the operation the fire is sometimes raised or damped, by a plate sliding over the chimney-top. The tobacco-pipe-kiln is engraved and more fully described in Dr. Ure's Dictionary of Arts. (Penny Magazine, No. 496; Dr. Ure's Dictionary of Arts, 1826, 1227.)

TOBAGU, an island in the Columbian Archipelago, in 11° 16' N. lat. and 60° 30' W. long. It is the most southern of the Caribbean Islands, and lies about 25 miles north of Trinidad. Its greatest length is 90 miles, and its greatest breadth about 13 miles. Its mountainous ridge 1800 feet high extends two-thirds of the length of the island, and smaller ones proceed from it, rendering the general surface of the interior irregular and abrupt. The valleys and plains are sometimes flat, and sometimes elevated to a small extent. The northern coast is lofty and rugged, and the southern terminates in lowlands. Conical elevations, which slope with a gentle descent, are often found isolated, and the island is dotted with the tops of the cones of some of the volcanic features which most of the neighbouring islands present. Tobago is out of the range of hurricanes. There are harbours on both the northern and southern coasts for vessels of 150 tons. The capital and chief port is Scarborough, on the northern coast. The climate was said to be healthy in some accounts, but this may possibly only refer to the elevated lands in the interior. Statistical returns show that the mortality of the troops stationed in Tobago has always been higher than in any of the other islands of the West Indies. The exports consist almost solely of the produce of the sugar-cane. In 1836, 109,649 cwt. of sugar, 129,570 gallons of molasses, and 435,994 gallons of rum were exported, the total value of which was estimated at 150,074l. In the same year the estimated value of the imports was 73,047l. In 1839 the exports were two-fifths less than in 1830, and in 1841 still less, but small quantities of cotton and arrow-root were shipped.

The population of the island in 1835 was 10,885, consisting of 250 male and 30 female whites; 300 free blacks, and 9800 apprentices (black) labourers. On the lst of August 1834, the number of registered slaves was 11,599, for which they paid a tax of 228,857l., or 20l. 3s. 7d. per head. It was paid out of the parliament funds, for the purpose of removing their freedom many of them proceeded to the other islands, in which there was a greater demand for labour.

Tobago was discovered by Columbus in 1498, and derives its name from 226 pipe (tobacco) used by the Indians for smoking the herb 'kohiba' (tobacco). At an early period the British flag was planted on the island, and James I. granted it to the Earl of Pembroke, but no attempt was made by the English to colonise it. In 1632 the Dutch formed a settlement and called the island New Walcheren, but the Spaniards from Trinidad attacked and destroyed the colony. Twenty years afterwards the Dutch returned, and soon after a party of about a hundred Courlanders, under command of Courlander, obtained a grant of the island. In the disputes which arose between them and the Dutch the latter were successful. The subsequent history of the island is not of general interest. It was ceded by the British to England in 1763. In 1768 the French captured it, and in 1769 it was regularly ceded to France by the treaty of Versailles. In 1793 General Cuyler of the Americans landed on the island. It has ever since been a British possession. Tobago has a local legislature consisting of the lieutenant-governor, a legislative council of nine, and a house of assembly of sixteen members.

TOBIN, JOHN. The author of one play, which is still in use. His name is frequently met with in printed documents, although displaying little of what may be termed original genius—would scarcely be entitled to notice in a work which does not profess to include the minor adventurers in literature, were it not for the peculiar circumstances under
TOBIT (Tofer: according to the Vulgate, Tobit), a
canonical book of the Old Testament, according to the
Christian Catholick, is rejected by the Protestants. This book contains the his-
tory of Tobit, and purports to be written by himself.
Tobit was a native of Thule in Galilee, and belonged
to the tribe of Zebulun. He had one son, Tobias, who
while the rest of his tribe sacrificed to Baal, he re-
mained steadfast in the worship of the Lord. He, with his
wife and son, accompanied the other Israelites in their
captivity to Nineveh, where he gained the favour of the
king Shalmaneser, but he did not keep his surverey. He
was thus enabled to acquire considerable property; but
was deprived of it all in the reign of Sennacherib, in con-
sequence of having buried some Israelites whom the king
had slain, and he was obliged to flee from there. He
was however recalled to Nineveh on the accession of Esar-
hadnou, through the influence of Achicharius, who was
his own nephew, and held high offices in the court of
the king. Not long afterwards he bought and adopted one of his
countrymen who had been slain, and being polluted, he did
not enter his house, but slept outside by the wall of the
courtyard with his face uncovered. While lying here the
sparrows dropped some warm dung into his eyes, which
occasionally produced a great deal of pain. Tobit however did not lose
his confidence in God. Being reduced to poverty, he sent his
son Tobias to Ragas (Rhiage) in Medin, to obtain a sum of
ten talents, which he had left some years before with one
of his servants. Tobit's son-in-law, Henoc, a Chaldean
angel, who, under the form of an Israelite of the name of
Aarabas, was so kind as to offer himself as a guide. In the
course of their journey Tobias caught a fish in the Tigris,
of which he carefully preserved the heart, the liver, and the
gill, according to the directions of the angel, who explained
their wondrous efficacy. At length they arrived at Ecbatana, where Tobias married the daughter of Raguel,
his kinsman. Now the damsel had already been married
to seven husbands, but on the wedding-day of each the
evil spirit Asmodeus had killed them. Tobias however
burnt the liver and the heart of the fish, as he was ordered
by the angel, and by the smoke arising from them drove
the evil spirit straightway into Egypt. As Raguel would
let his son-in-law, the direction of the angel, who
was sent to Ragas for the money; and upon his
returning with it, Tobias went back to Nineveh, where he
cured his father's blindness by rubbing his eyes with the
gill of the fish. Tobit continued to live happily till
the time of his death, which did not take place till he
was a hundred and fifty-eight years old. After the
death of his parents Tobias removed to Ecbatana with his wife
and children, and died at the age of a hundred and twenty-
seven years.

The Book of Tobit is written in rather a pleasing style.
Sound criticism will scarcely regard it as a true history. It
is rather a tale written to inculcate the duty of trust in
God, and to show the excessive punishment which was meted
out to every one who did not keep the commandments of God.
It also abounds in exhortations to practise good works, and to
continue steadfast in prayer.

The translation in the Vulgate was made by St. Jerome
from the Chaldee. It also exists in Greek, which is prob-
elly a translation of an old Hebrew original, of which
the Chaldee text used by St. Jerome was perhaps also a
translation. There is a Syriac version besides, which diff-
cers considerably from the Greek and Latin ones. It seems
impossible to do more with any accuracy the time when
the book was written.

(K. D. Igen, Die Geschichte Tobis nach drei verschieden
en Originalen, dem griech., dem latein., des Hieronymus,
und einen syr. Übersetzung von Eusebius von Caesarea, 
1800: De Wette, Einleitung in die Bücher des Alten Testamentoes,
p. 381, &c.)

TOBOLSK, Asiatic Russia, or the kingdom of Siberia,
was formerly divided into two great governments, Western
and Eastern, which by a law of 1638 were combined into one
under the name of Tobolsk, and the name of Russia to the east.
Tobolsk was subdivided into the provinces of
Tobolsk, Omus, and Tomusk. Subsequently Tomusk
was erected into a separate government; and in 1838
the province of Tomusk was applied to the new government of Tobolsk, as now constituted, is bounded on
the north by the Frozen Ocean, on the west by the
governments of Archangel, Orenburg, and Perm, and on the
south and east by Tomusk and Jenisseisk; the area is 519,200
square miles, and the number of inhabitants is 522,684, not
Tobit which he devoted a to dramatic writing. John Tobin
was born at Salisbury in 1770. His father had property in
the county of Wiltshire, and the family were in the
period, thinking his presence necessary upon his plant-
tation, he took up his residence there, leaving three sons
under the care of their maternal grandfather. They were
placed in the care of a master, a Quaker, who had covered some precocious talents. His father, returning to
England, settled at Bristol in a mercantile employment,
where his sons became pupils of the Rev. Mr. Lee. John, who was the third son, was in 1785 placed in the house of a Liverpool merchant, and went to sea as a young man.
His ambition was however early directed to dramatic
composition, and for fifteen years he persevered in
offering to the theatres play after play, each of which
was unanimously rejected by the management. Tobin per-
haps more real talent than the greater number of those
who had possession of the stage, at a period when a suc-
cessful dramatic performance was not only highly paid,
according to any commercial estimate of literary merit,
but was very often a little fortune to its author. But the
stage was then also in the hands of three or four writers,
who perfectly understood the taste of the town, and es-
pecially adapted themselves to the peculiarities of the actors
rejected pieces were eventually brought upon the stage.
A consequence of this system that whilst no drama was com-
posed upon a principle of art—whilst no attempt was made to
sustain a plot by consistent and natural character, wit
or humour, pathos or poetry, which were indispensable to
his character, his mind always continued to think of the
comedian's flexibility of face, and his sentiment with a due reverence,
for that tragedian's stride and intonation,—there was still
something produced which was perfect in its way, through
the power of the machinery by which it was worked; a
thing to move laughter or tears upon the stage, but singu-
larly provocative of sleep in the closet. This was the day
when the drama existed upon slang and clap trap, mismal-
conceived. tragedy had died out of its dullness; and fiction
—most legitimate fiction—demanded the five acts of Reynolds,
Morton, and George Colman the Younger. At this period
Tobin essayed to become a writer of comedy. He pro-
duced 'The Faro-Table,' 'The Undertaker,' and 'The
Seducer for Authors.' These were all rejected. He then
tried his hand at the romantic drama, and wrote with equal
success 'The Curfew' and 'The Indians.' The latter piece
was called for by the success of Sheridan's melo-
drama of 'Zizoro.' One some, it is said, he worked this
question to Tobin at a social meeting where the state
of the drama was a subject of discussion: 'Would a revival of
the dramatic spirit which produced the plays of Shaks-
per and Fletcher be relished by the public?' Then
the play was presented to the managers of Covent-Garden,
and refused. It was finally accepted at Drury-Lane, and
was acted with a success which has attended very few
pieces of the more modern drama. It is the only
play which a writer who had a tendency to consumption, was obliged to leave
London, seeking the recovery of his health. He had
worked for many years at his profession by day, and at his
dramatic compositions by night. He died on the 8th
of the 1st of November, 1803. Those who cater
for the public taste have often an alacrity in discovering
the merits of a man when he is dead; and so Tobin's
reputation seems incomparable to do much with any accuracy the time when
the book was written.
The principal rivers are the Obi, the Tobol, the Irtil, and the Irtysh. The south and south-western parts of the government are very fertile, and produce abundance of corn and flax. The south and north-western parts of the government are very fertile, and produce abundance of corn and flax. The real agricultural districts are on the west, on the Tobol and its tributaries, which yield luxuriant crops, and supply water and means for the navigation of the district into the distant parts of Perm and Orenburg. There are rich pastures favourable for the breeding of horned cattle, horses, and sheep. And here and there some camels are bred. This plumbs here and there, and huts for the provision and quantity and value of the fish in the great rivers. The mineral wealth contained in the mountains on the west and southern frontiers is immense. The Ural Mountains produce iron, copper, gold, and platinum; and the forests of Ekaterinenburg are among the most extensive in the world.

The shores of the Frozen Ocean to 60° N. lat. the whole country is totally unfit for agriculture. It is covered with thick forests, the ground of which is a morass, and it only gives way to the sand and the morasses and swamps, and these two entirely disappear towards the Frozen Ocean, where a little moss is almost the only sign of vegetation.

The fishery and the chase of the fur-bearing animals are the only resources of this inhospitable tract. The bird, one of the most pretentious of animals, is nearly extinguished. Besides the Russians there are among the inhabitants Mongols, Bokharins, Tunguses, Saimours, Ostiaks, and wandering Tartars of different tribes. The necessities of life being abundant and cheap, the inhabitants have no sufficient stimulus to raise them from the indolence which appears to be a predominant characteristic of the people of this region.

The town of the government of Tobolsk is situated in 56° 12′ N. lat. and 58° 15′ E. long., at the junction of the Tobol with the Irtil, 582 feet above the level of the Caspian Sea. It is divided into the upper and the lower town: the former, on the east bank of the Irtil, is on a hill, or rather ridge, which runs parallel to the river, at a small distance from it; the latter, which is the larger, is in the interval between the river and the ridge, and is exposed to inundations. The communication between the upper and lower town is by a gently sloping causeway laid with planks, which is continued in a ravine of the ridge, and is practicable even for carriages.

The view from the summit, which is 200 feet above the lower town, though not very diversified, is striking; the great river and the Irtil, that wind in a circle, the right bank is the lower town; beyond the river is a verdant plain extending to the horizon, the uniformity of which is interrupted only by the Tobol, of which there are numerous branches, and by the Tartar villages, most of which are near the river, and among them the Tartar villages are always to be recognised by a little grove of trees (not pines), which are their burying-grounds.

At the foot of the ridge some springs issue, which Professor Rose examined, and found that the temperature of one to be 4° 2′, that of the other 4° 6′, by Réaumur's thermometer; his temperature, he says, is manifestly too high for the latitude of Tobolsk to be correct. The thermometer was by the north. Professor Rose, who passed several months at Tobolsk in 1828, found the temperature of the earth to be only 1° 8′ of Réaumur's thermometer.

Tobolsk is the seat of a Russian archbishop, the metropolis of all Siberia, and has a theological seminary, an establishment for the education of schoolmasters, a gymnasium, and several other schools; some printing-offices, a Bibie Society, and a theatre. The only manufactures of importance are those of Russian leather; the East European women make linen, carpets, and woollen cloth. There are in all twenty-three churches, one German Protestant church, two mosques, two convents, and the residence of the governor-general.

The population, consisting of Russians, Tartars, and Circassians, amounts to 20,000, exclusive of the soldiers, the clergy, and the exiles, for whom there is a house of correction. The Tartars were formerly allowed to live in the lower town, where a number of streets were assigned to them; but the crowded manner in which they built their houses, rendering them very liable to fire, which occurred very frequently, led to their removal to a separate quarter. The style of living and the manners of the upper classes of society are not very different from those of Europe. Kotzebue, during his exile, had the means of observing the Tartar lives, and he says they were more extroverted in the vicinity of the town, where partridges and grouse are the daily and almost necessary food of all classes. The cock of the wood is not found in great numbers near the city till the winter months, when large numbers of them come from the Osiakas, to the north, all the year round, as well as the black cock and other game.

The common use of these and other articles of food, which in Europe are chiefly confined to the tables of the richer inhabitants, forcibly reminds us, says Professor Erman, of the remark of Paulus Jovius, in the sixteenth century, who affirmed that the Russians lived less with refined elegance than in the greatest abundance, for that the tables of the Russians were more furnished with the riches and the luxuries which in Europe none but the most prodigal (luxuriosissimis) wished for or could obtain. (See Pauli Jovii De legisl. Basilii Magni, Princip. Moscov. ad Clementem Vii., Pont. S. Max. liber. In Comm. Rer. Moscov., P. 170.)

Though Tobolsk has no manufactures, it has a very considerable trade between European Russia and China. The European traders arrive in the spring with the goods destined for the Chinese, and at the end of summer the boats return with their cargoes for Moscow and Petersburg. The merchants from Tartary and Bokhara arrive at the beginning of the winter, and remain at Tobolsk till the spring. All the sums collected as tribute from the wandering Tartar tribes are kept there, and brought to Tobolsk, where there are extensive magazines for the various descriptions of goods.

In 1756 the Abbé Chappé d'Autechoe was sent by Louis XV. to Tobolsk to observe the transit of Venus. He erected a small observatory, and determined astronomically the position of Tobolsk. Though no traces of the observatory now remain, Professor Erman, after much inquiry, ascertained the spot where it stood, and found his observations were very nearly corresponding with those of Chappé:

- Latitude, according to Chappé, 58° 12′ 22″ N.
- Latitude, according to Erman, 58° 12′ 13″ N.

Humboldt's observations nearly coincide with the above.

(Adolph Erman, Reise um die Erde durch Nord Aseran und die beiden Ossmanen, 1828, 1829, 1830, erst erster Band; A. von Humboldt, G. Ehrenberg, and G. Rose, Reise nach dem Ural, dem Altai, und dem Kispischen Meer, erster Band, Berlin, 1837; Hirschelmann; Crannich.)

TOCUYV [VENIZEULA]

TODDALLA, a genus of plants of the natural family of Rutaceae, tribe Xanthoxyllae, which is itself sometimes made into a distinct order. The same Toddalia is derived from Toddali, the Malabar name of one of the species. The genus is distinguished by having unisexual flowers, the calyx 3-toothed. Petals 5. Staminodes 5, longer than the petals. Fruit a pyriform capsule almost smooth, ovoid, 3-ribbed, 5-seeded. Seed kidney-shaped. Embryo attached. The species are of moderate-sized shrubs, with alternate trifoliate leaves full of pellucid dots. Male flowers of different branches of the same tree. Fruits bright red at maturity. Toddalia are very abundant in India and in the Mauritius, as well as in Brazil. The Indian species are found in the Peninsula, but extend...
northwards as far as Nepaul and Deyra Doon; from Nepaul Paul Dr. Wallich figured T. borivianus (Pl. As. Brot., t. 322). T. aculeata has prickly stems and branches, and extends to 30° N. lat., along the jangly base of the Himalayan Mountain to Nepal. It is to be noted that T. borivianus is now used as a cure for the remittent fever of such situations; and as many of the allied plants are possessed of bitter with aromatic properties, it is probable that this plant also may be used for such purposes.

TOD. [Praetor.] TODIRAMPHUS. [Kingfishers, vol. xii., p. 229.]

TODUS. [Musicae, vol. xvi., p. 14.]

TOEPLITZ. [Teplitz.]

TOL, TOLI, TOLUS, TOLUANA.

Toga is the name given to the principal outer garment worn by the Romans. The Romans generally wore the same kind of dress as the other Italian nations and the Greeks; the toga alone is by some writers said to have been derived from the Lydians, but this statement probably arose from the belief that the Etruscans had come from Lydia; and that at least a particular kind of toga (the toga praetexta) was introduced at Rome at a very early time from Etruria, is expressly stated. ([Livy, i. 8; Pliny, Hist. Nat., viii. 74.) In later times the toga was the peculiar garment of the Romans, which in times of peace they wore both at home and abroad, and whenever they appeared in public. Becker, Zürich, have covered it. (Servius, ad Am. i. 229. Aug. 60.)

The peculiarity of the toga as a Roman dress is also indicated by the circumstance that emperors and distinguished persons of the empire, and even the less distinguished, were termed togati, to distinguish them from Greek comedians. As the toga covered the whole body with the exception of the left arm, it could not be worn by a person while at work either at home or in the field. (Juvenal, iii. 171; Livy, iii. 26.)

The material of which the toga was made was woollen cloth, which differed in thickness and fineness according to circumstances and the seasons. Under the empire persons of rank used to have their togas made of silk. The colour was usually white, probably the natural colour of the wool. Those who appeared before the people as candidates for a public office, wore a particularly white and even one, or black and white toga, for the candidates (candidati). On festive occasions too it was considered a matter of importance that the toga should be perfectly white. (Horat. Sat., ii. 20; Cicero, ad Vatini, iv. xvi. 4; Galen, vol. xxxii. 313; Varro, De Ling. Lat., iv., p. 83; Epict., ii., p. 33.)

Whether, however, the word pulla refers to a particular dye, or whether it only means a dirty and worn-out toga, was also put on with less care than usual, as seems to follow from the adjectives sordida and squinilis, which are often given to it (Livy, iv. 54; xiv. 20.). It is not quite certain, though it is a well-known fact that the mourning colour among the Romans was a dark blue. There are instances of the small mountain villages of the Romans worn the toga pulla, or dark-coloured toga. (Cicero, in Vatini, iv. 13; in Terr., iv. 21.)

The town during the empire continued to be the honourable dress which was worn by persons of rank, as senators, judges, priests, and by clients when they saluted their patrons or received the spoils (Martial, xiv. 125.), and continued to be the dress of the emperors, when they exchanged the description in Quinellina (x. 3, 137, &c.) and the many statues with toga still extant. Those who are curious about this matter may consult an excellent article in 'Dictionary of Greek and Roman Antiquities,' under 'Toga.'

Besides the different kinds of togas we have mentioned above, the following must be noticed:—

1. Toga praetexta was worn by the children of the nobles, by girls, and by boys until they attained the age of puberty (fourteen), when they exchanged it for the toga virilis, also called pura, libra, or recta, which was the usual white toga described above. The praetexta was also the official robe of the higher magistrates of the city and the municipia, as well as the colonies.

2. Toga picta was also a toga ornamented with embroidery and gold according to the Etruscan fashion. It was worn by generals in their triumph, whence it was also called toga Cypontina. During the empire it was also worn by the emperors, consuls and praetors when they were present at the public games.

(Ferrarius and Rubenius, De Re Vestit. ; Beckers, Gallia, ii., p. 78, &c.; Dictionary of Greek and Roman Antiquities.)

TÖGGEBURG, the Upper and Lower, a long valley in the north of Switzerland, was formerly the name of a county lying between the territories of the Abbey of St. Gallen, the Thurgau (Thurgovia), and the cantons of Zürich and Appenzell. It is separated from these cantons on one side by mountains, which contract its breadth; it is however above 50 miles in length, and its area 230 square miles. It is traversed by the river Thur, from which it is sometimes called the Thurtal, or Valley of the Thur. The chief occupations of this region are tillage of the land, and partly weaving linens and spinning cotton for the large establishments in the towns.

In the fifteenth century the counts of Töggeburg were among the richest and most powerful landholders in Switzerland. The line of the counts becoming extinct in 1566, they were succeeded by the barons of Rason as the next heirs:—they indeed confirmed to the inhabitants the great privileges which had been granted to them by the last count of Töggemberg, but in 1469 sold the county to the abbots of St. Gallen. Unhappy differences ensued. The abbots wished to govern despotically, and the inhabitants to preserve their privileges, founded on the charter granted them by the last count, by force, and concluded with the counts of Oberrhoden, 1459, the last count, by which they were empowered to conclude after his death an alliance with the Swiss for the security of their rights. Such an alliance they afterwards concluded with the counts of Oberrhoden and Schaffy. The oppressive conduct of the abbots twice led to a sanguinary conflict. The first time was in 1712, when several of the cantons took part in the contest, which was ended, in 1718, by a convention concluded at Rorschach. Fresh conflicts arose in 1750-1760. At present Upper and Lower Toggenburg form the fourth and fifth districts of the canton of St. Gallen. Here are the little manufacturing town of Lichtenstein, which may be called the capital; and the small mountain-village of Wildhaus, 3010 feet above the Lake of Zürich, the birthplace of Ulrich Zwingli.

(Stein, Georg. Lexicon; Cannabich; Hörschellmann; Brockhaus, Conversations Lex.)

TOGHRAI, or TÖGHRAI, the name of Abu Ismail Hosein Ben Ali Ben Mohammed Mowayed ed-Din al-Issalani, and the name by which he is commonly known. He was descended from Abú-I-Iswad al-Da‘ūd, one of the first and celebrated missionaries of Islam. He was born at Iṣalān in the fifth century of the Hégira, or the eleventh of the Christian era, and gained great reputation as a poet. He was at first in the service of the celebrated Melek Shah (a.h. 465-89; a.d. 1073-1092), who was a patron of the Seljuk dynasty; and he afterwards became vizar to Maw'ūd, the son of Mohammed, and Sultan of Mosul.
When this prince revolted from his brother Mahmud, the seventh Seljukian Sultan of Persia, and was conquered in the battle at Esterbarg near Hamadan, A.D. 514 (a.d. 1120), Tograi was taken prisoner, and was at first kindly treated by the conqueror. This however excited the jealousy of his vizir, Abu Talib Ali Ben Ahmed As-Semiri, who had already made the reputed one from the bath and left the latter lying dead in the court-yard. A.D. 515 (a.d. 1121), under the pretence of his being a heretic who believed the doctrines of the Mahaheds or Ismaelites, but in reality from fear of his talents. This is the account of his death given by Al-Abidah ('Annals of Isfahan,' iii. p. 417) and Ibn Khallikan ('Vit. Illustr. Viroi,' § 196, ed. Wustenf.); that given by Leo Africanus ('De' Vic. Illustr. Arab.,' cap. 13) is somewhat different. He was not killed in battle, nor did he die at the time of his death. He appears to have enjoyed a great reputation, and was distinguished by several titles or surnames. The word Tograi is the name given to the person employed by the sultan to write on all the imperial decrees and proclamations his name and titles in a peculiarly large and flourishing character, which is called, from a Persian word, the togra; and from Tograi's skill in writing this, or perhaps from his celebrity as an author, he derived the title of 'Fakhr el Cottab,' or the Glory of Writers. His surname 'Al-monashi' signifies a person employed to draw up the letters written in the name of the prince; and that of 'Alostad' means the master or doctor. The most celebrated of his poems, and the one which has been published, is the 'Tograi al-Iskandari' or 'Tograi at Bagdad,' composed in Arabic at Bagdad, A.D. 505 (a.d. 1111-2). It derives its name 'Lamiat' from the circumstance that all the verses end with the letter lam, 0 or I; and 'al-Jam,' that is, the joining of one to the other, is added to distinguish it from the earlier Arabic poem written by Shanfara, and entitled 'Lamota-'l-'Arab.' It is a poem of the elegiac kind, written in a plaintive style, and composed of diastichs; and has been frequently published and translated. The first translation is that by the elder Pococke, Oxford, 1661, 8vo., with a Latin translation, and copious elementary notes. At the end of the volume is a treatise on Arabic prosody by Samuel Clerk, the University printer. There is an edition by Mathesius, Leipzig, 1711, 4to., with an uncorrected Latin translation by Golius, published in 1707, Utrecht, which is now exceedingly scarce, as almost all the copies were lost at sea. Tograi's poem was also published in Arabic, together with that by Shanfara, by H. A. Palma, Casan, 1814, 8vo. It was translated into English by Leon Chappelow, Cambridge, 1758, 4to.; into French by Pierre Vattier, Paris, 1660, 8vo.; into German by Reiske, Friedrichstadt (Dresden), fuller account of the editions and translations of this poem may be found in Schmutz ('Bibliotheca Arabica,' and Zenker's 'Bibliotheca Orientalis,' Leipzig, 1810, 8vo.). Tograi also wrote a work on alchemy, entitled 'Directio in Usam Filiorum,' which title has been the occasion of some of the critics making a great mistake as to the contents of the book.

(Schmueler, 'Biblioth. Arab.' de Sacy's article on Tograi, in the 'Biograph. Unvers.,' Wustenfield, 'Geschichte der Arabischen literatur und Naturforscher,' Göttingen, 1840, § 151, p. 87.)

TOISE, a French measure of six French feet, particularly used in all the older French measures of the earth.

(TOISTE AND MEASURES.)

TOKAT, or TOCAT, a Town of Asia Minor in 40° 16' N. lat. and 39° 45' E. long. The ancient name of the place is supposed to have been Berson: under the lower empire it was called Eudocia, and the same name is given to it by the Armenian writers. That it is the site of Comana Pontica, as was formerly supposed, is now quite certain. Tokat is surrounded by hills, which enclose it on three sides, the only opening being to the north-east; a small stream runs through the town in the same direction, which joins the Tokat River a short distance below the town.

The town is not walled; the streets are paved. The houses are all tiled (i.e. not flat-roofed), and the higher class of them built with unbent bricks, but the greater part are mud houses, and give a sparing appearance of a sand hill towns. The streets are filthy and narrow; and from the eaves of the houses nearly meeting overhead, are very gloomy. Still some of the edifices are of good size, and particularly a tolerably neat for a Turkish city. Fires are frequent in Tokat. The present vegetation of the gardens in and near the town, the fineness of the streets, and the abundance of fruit, occasion malignant heats in summer and autumn. Tokat is under the Bey of Siwas. It is stated by Mr. Vice-Conul Suter to contain about 6730 families; of whom 5000 are Musulmans, 1500 Armenians, 150 Greeks, and 30 Roman Catholics. The place is the seat of an ancient bishop, who is said to have had three bishops before him and thirty priests of that persuasion. The place has lost much of its former commercial importance, and the import trade is now limited to supplying the local consumption of the neighbouring villages. The trade is principally in silk, and the manufacture of silk is carried on there. There is an extensive dyeing establishment in which British calicoes and indigo are used; there is also an establishment for printing on cotton (by hand); the cloths are printed in the plain Persian style, and sold at about a single third of the price of English printed goods, which many are thus required. Copper from the mines of Arghans is brought to Tokat to be refined; and there are manufactures of the raw silk brought from Amasia and other places.

(Mr. Vice-Conul Suter's Notes on a Journey from Erzûm to Trebizond, in 'Geog. Journ.,' vol. x.; Smith and Dwight's Researches in Armenia.)

TOKAY is an ill-built town in the county of Zemplin. in Upper Hungary, on the river Bodrog, at its confluence with the Theiss. Tokay contains 4500 inhabitants, and has four churches—one Roman Catholic, one Lutheran, one Calvinist, and one United Greek; one convent of Priests and one of Capuchins. It is situated in 48° 7' N. lat., and 21° 6' E. long., on a beautiful chain of hills which is about 30 miles in length, from Szanto to Tomon, 8 or 9 in breadth, and the highest point 700 feet above the level of the sea. The whole of it, to the height of about 60 feet, is covered with brushwood. The town was the residence of Bela IV, had brought to Hungary by Italian colonists; but the finest wine is produced on the small isolated hill called the Theresenberg or Mezes-Melé (honey from the comb). The greater part belongs to the crown: the other chief owners are the Prince Breetzheim, and the family of Salm. At the foot of the several vineyards of the Heygalla the places are situated, the inhabitants of which are employed in the cultivation of the vine: the wines of Talics, Tarezal, and Tokay, obtain a name, and are consigned to the German market. A branch of the wine-bourough of Tokay, are considered as the best. The whole produce is estimated at 150,000 to 200,000 eimer (the cimer in Upper Hungary is nearly 20 English wine gallons, not imperial gallons). All these wines of the Heygalla are comprehended under the name of Tokay, though they differ a little in quality: those of Tokay and Tarezal are the finest. A great deal of wine which is sold as Tokay is produced in other parts of Hungary.

The superior productions are the wines of Tokay, and partly to the great care taken in the cultivation of the vines, in the selection of the grapes, and in the preparation of the wine. The vines are grown on the sides of the mountains, where ranges of vines are planted up, which protect the soil against torrents of rain, and, by reflecting the rays of the sun, greatly increase the heat. The ground is turned up with the spade three times in the season. Throughout this district the full ripe grapes are gathered one by one, without throwing the bunches with the sticks, and the fruit, in the different stages of maturity, into the press, as in other parts of Hungary. The wine is of three sorts. 1. The Essence. The grapes being put into a barrel with heads at the top, and their own branches, and which is sweet and thick. 2. The Ausbriuch. This wine is made from the grapes which have furnished the essence. On these grapes new wine of fresh grapes is poured, and a slight pressure applied. This wine is chiefly that sold abroad in Vienna; it has an aromatic flavour, and is not fit to drink till it is three years old. 3. The Musulas, or Muschlas, is obtained by pressure with the hands and the addition of new wine: The prices of the Essence and Ausbriuch are very high in the country itself and at Vienna.

Tokay, though a small town, is a place of considerable trade, not only as being the centre of the wine trade, but also as having great magazines of the salt of Marmaor, which are sold to all parts of the country. The salt fairs are much frequented. The vintage at Tokay gives occasion to a truly national festivity, at which great numbers of the nobles of the country are present. This fête affords the best opportunity of studying the character and manners of the several nations of which the population of
Hungary consists. The grave character of the Magyars is manifested even in their national songs, while those of the Germans and Slavonians are for the most part cheerful and gay. (Jenny, Handbuch für Reisende in dem Oesterreichischen Kaiserstaate; Cannabich, Lehrbuch der Geographie; Stein, Handbuch, by Horschelmann; Brockhaus, Convers. Erinnerungen; C.W. Röhrdauz und H.E. Lloyd, European Commerce.)

TOLAND, JOHN, was born on the 30th of November, 1669 or 1670 (it is not certain which), in the most northern part of the county of Loundonerry, in the peninsula called this Bogger, whence in one of his works, published with the Latin title, he called himself Egonosus. Though it is not known who his parents were, it is known that they were Roman Catholics. He tells us of himself, Being educated in the colleges of London, and became a Jesuit, he says that he was not sixteen years old, when he became as zealous against Popery as he has ever since continued ...

Yet in Ireland that malicious report gained upon some few, and it is probable that some of his friends happened to be so brought up himself in his childhood. He was sent first to a school at Redcastle near Loundonerry, where, we are told, that, having been christened John, had he persevered in his friendship, and that is, in the company of some boys, and took the name of John, which he ever after kept. He went in 1687 to the university of Glasgow, and after being there three years, to the university of Edinburgh, where he got a diploma as Master of Arts, in June, 1687. Shortly after this he went into England, where managing to gain the favour of some influential dissenters, he was sent by them to the university of Leyden to study, and prepare himself for the duties of a minister.

In 1697 Toland returned to his native country. Mr. Molyneux wrote to Locke, April 6th, 1697, from Dublin: 'In my last to you, there was a passage relating to the author of "Christianity not Mysterious," I did not then think that he was so near me as within the bounds of this city; but I find since that he was come over hither, and have had the favour of a visit from him. I now understand, as I intimated to you, that he was born in this country, but that he hath been a great while abroad, and his education was for some time under the great Le Clerce, but that for which I can never honour him too much is his acquaintance and friendship to you, and the respect which on all occasions he expresses for you. I propose a great deal of satisfaction in his conversation— I take him to be a great scholar, and a great politician. But there is a violent sort of spirit that reigns here, which begins already to show itself against him, and I believe will increase daily; for I find the clergy alarmed to a most extreme degree against him; and last Sunday, he had the welcome to this city, and hearing himself harangued against out of the pulpit by a prelate of this country.'

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Locke's Works, vol. vii., p. 405, 8vo., ed. 1729. Toland appeared in 1697, and was employed in various subjects, in the Bodleian library. The vanity of his character, and the obstinacy and as a free-thinking man in religion, appear to have made him conspicuous at Oxford, as they did everywhere else through the whole of his life. But in reply to a letter of advice which he received here, he denied his being either an atheist or a deist. (Collections of Several Pieces of Mr. John Toland, &c., vol. ii., p. 302.)

At Oxford he began his 'Christianity not Mysterious,' which was published in 1696, and his first printed work. He left Oxford. The remainder of the title, viz., A Treatise showing that there is nothing in the Gospel contrary to reason nor above it, and that no Christian dogma is in any way inconsistent with the object of the publication. The work created a very considerable sensation, and elicited much attack and some persecution.

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of the queen of Prussia; they both courted his conversation, and afterwards his correspondence. On the occasion of the latter, when he held his annual discourse with Beaumarchais in the presence of the queen, who acted as a sort of moderator, and closed it, on observing that the disputation were beginning to lose their temper. His letters to Serenas, published in 1704, were addressed to the queen of Prussia.

In 1702, in an interval of his residence abroad, he published "Vindicatus Liberus; or, Mr. Toland's Defence of himself against the Lower House of Convocation and other delusory opinions ascribed to him, in a subdued tone, which is perhaps to be accounted for in a great measure by the prospect of political advancement which seemed to be opening for him. Being now arrived to years that will not wholly excuse the credulity of his readers, or inattention. I firmly hope that my persuasion and practice will show me to be a true Christian, that my due conformity to the public worship may prove me to be a good churchman, and that my untainted loyalty to King William will argue me to be a staunch commonwealth's man." Subsequent theological works showed this to have been a moderation merely assumed for the time.

The mask of orthodoxy was thrown off in a pamphlet which he published in 1706, in the title of which he did not scruple to designate himself a 'Pantheist': 'Socinianism truly stated, being an example of fair dealing in theological controversies; to which is prefixed Indifference in the Sacrament, answered by Mr. Beaumont, an epistolary friend.' But he was now enjoying the zealous patronage of Harley, afterwards Earl of Oxford, who, in the previous year became secretary of state, and he probably thought it not affront that free-thinkers be the object of later employment. Harley employed him to write several political pamphlets, and sent him abroad again in 1707, to Germany and Holland. The nature of his connection with Harley may be gathered from the following extract from one of his letters: 'I have seen many memorials to the Earl of Oxford, which are printed in a posthumous collection of his pieces written at a time when the zeal of his patron had cooled.'—I laid an honester scheme of serving my country, your lordship, and myself; for seeing the latter convenient for those who would be all dear to me, that I should appear in any public post, I sincerely proposed, as occasions should offer, to communicate to your lordship my observations on the temper of the ministry, the dispositions of the people, the condition of our enemies or allies abroad, and what I might think most expedient in every congregation; which advice you wished to follow, whole, in part, or not at all, as your own superior wisdom should direct. As much as the present occasions allow, I have thought so by others, for general observations, so much have I ever abhorred, my lord, those particular observers we call spies; but I despise the calumny so less than I detest the thing.' He published this pamphlet in the same year, and was absent for about three years, acting as a sort of political spy for Harley, through he disapproved the name, and eking out his subsistence by his pen, and apparently in any way that presented itself. He made a trip from Holland to Vienna, commissioned by a wealthy banker to procure for him from the imperial ministers the rank of a count of the empire; but he did not succeed in attaining the object of his mission. He managed in Holland to ingratiating himself with Prince Eugene, who was very attentive and liberal to him. In the 'Memorial' to the Earl of Oxford, which has been before quoted, Toland mysteriously connects this prince with his mission to Vienna, and cunningly tries to give this foolish judgment a character of great dignity and honour. 'My inimenable negotiation at Vienna, hid under the pretence of curiosity, was not only applauded by the prince that employed me, but also pronounced highly rewarded' (p. 220). In due time he returned to Harley, and then wrote a pamphlet against him. As a Whig pamphleteer, he had the honour of Swift's notice in 'Toland's Letter to Dama.'

The principal publications of Toland which remain to be noticed are the following: 1. "Defence of Mr. Newton's "Prerogative of the English Parliament," against "Dr. Holdius,"" published in 1714; 2. "Caterina," a poem, dedicated to the late Princess, and illustrated by the "Art of Restoring, or the

Piety and Proidency of Gentle Monks in bringing about the last Restoration, evidenced from his own Authentic Letters, and a just defence of his personal character, as far as he can" (by Sir Roger was meant the earl of Oxford, his former patron, who was then plotting the restoration of the Pretender); and 3. "A Collection of Letters by General Monk, relating to the Restoration of the Royal Family," published in 1714; 'Reflections for Naturalizing the Jews in Great Britain and Ireland, on the same footing with all other nations, with a Defence of the Jews against all Vulgar Prejudices in all Countries,' published in 1714; 'The Saviour's Kingdom and the Sodality of the Keldees, or a particular account of its several Interesting and Particulars, their bent and genius, and what each of them, with all the rest of Europe, may hope or fear from the reign and family of King George, as a mean to the Prince of Wales, that led Toland to publish a second part; "Nazarineus," or Jewish, Gentile, or Mahometan Christianity, containing the History of the Ancient Gospel of Barabas, and the Modern Gospel of the Mahometans, attributed to the same Author, this last gospel being now first made known among Christians: also the original plan of Christianity, occasionally explained in the Nazarene, whereby divers controversies about this divine (but highly perverted) institution may be happily terminated; with the relation of an Irish manuscript of the four gospels, as likewise a summary of the ancient Irish Christianity, and the reality of the Keldees (an order of lay religious), against the two last bishops of Worcester,' which appeared in 1716; 'Pantheisticon,' a work 'published in Rome in tres partes divisa, quam Pantheistaram sive sodalium continent, 1. Mores et axiomata; 2. Numen et philosophia; 3. Libertatem et non fallentem legem neque alicuius fidei obstatentem.' The English edition was published in 1723; 'Theatrum Politicum,' published in 1725; 'The Principles of the Society of Jesus,' published in 1726; 'Toland's Works, in ten volumes,' published in 1721; 'Memoirs of the Earl of Shaftesbury to Robert Molesworth, Esq., now Lord Viscount of that name;' with two letters written by the late Sir John Cropley:

Some of Toland's other things will show at once the learning and the fantastical pedantry of Toland. The 'Tetradymus' consists of four treatises, which bear the names Hodeges, Clysphorus, Hypatia, and Mangoneutes, and have for their respective subjects the pillar of cloud and fire which led the Israelites, and which Toland calls the Holy Israel; the exoteric and esoteric philosophy of the antients; an account of the female philosopher Hypatia, who was murdered at Alexandria, as was supposed, at the instigation of her father, in 415. From her he had attacked his 'Nazarineus.' The 'Nazarineus' and the 'Pantheisticon' had again evoked the anger of the church. Dr. Hare, dean of Worcester, in a treatise against Hoadley, speaks of this pamphlet as being that which Toland never dreamed of. Toland published an advertisement to the effect that he had never quoted or even named Locke in his writings. Hare issued a counter-advertisement, in which he directs makes great use of Mr. Locke's principles to the lad and instead of 'it is often of the utmost import notions he never dreamed of.' Toland then published a pamphlet, with the title 'A Short Essay upon Lying, or a Defence of a Reverend Dignitary, who suffers under the persecution of late Tranquillus,' and as his advertisement was reprinted, with Hare's advertisement, as an appendix, tolh; Toland returned to the charge, and, in the preface to a new edition of his work, speaks of 'downright Atheists,' such as the impious author of the 'Pantheisticon.'

Towards the close of his life, Toland, whom all his literary industry could not keep from pecuniary difficulties, found a benefactor in Lord Molesworth. Mr. D'Israeli, in his "History of the English Stage," mentions this young gentleman as the person who printed 'Toland's Works.' The 'Tetradymus,' and the 'Nazarineus' were reprinted by the "Society of Authors," mentions, from Toland's papers which he has seen, the pilly symphony which he generally received for his writings. 'For his description of Epos he was receive 1700, one guinea for his pamphlet on Naturalizing the Jews, and ten guineas more in case Bernard Lintott sold 2000.' And in another place, in the 'Quarrels of Authors,' in the chapter headed 'Toland's Account-Book,' he says, 'It appears that Toland never got above £10, or 210, for
his publications. ... All this author seems to have reaped from a life devoted to literary enterprise, and philo-
sophy, and was of the age of 80 when he died in 1728, according to
Litolff's life of him. This last statement must be an exaggeration. 
Further details as to Toland's literary gains, derived also from
Litolff's Interview-Book, are to be found in Nichols's Liter-
ature in 1726.
Toland died at Putney, where he had lodged for about
four years previous, choosing that place on account of its
convenience, and where he died in 1727.
Toland's posthumous works were published in 1726, in
2 vols. 8vo., with a Life by Des Maizeaux prefixed, and
were reprinted in 1747. The contents of these two volumes
are an account of the life and works of the author. They
contain, together with many other essays, the Memo-
rials of the Earl of Oxford which have been referred to,
and several private letters; an account of Giordano Bruno;
the History of Spain; the History of France, and Yalgar
of Spain, engraved. Toland had been concerned in a Plan for a National Bank,
and a proposal, in Latin, for a new complete edition of
Cicer. a Historical Account of the Life and Writings of the late famous
Mr. John Toland, by one of his most intimate friends, in a letter to the Lord
or rather a sketch of his writings and means. There is appended
to it a complete list of Toland's works, many of the smaller
of which are not mentioned in this article.
Toland's works have never been collected, and the no-
tority which attended him during his life has, having soon
died away, they are now little known. But they are almost
all of some worth, and his political writings may throw some
little light on the history of the times.
TOLDO, a province of Spain, formerly part of New
Castile, but now a separate province. It is divided
into three large districts, Toledo, Ocaña, and Talavera,
comprising 289 towns and hamlets. Its boundaries are,
to the north the province of Madrid; to the east that of
Cuenca; to the south the province of Castile-La Mancha,
and to the north-east the province of Avila. It covers a surface of
784 square leagues (Spanish), and is watered by five rivers,
the Tagus, the Tajo, Rio Anares, Guadarrama, and Alberche, besides other inconsiderable streams. A chain of
mountains—Los Montes de Toledo-interacts it from east to west.
TOLDO (Toletum), a large city of Spain, and
the capital of the province of that name, is situated on a rocky
eminence surrounded by the Tagus, except on the northern
side, in 39° 52' N. lat., 4° 11' W. long. It is a very ancient
city. Pyrrhus, one of the fabulous kings of Spain, is sometimes
called the founder. Its origin is also attributed
to some Jews who migrated to Spain during the period of
Judaism in Jerusalem, and who called it Tole-
do, i.e. genealogies; because they say the exiles there
reviewed their family genealogies when they assembled
to dig the wells and found the city. In support of the latter
theory Manuel Insturz has pointed out in the province of
Toledo which retain to this day the names given to them
by their Hebrew settlers, such as Escalon, from Ascalon;
Noves, from Nore; Maqueda, from Megiddo; Jepes, or
Yepes, from Jericho; etc. Toledo was a city of some impor-
tance under the Romans, who made it a colony. In a.d. 577, Leovigild, king of the Goths, transferred the seat
of his empire from Seville to Toledo. It was also greatly
enlarged and embellished by Wamba, who surrounded it
with walls. The city is built upon a hill, and is about
6 miles in circumference. Under Turk Ibn Zeyyad, in a.d. 712 (April), after the celebrated battle
of Guadalete, which opened the gates of the Peninsula to
the Moors.
Under the Arabs, Toledo was a city of the first rank, second to none but Cordova, the capital of the
Mohammedan empire. Its motley population,
composed of Arabs, Berbers, Jews, and Christians, which
last were denominated Mostarabes, or Mozarabes (Moor-
ish Christians), were of different nationalities, and, with
the exception of the Moors, were instituted by
Tolando, at the breaking up of the empire of the Beni-
Umayyad, and when the governors rose in the provinces
and declared themselves independent of the capital
at Cordova, the province of Toledo, which had been
locked into a kingdom by a powerful chief
named Ibn Yayah. At his death he was succeeded by
Isaiai Ibn Dhi-n-nun, and this latter by Yahya Ibn Dhi-
nun, surnamed Al-mamun, an able and enterprising
monarch, who became the chief of science in the provinces
of Valencia, Cordova, and other large cities to his hereditary
dominions. His son Yaya, surnamed Al-kadir-billah,
succeeded him in 1075, but in the year 1083 Alfonso VI.
was raised to the throne of Castile, and introducing
the metropolitan into Toledo, took possession of that city in the 25th of May, a.d. 1085.
Alfonso having assumed on the occasion the title of emperor of Toledo, and founding the Respublica Real & Imperial
(Royal and Imperial). During the civil wars between
Peter the Cruel and his bastard brothers Don Facund and
Don Enrique (1354-69), Toledo was often taken and retaken,
and the population, which consisted chiefly of Jews, sub-
mited to all kinds of sufferings until 1369.
Toldeo is the see of an archbishop, who is the primate
of all Spain, and has the title of 'Canciller de Castilla.' The
bishopric of Cordova, Cuenca, Siguenza, Jaen,
and Barcelona, occupies the ancient territory of the
province of Andalucia, which was formerly the richest see in all Spain, but
the revenue is now greatly diminished. Some of the
greatest men that Spain has produced have been
archbishops of Toledo, as Rodrigo Simon de Rada, Ximenez
de Cisneros, Gil de Albornos, Mendosa, Torres, and many
others.
The cathedral is the largest in Spain, and is by some
considered the finest; for although, owing to its having
been built at different periods, it does not present
that uniformity of style which might have been confidently
expected, it is nevertheless exceedingly interesting in its details. It stands
on the site of the old Moorish mosque, and the foundations
were laid, in 1298, by Ferdinand III. of Castile, afterwards
married to Queen Isabella, and Ferdinand, and Rodrigo Ximenez,
at that time archbishop of Toledo. It consists of
the nave, and measures 404 feet in length and 204 in width.
The naves are supported by eighty-four colossal pillars
and the whole church is paved with white and blue
marble. Some of the chapels are adorned with
La Capilla Mayor (great chapel), which was enlarged
by Cardinal Ximenes, contains the mausoleums of Alfonso
VII., Don Sancho el Destacado, Don Sancho el Bravo, the
kings of Castile, and the remains of the famous
Archbishop Don Pedro de Mendoza, which last is sur-
rounded by a most beautiful plated iron railing. The
chapel of Santiago, where the celebrated Don Alvaro de
Guas to and his wife, Maria de la Pimentel, are buried; that
of San Ildefonso, Nuestra Sehora de la Churra, and other
chapels—most of which contain the tombs of Enrique II.,
Juan I., Enrique III., and their wives—are all deserving
of notice for their architecture, and the profusion of ex-
quisite marble and carvings in wood with which they
are decorated.
Another chapel, called Capilla Mzarabe, because mass is still said daily according to the Mozarabic
ritual, is a great curiosity of its kind. It was founded, in
1610, by Cardinal Ximenes. The cathedral of Toledo was
formerly celebrated for its jewels and its silver and gold
ornaments. There was once, among other relics, a figure
of massive gold representing San Juan de las Viñas, and also
a petticoat of Our Lady embroidered with pearls and
rubies, said to be of inestimable value. Most of them
however disappeared during the Peninsular war, and what
remained has lately been disposed of by the government.
Annexed to the cathedral is the archbishop's palace, which
contains a very large library, rich in old manuscripts.
Besides the cathedral, Toledo has other splendid buildings,
among which the following are the principal:—The
convent and church of San Juan de los Reyes, built, in 1475,
by Ferdinand and Isabella, in commemoration of the vic-
try they gained over the Portuguese in the battle of
Aljubarrota. Later, in 1492, another convent was
erected by the friars, and later still, in 1510 another
convent was built, these latter being built by the Christian
and Moslem nations in the city of Cordova, the
province of Andalusia, which was taken by the
Catholic sovereigns in 1492, and the Moors, who were
killed in the battle of Guadalete, were surrendered to the
outside walls of the town, and where they are to be seen, to
the east of the elcoster, built in the richest Gothic, are particularly
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admired. The foundling hospital of Santa Cruz, founded by Cardinal Mendoza in 1504; that of St. John the Baptist, called 'The Royal Hospital of a fevers,' because it stood outside the city walls, built and richly endowed by Cardinal Tavera; San Juan de la Penitencia, which is a foundation of Ximenez,—all will afford subject of study to the artist. La Iglesia del Transito, one of many Jewish synagogues built during the reign of Peter the Cruel, at the expense of his treasurer, Samuel Levi, is a curious specimen of Saracenic architecture. The same may be said of another church, called Santa Maria la Blanca, which was once a Moorish mosque.

The Alcazar, or royal palace, stands on an eminence, at the foot of which flows the Tagus. It was built by Alfonso X. on the site of the Moorish palace, and was almost entirely rebuilt by Charles V., who employed the Spanish architects of his time. His son, Philip II., made also considerable additions to it, which were principally directed by his chief architect, Herrera, who designed the Escorial. At present it is in a very dilapidated state, and unless it is speedily repaired, it will soon be a heap of ruins. A lunatic asylum, called 'el Nuncio nuevo,' and the 'Universidad Literaria,' are the only two modern buildings of note. Both were erected about the end of the last century by an enlightened archbishop, named Lorenzozana.

At a short distance from the city, on the right bank of the Tagus, are the ruins of a Moorish building, which the people of the country call 'Los Palacios de Galiana;' it is surrounded by a castle of small towers belonging to the Moors and rulers of Toledo. Of the two bridges on the Tagus, that of Alcantara was built by the Arabs. It consists of only one arch, which spans the whole stream. The streets of Toledo are very narrow and crooked, like those of most Moorish towns. Several famous battles, which are built in the Moorish style, have generally only one or two stories; and the apartments are arranged round a court, over which an awning is thrown. In this court, which is frequently ornamented with a fountain and flowers, the family usually sit in summer-time. The environs of the city are barren and unproductive, but the neighbouring mountains contain some green valleys, where the wealthy inhabitants have their villas and houses, called 'cortijales.' During the fifteenth and sixteenth centuries Toledo was celebrated for its manufactory of sword-blades, as well as for its silks: the fabrication of the former still continues under the patronage of the government; but of the latter, not one loom remains in operation. The population of Toledo, which in the sixteenth century exceeded 100,000 inhabitants, does not amount now to 12,000. There are several histories of Toledo, among which the most curious description of the city is that of Father Herrera, a Jesuit, of the name of Roman de la Higuera, well known as the forger of the chronicles of Luitprand and Duxtrus, wrote also a history of Toledo in several volumes, which is preserved in manuscript in the Royal Library at Madrid.

(Milanino, Diccionario Geografico, vol. viii., p. 444; and the historians above named.)
great horror of that gloomy and arbitrary court and its secret proceedings; they had heard of its deeds in Spain, and they determined to resist its introduction into their country, even by force of arms if need be. The incident took place about the middle of May, when the people tore down the placards containing the edict which sanctioned the establishment of the Inquisition, from the gates of the archbishop’s palace, the principal thoroughfares, streets and squares; most of the nobles, who hated Toledo for their own reasons, joined the citizens in their resistance. The people turned out some of their municipal magistrates, whom they suspected of being for the viceroy, and elected others of their own choosing. Toledo, having resented this proceeding, the people took up arms, and attacked the Spanish soldiers who Garrisoned the castles. The Spaniards fired with cannon into the city, and the streets and squares were strewn out for a long time with the bodies of the dead and the wounded. The viceroy, having seized some of the head strikers, caused them to be summarily executed, which added fuel to the flame, and the citizens and nobles formed themselves into a union or patriotic convention, taking for their motto, ‘For the service of God, the emperor, and the city of Naples;’ stigmatizing as traitors to their country those who did not join the union. The union sent as envoys to Charles V. the prince Sanseverino and another nobleman, who remained within the territories of their viceroy, who remained in the castle with his Spanish soldiers and a few Neapolitan adherents, and the town was without any regular government. Frequent skirmishes took place in the vicinity, and of those who perished, several hundred men and many individuals were killed, and houses were plundered. At last the answer came from Charles V., commanding the citizens to lay down their arms, with secret instructions to the viceroy to proceed leniently and prudently in the management.

On the 12th of August Toledo signified to the deputies of the city the will of the emperor that the Inquisition should not be established in Naples; that the past should be forgotten; that the affair was not the affair of legislation itself, but the affair of the last day of the unfortunate day of the revolution, who were obliged to emigrate; and that the city should pay one hundred thousand crowns as a fine. And thus this serious affair was hushed up, but the Neapolitans gained their point, and the tribunal of the Inquisition was never established at Naples, though persons accused of heresy were tried by the common ecclesiastical court, and several of them were put to death by the conviction of the lay power. The prince Sanseverino, who had displeased Charles V., thought it prudent to emigrate to France, and was outlawed. [Tasso, Bernardo.] In July, 1532, a large Turkish fleet, under Dragut Rais and Sisman Pasha, anchored near Procida, at the entrance of the Bay of Naples, and the inhabitants of Salerno were to have joined them with a French squadron; but the viceroy, it is said, by means of a large bribe, induced the Turkish commanders to leave the coast before the fleet could approach.

Towards the end of the same year the viceroy, although old and infirm, was desired by Charles V. to march to Sicily with a large force in order to meet a powerful army sent from France, under Gambino. The viceroy, although old and infirm, was desired by Charles V. to march to Sicily, which republic had thrown off the protection of the emperor and adopted a French garrison. Don Pedro having sent most of the troops by land, embarked with the rest for Leghorn. On arriving there he fell seriously ill, and was removed to Florence. The duke Cosmo de‘ Medici had married his daughter Eleonora. He expected to derive from the influence and power which he held the kingdom of Naples for more than twenty years. He is by far the most distinguished in the long list of the Spanish governors of Naples, and one of the few who are still remembered with feelings of respect by the Neapolitans.

(Giannone, Storia Civile del Regno di Napoli; Botta, Storia d’Italia.)
The 'underneath' matter be is {Moral But is practised. What is peculiar ance, tolerated and in watching the exercise of the faculties which God has given must, as a general rule, conduct to good, require that every action and expression of opinion should be tolerated, save those which clearly condense the happiness of the members of the particular political society.

The scope of tolerance among individuals, as applied to opinions, has been well defined by Mr. Bailey, in the following passage from his admirable 4 Essays on the Formation of Opinion and Public Opinion: 'It is in no imputing to others any moral turpitude because their opinions differ from our own. It does not consist in ostensibly yielding to the opinions of others, in refraining from a rigorous examination of their soundness, or from detecting and exposing the fallacies which they involve, but in regarding those who hold them as free from consequent culpability, and abstaining from casting upon them that moral odium with which men have been ready in all ages to brand laws such as deviate from the miserable compound of truth and error which they hugged to their own bosoms.' The importance of cultivating the virtue of tolerance in the education of individuals cannot be too strongly insisted upon. The bond between the community possess power, or in which they influence indirectly a government that is not in itself democratic, and that requires the control of a wise public opinion, the duty of the toleration act is set up to by a state will greatly depend on the state of the tolerant feelings prevailing among its individual members.

It is the duty of the governing power in a state to tolerate all actions and opinions save those which have a tendency contrary to the happiness of its members. The practical question then to be solved is, What are the cases of exception? what are the actions and opinions which it is the duty of the governing power in a state to repress? The proper solution of this question will be necessary for any participant in the state of toleration may be properly fulfilled. In the case of each particular state, there will be particular circumstances entering into this question. But it is obvious that we must here content ourselves with a general answer to the question.

It is the first duty of every government to protect, to the utmost of its power, the persons and the property of all and each of its subjects, and to repress all injuries to these. It is the second duty of every government to prevent or remove that free circulation of opinions calculated to suggest or encourage such injuries. It may often be a question, as with all other opinions which it is desirable to repress, whether active steps for the purpose may be taken, with the effect of extending than of contracting the circulation of the opinion. True, it may be said, this is a matter of prudence, which does not affect the question of the desirability of repressing such opinions, and of the duty of the state to pursue what may be the best method of repression.

It is the duty of the governing power in a state also, watching over and availing itself of every means to forward the moral welfare of its members, to repress immoralities, whether of action or of published opinion. The same question will occur, as in the former case, as to whether prosecution in many cases will not thwart rather than forward its object; but to abstain from prosecuting on the ground of prudence is not to tolerate, and there will be no discretion in the matter of expediency. The same toleration in a state, open acts of lewdness and indecency, the exhibition of indecent prints, immoral books, &c.

We come now to cases which present more difficulty, and in which there is more scope for the modifying influence of differences in form of government and in other circumstances of political societies, viz., the cases of opinions on government and on religion. The degree to which differences of opinion on these subjects are to be tolerated is, a question of great importance, and into which, in almost every different state, some peculiar elements enter.

It may be stated generally however, that the maintenance of an existing government, its protection against overthrow or rebellion, is required for the happiness of those who are under it, and that it will be the duty of the governing power to prevent acts tending to its overthrow, or to the overthrow of the government. It is the duty of government to the maintenance of a government in which a large portion of the community have a part. The degree to which restriction is required by a form of government will not be more, than the consideration of the common good and form of government; but there can be no question as to the duty of the governing power to impose the amount of restriction necessary for its own safety. Disobedience to an established government, let it be never so bad, is an evil less than the mischief of anarchy. (Austin's Province of Jurisprudence Determined, p. 54.) But it will be a question, and in the cases of all governments open in any degree to popular influence, a question likely to excite much and keen discussion, what is the requisite amount of restriction.

And here there will be no difficulty as to overt acts against a government, such as rising in arms to alter it, &c. But as regards spoken and written opinions affecting the government, the laws must be determined in a more precise point at which the safety of the government and the interests of free discussion are both sufficiently consulted. It will be the natural aim of those who possess power to prevent the actions of the government, but the balance between public duties, to overstretch the proper limits of free discussion; and, on the other hand, the mass of the community, looking at the question from an opposite point of view, will be disposed to attach less importance than before the question is properly adjusted. In the case of a despotic there is of course no toleration of political opinion. But in constitutional governments, see the difference between the degree of toleration of political discussion established among ourselves, and in France or in the German states, even to the extent of themselves—Bodin and Würtzberg. And see the struggles which the people of England have undergone to achieve the degree of freedom as to political meetings and the press, which is now enjoyed in this country.

There remains to be considered the question of the toleration of religious opinions in a state, to which question the use of the word toleration is often specially appropriated. It is more especially applicable to the establishment of religious opinions, according as there exists or does not exist an established or church-establishment in a political society. We are here concerned only with the existence or non-existence of an established religion as facts, and finding political societies either with or without, and not with the degree of religious toleration to the cases. The question of the desirability of an established religion has been already considered, so far as is compatible with the object of this work, in the article Germany.

Where no particular system of religion has been adopted by the governing power in a state, and distinguished from all others, no question arises save that of the duty of representing, in whatever may be the most efficacious mode, the implications of opinions hostile to the foundation of religions. This exception to the general toleration of all opinions on religion, which is implied in the absence of an established religion, is thus expressed and argued by Dr. Paley, an eminent theological writer, in his Principles of Moral and Political Philosophy: "Under the idea of religious toleration I include the toleration of all books of serious argumentation: but I deem it no infringement of religious liberty to restrain the circulation of ridicule, which attacks or defames the opinions on religious subjects; because this species of writing stimulates the passions, weakens the judgment, and contaminates the imagination of its readers: has no tendency whatever to assist either the investigation or the impression of truth: on the contrary, whilst it stays not, distinguishes between the authority of different religions, it destroys alike the influence of all. (Moral and Political Philosophy, p. 472. ed. 1800, 6 vols. 6vo.) The repression of profanity and blasphemy rests upon the same grounds as that of indecency and immorality.
But where a church establishment exists, there has at once been a distinction between one set of religious opinions and all others, and power and preeminence have been given to the holders of the favoured religion over all other religious denominations. They who are thus professedly religious are specially favored by government, or by exclusion from civil privileges, all whose religious tenets are not those of the establishment, and the latter fighting for the rights of conscience and the cause of free discussion of truth in religion, which is committed to God. The first striving to suppress by violent punishments, or by exclusion from civil privileges, all whose religious tenets are not those of the establishment, and the latter fighting for the rights of conscience, by a public policy grounded on the general happiness. Let then a church establishment exist as a means by which the governing power in a state may most effectually educate its people in the right way of civilization; and at the same time let all who dissent from the established religion pursue in peace the worship which they severally approve of, and let all members of the state, of whatever religious denomination, participate equally in civil rights, except so far as such participation may tend to destroy the church establishment.

There is no part of Dr. Paley's well-known treatise on the Church and Establishment, in his chapter 'Of Religious Establishments and of Toleration.' Having contended for the existence of a church establishment, and having in the course of his argument for this purpose laid down the two propositions, that any form of Christianity is better than no religion at all, and that, of different systems of faith, that is the best which is the truest, he proceeds:—Toleration is of two kinds; the allowing to dissenters the un molested profession and exercise of their religion, but being, however, liable to persecution and emolument in the state, which is a partial toleration; and the admitting them, without distinction, to all the civil privileges and capacities of other citizens, which is a complete toleration. The expediency of toleration, and consequently the liberty which no citizen is entitled to assure to himself, as relates to liberty of conscience, and the claim of being protected in the free and safe profession of his religion, is deducible from the second of those propositions which we have delivered as the grounds of our conclusions upon the subject. That proposition asserts truth, and truth in the abstract, to be the supreme perfection of every religion. The advancement, consequently, and discovery of truth, is that end to which all religion, or according religion ought properly to be adapted. Now, every species of intolerance which enjoins suppression and silence, and every species of persecution which enforces such injunctions, is adverse to the progress of truth; forasmuch as it causes that which is fit to be made known to be gradually gained over the other and much better, and with much more probability of success, left to the independent and progressive inquiry of separate individuals. Truth results from discussion and from controversy; and in religion, as in other subjects, truth, if left to itself, will almost always obtain the ascendency. If different religions be professed in the same country, and the minds of men remain unfettered and unavowed by intimida-
tions of law, that religion which is founded on maxims of reason will be the most popular, and will gain the ascendency, except when there are some auxiliary considerations too important to be omitted. The confining of the subject to the religion of

the state is a needless violation of natural liberty, and is an instance in which constraint is always grievous. Instruction produces no sincere conviction, nor any real change of opinion: on the contrary, it vitiated the public morals, by driving men to procrastination; and commonly ends in abuse, and the general thoughtless treating or abusing, under the name of revealed religion, systems of doctrine which men cannot believe, and dare not examine; finally, it disguises the character and wounds the reputation of Christianity itself, by making it the author of oppression, cruelty, and bloodshed.

Concerning the admission of dissenters from the established religion to offices and employments in the public service (which is necessary to render toleration complete), Dr. Paley's remarks have a still more marked appearance of reason. It is possible that such religious opinions may be held as are utterly incompatible with the necessary functions of civil government; and which opinions consequently disqualify those who maintain in them from exercising any share in its administration. This is possible; therefore it cannot be laid down as a universal truth, that religion is not in its nature a cause which will justify exclusion from public employments. When we examine, however, the sects of Christianity which actually prevail in the world, we must confess that, with the single exception of refusing to bear arms, we find no tenet in any of them which incapacitates men for the service of the state. It is true, some have taken this to be a common function of religions, even supposing each religion to be free from any errors that affect the safety or the conduct of government, is enough to render men unfit to act together in public stations. But upon what argument, or upon what good example, have we the least foundation for thinking, why men of different religious persuasions may not sit together upon the same bench, deliberate in the same council, or fight in the same ranks, as well as men of the same persuasion, without any violation of natural philosophy, history, or ethics. (pp. 470-3.)

Such is the clear, cogent, and temperate statement of the question of religious toleration by an eminent member of the Church of England. The paper on the subject is great length, from different points of view, and with differences of opinion in detail, but always with eminent advantage to the cause of toleration, whose progress in England has been materially aided by them, by Chillingworth in his 'Religion of Protestants in a Safe Way to Salvation,' by Jeremy Taylor in his 'Liberty of Prophesying,' and by Locke in his 'Treatises on Toleration.'

The history of the literature of toleration generally, and in our own country, especially, and particularly, religious toleration itself in the several European states, and particularly in England, are subjects all of them interesting, but any one of which it would be impossible to treat within the limits of this paper. The leading points of the history of religious toleration in our own country are indicated in the article DISSENTERS.

TOLETAiNUS, RODERICUS, or RODRIGO DE TOLÉ DO, an eminent ecclesiastic and historian, was born at Badia, in Navarre, about A.D. 1170. His name was Rodrigo Simonis, commonly Ximenes; but he is better known as Rodericus Tolentanus. On his return from Paris, where his parents sent him to complete his education, he attached himself to Sancho V., the Infante, by whom he was employed to negotiate a peace with Alfonso VIII. of Castile. The manner in which he discharged this mission procured him the favour of Alfonso, by whom, in 1192, he was appointed bishop of Siguenza, and on the death of the present bishop of Toledo, he was raised to the vacant see. He showed great zeal in the frequent wars with the Moors, and at the battle of Las Navas, where the Almohades, under Mohamed An-nasir, were defeated by Alfonso, his penance was the first to fight the back ranks of the enemy. Indeed such were his courage and martial disposition, that even when the king was at peace with the Moors, he would, at the head of his own vassals, strike frequent encounters into the Moors, and engage them in such a manner as to enjoy so much favour with the kings of his time, especially with San Fernando, that nothing was undertaken without consulting him. His zeal for learning was no less a sedent than his hatred of the infidel. He persisted in the study of the history of his country, and took measures to avoid the necessity of sending youths to be educated in foreign countries. At the fourth Lateran council he is
said not only to have harangued the fathers in elegant Latin, but to have gained over the secular nobles and ambassadors by conversing with each of them in his mother tongue. He died in France, in 1647, after attending the coronation of Louis, convoked by Innocent IV. His body was carried to Castile, and interred in the Cistercian monastery of Huerta. To him the history of his native country is more indebted than to any other man. He wrote several historical works, most of which are published in the collection entitled 'Hispania Illustrata,' by Andreas Schott, Frankfurt, 1653-8, 4 vols. fol. His 'Historia Arabum,' or history of the western Arabs from the birth of the Arabian prophet to the invasion of Spain by the Almoravides, shows him to have been well versed in the language and history of the Arabs. This valuable work was first published, in 1603, in the second volume of Andreas Schott, 'Hispania Illustrata,' and subsequently, in 1625, by Bennedictus as an appendix to his 'Historia Saracenica' of Georgius Elmæus. There is a third edition. He also wrote a history of the Ostro-Goths, another of the Huns, Vandals, Suevi, Alans, and Silings, which is published in the collection entitled 'Rerum Hispánicarum Scriptores aliquot,' Frankfurt, 1579, 3 vols. fol., and subsequently by Schott; a history of the Old and New Testament, entitled 'Annalae Saxonæ, or the Old and New Testament,' published, and other works, the list of which may be seen in Nicolas Antonio. (Marina, Hist. Gen. de España, lib. ii., cap. 22; Zurita, Annales Argonensis, lib. ii., cap. 67; Nicolas Antonio, Bibl. Hist. Vetus, vol. 50.)

TOLL, from the Saxon ' tolne ;' in German, 'zoll;' 'called (as in Law Latin 'tolenum,' 'theolonium,' and 'tolnetum,' with many other variations, which may be seen in Ducange, all which Latin terms are derived apparently from τόλμην, 'corrected, or distributed, or revenue, or profit paid in money or in kind, in fixed amount, made either under a royal grant, or under a prescriptive usage from which the existence, at some former period, of such a grant is implied, in consideration of some service rendered, benefit conferred, or right forborne to be exercised, by the party entitled to such payment.

The owner of land may in general prevent others from crossing it either personally or with the cattle or goods, by bringing actions against trespassers, or disclaiming their cattle or goods. (Distress.) These remedies cannot be refused to the owner of the land who has acquired in its being used as a public way; but in such case there may have been injury, so that the owner is entitled to demand a reasonable compensation for the accommodation: this is toll-traverse.

Where a corporation, or the owner of particular lands, has the exclusive right of crossing the road or tolls of a town or bridge, &c., and, in consideration of the obligation to repair, has immemorially received certain reasonable sums in respect of persons, cattle, or goods passing through the town, such sums are recoverable at law by the name of toll-thorough.

An antient toll may be claimed by the owner of a port in respect of goods shipped or landed there. Such tolls are port-tolls, more commonly called port-dues. The plural of these words was antiently called the Toley, where, as at the modern Exchange, the merchants usually assembled, and where commercial courts were held.

Another species of toll is a reasonable fixed sum payable by royal grant or prescription to the owner of a Fair or Market, from the buyer of tollable articles sold there. The benefit which forms the consideration of this toll is said to be the security afforded by the protection of the sale by the owner of the fair or market, or his officers. It is not due unless the article be brought in bulk into the fair or market. Where however the proper and usual course has been to bring the bulk into the fair or market, the owner of the fair or market may be entitled against a party who sells by sample, in order to deprive him of his toll. In some cases, by antient custom, a payment, called turn-toll, is demandable for beasts which are driven to the market and return unsold. The term toll is sometimes extended to the compensation paid for the use of the soil by those who erect stalls in the fair or market, or for the liberty of picking holes for the purpose of temporary erections; but the former payment is more properly called a stallage, and if the franchise of the fair or market, and the ownership of the soil on which it is held, come into different hands, the stallage and piege go to the owner of the soil, while the tolls, partly at least, may be continued.

If tolls are wrongfully withheld, the party entitled may recover the amount by action as for a debt, or upon an implied promise of payment, or he may seize and detain the whole or any part of the property in respect of which the toll is due, and sell such property, and if excessive toll be taken by the lord, or with his knowledge and consent, the franchise shall be seised; if without such consent, the officers shall pay double damages and suffer imprisonment. (Stat. 3 Edw. I. c. 31.)

Grants of tolls were formerly of very ordinary occurrence. But it seems to be very probable that many antient payments of this description, though presumed, from their being so long acquiesced in, to have a lawful origin under a royal grant, were in fact mere encroachments. The evil was however practically lessened by the exertion of the royal prerogative of granting immunities and exemptions from liability to the payment of tolls, either in particular cases, or in general, in order to prevent abuses, and the exemption was usually exercised also by inferior lords who possessed juris regalia. Tho Reginald de Dunstanville, earl of Cornwall, granted to his burgesses of Truro (Truro) to be free of toll through- out the realm, under the title of 'Coram Regali ingenuis,' (Hist. Espaia, ii., III., 111.) If a party entitled to exemption was wrongfully compelled to pay toll, the remedy was by writ of esseundo quetum de theologia (of being quit of toll), which might be brought, either by the individual aggrieved, or by the exempted body of which he was a member. (Reg. Bren., 258; F. N. B., 226, b.)

The term 'toll' is used in modern acts of parliament to designate the payment directed to be made to the proprietor of canals, turnpike roads, canals or bridges, &c., in respect of the passage of passengers or the conveyance of cattle or goods.

The term toll is applied to the portion which an artificer is custom or agreement, allowed to retain out of the bulk in respect of services performed by him upon the article; as corn retained by a miller in payment of the murture; also to the portion of mineral which the owner of the soil is entitled, by custom or by agreement, to take, without payment, out of the quantity brought to the surface, or, as it is technically called, to gross, and made merchantable, by the mining adventurer. To collect these dues the duke of Cornwall, and other great landlords in the forest and districts of the west, have their officers, called tollers. (Tollers. [Toll.])

TOLLUS, CORNELIUS, a Dutch philologer, was born at Utrecht about the year 1620. His father, who had two other sons, Jacob and Alexander, had been a merchant, and giving his children a good education, but he had in G. J. Vossius a friend who gratuitously supplied the want. After Cornelius had for some years enjoyed the private instructions of Vossius, he entered the academy of Amsterdam, and continued his philological studies under the auspices of this strong benefactor, who had formed a strong attachment. In 1648 he was elected a member of the academy of Harderwyk. The year after this event Vossius died, and Tollius delivered on the occasion the customary eulogy, which was printed under the title 'Oriens Academiciun G. J. Vossii,' Amsterdam, 1649, 4to. During his stay at Harderwyk Tollius exercised great influence on the affairs of the Academy, for the curators are said to have had such confidence in him that they never appointed a professor without his previous sanction. The year of his death is not certain; it appears to have been soon after 1652; this year at least is the last in which any work of his appeared.

The works of Tollius are not numerous, but he had formed plans for a great work in art history, and in connection with Phæmus, which his early death prevented him from executing. There is an edition of the work of J. P. Valerianus, 'De Infelicitate Literarum,' Amsterdam, 1647, 12mo, with supplements by Tollius, which give some in-
TOLLIS has been charged by his biographers with having appropriated numerous remarks and emendations on ancient authors which he found among the papers of his benefactor Wossius, but hitherto no positive evidence can be adduced to substantiate it. (Casp. Bormann, Trajectum Erudition, p. 367, etc.; Saxius, Onomasticon Literarium, vol. iv., p. 528.)

TOLLIS, JACOB, a brother of Cornelius, was born in Amsterdam, and on the 12th of June, 1630, to the profession of a Protestant clergyman. After the death of Wossius, T. returned to Utrecht, and became a corector of the University Library. He afterwards studied at Amsterdam. He gave perfect satisfaction to his employer, both by his great knowledge and the conscientious discharge of his duties. In the meantime D. Heinsius, who was then residing in Italy under a commission from Queen Christina, offered to T. the place of secretary to the commission. T. accepted the offer, and set out for Stockholm in 1662.

T. studied the various papers and manuscripts of Heinsius, his own principal inclination revived, when Heinsius discovered this, and, it would seem, some additional and more serious offences, T. was dismissed, and returned to Holland, where after a short time the influence of his friends procured him the office of rector of the gymnasium at Gouda. Here he devoted all his leisure hours to the study of medicine, and in 1669 he obtained the degree of Doctor of Physic. Some dispute between his employer, Vossius, and him, led to an unreserved mode of dealing with them, because of his being deprived of his office at Gouda in 1673. After this he for some time practised medicine, and gave private lessons in Latin and Greek at Noddyck. Finding that he could not gain a subsistence, he again obtained an appointment as teacher at Leyden, but in 1679 he gave up his place for that of professor of history and eloquence in the University of Duisburg. His reputation as a mineralogist was considerable, and the Electoral Prince of Saxony commissioned him to travel through Germany and Italy for the purpose of examining the mines of those countries. It appears that he faithfully discharged this commission, as his son Cardinal Barberini, and T. who had hitherto not been promoted in his own country as he thought he deserved, secretly embraced the Roman Catholic religion. His long stay in Italy created in Germany some suspicion of his having renounced Protestantism; and on hearing this he hastened, in 1690, from Rome to Berlin. His reception by the elector however was of such a nature that he thought it advisable to leave Berlin and return to Holland, T. being now again without means and employment, opened a school at Utrecht, but it was closed by order of the city authorities. His friends were displeased with his conduct, and forsook him one after another; he sank into despair, and died June 22, 1699.

The works of T. are rather numerous, and are partly philological, partly alchymistical, and partly on travels. Among his alchymistical works are his 'Fortuita, quibus praeter critica nonnulla, tota fabulosa historia, Gnesa, Phoenix, Aeropagitae, et chemicorum partum inscribunt,' Amsterdam, 1688, 8vo. He published an edition of Antonius, Amsterdam, 1671, which is the Variorum edition of Antonius, and is still very useful; and also an edition of J. L. Subtilis, 8vo. He had also notes and a Latin translation. T. translated into Latin the Italian work of Bacchini, De Sistis, Utrecht, 1696, and the account of ancient Rome, by Nardini, both of which are incorporated in the Italian translation.

He is also the author of 'Gustus Animadversionum Criticarum ad Longinum cum Observatia in Cicce, P. C. N°, 1556.'
TOMO [Solanum].

TOMO [in Greek, τόμος; Latin, Tomus; Italian, Tombo] French, tome, is the old name for a volume of a book, still occurring, a mass of masonry or stone-work raised immediately over a grave or vault used for interment; but it is often applied, in a wider sense, to any sepulchral structure. Works of either of these two classes constitute an important part of architectural study, immortal by reason of so many and such various materials for it, not only as regards the arts of painting and sculpture, but all the objects described by them, and a number of utensils and manufactured articles, which are variously dissected and dispersed. Mention the tombs of Egypt and of Etruria, in both of which interesting discoveries have been made of late years. The Christian catacombs (Catacombs) have likewise furnished much towards the history of art; and the tombs and sepulchral monuments of the middle ages, down almost to our own times, are valuable monuments, either as specimens of architecture and sculpture, singly or combined; or as handing down to us inscriptions and dates, and other evidences of historical personages.

Of primitive sepulchres there are two classes—both of such high antiquity, that they are entitled to precedence—one of which may be distinguished by the words of Vitruvius, *de architec.* 'The first is that which is subterraneously excavated; the other, by that of Hypergean, that is, above-ground, or raised mounds or tumuli heaped over the dead. Monuments of the first kind are very numerous in Egypt. They commence with the earliest tombs of the pharaohs; the ancient tomb to the extensive royal sepulchres consisting of numerous galleries and chambers. The other class presents itself in the Pyramids, which, though far more artful in form and construction, and no doubt a common origin with the Tombs of Thebes (Towars), which occurs under various designations in every part of the globe.

The extraordinary labour bestowed in excavating or constructing these ancient sepulchres is perhaps not so surprising as it appears, when it is considered that the subterraneous abodes of the dead, not only adorning them with polychromy and paintings, but depositing in them the most costly and exquisitely-wrought articles. In this respect there was a striking similarity between the practice of the Egyptians and that of the Etruscans, nor is the coincidence the less remarkable from such practice being contrary to that of the comparatively modern Greeks and Romans, whose tombs and sepulchres were chiefly architecture and art, and not intended to be inhabited by the living. Egyptian architecture and art some of the most astonishing monuments are entombed within the earth. Among these are what are called the 'Tombs of the Egyptian Kings.' Belzoni among his many expeditions discovered the sarcophagus, or tomb, properly so termed, which is now in the Soanean Museum. In respect to the architecture of these subterraneous works, the arrangement of their plans is precisely the reverse of that of the temples, in which the parts are successively contracted in space, that last reached being the smallest of all [Egyptian Architecture, p. 318]; whereas in these tombs the entrance passages are narrow, and the first chambers are smaller than those to which they lead. The numerous paintings found in these tombs describe with minuteness the social life and manners of the people, their banquetings, their festivals, their amusements, their costume, their furniture, their arts, and the various utensils and implements employed in them. These records prove not only the perfection the mechanic arts had attained, but also the luxurious refinement of those remote ages. The same remark applies to the paintings and engravings of the ancient tombs and sepulchral chambers discovered since 1827 at Corneto, on the site of the ancient Tarquinii, at Vulci, Tuscancella, Bomarzo, Cere, Val d'Asso, and other places in the ancient Etruria. The number of these tombs is very great. Among these, some having been discovered, others having been found, which have been obtained, besides upwards of five thousand painted terracotta and vases, an immense quantity of other articles of almost every description,—military implements, domestic utensils, various forms of furniture, all kinds of furniture, all kinds of patterns and dimensions, sarcophagi, couches, sculptures, inscriptions, &c., together with bracelets, rings, ear-rings,
and other ornaments of dress, some of them of the most tasteful design and exquisite workmanship. The greater portion of these antiquities are deposited in the new Museo Corinziano at Pisa, where they have been brought together. The Romans extended, Bove, basement in their villas, the paintings on their walls were not the least interesting, especially the generality of the smaller villas, have all suffered by exposure to the air. While they are for the most part more carefully and better executed than the Egyptian paintings, they are equally curious, insomuch as they are almost unconnected in design, and people respecting whom history has preserved very little. One of the most interesting sepulchral chambers yet opened is a tomb which has been named, from the subjects represented on the walls, the "Camera del Trichino del Balbo." In the "Trichino," or banquet scene, are three couches, with a female and male figure upon each, crowned with wreaths of ivy and myrtle, and richly attired. Everything bespeaks luxurious refinement,—the embroidered table-cloth, and draperies on the couches, the rich dresses of the attendants, the quantity and variety of the vessels leaped up on the sideboard, and the number of dishes with which the table is set out. Nor does the other scene convey a less favourable idea of the gayety and liveliness of an Etruscan dance. The subjects of some of the paintings that have been discovered are however of a very different character; and as a contrast to the above may be mentioned those in what is distinguished by the name of the "Camera de' Morti," at Tarquinia, where the deceased, after the custom of the dead, conducted by genii to their final judgment. These and other paintings are described in Mrs. Hamilton Gray's "Tour to the Sepultures of Etruria," and a very interesting account of the tombs and their contents has been given by Carlo Avolta, in the "Annali dell' Instituto di Corrispondenza Archeologica, per l'anno 1829." Of Etruscan art generally, Winckelmann speaks in the third book of his "Geschichte der Kunst," but in his time only a few of the tombs had been excavated.

At other places in Etruria—Orchia, the modern Norchia, and Axia, now called Castel d'Asso—the tombs are hewn out on the sides of rocks and hills, and present an architectural frontispiece or façade forming their entrance, as is the case with many Egyptian tombs, and likewise with those which are found in Lycia and other parts of Asia Minor. Many of the Lycian tombs have columns and entablatures to their façades wrought out of the solid rock. Some of the Lycian tombs however are upright insulatered structures, either plain or decorated with pilasters and other ornaments, with roofs whose section is a pointed arch, after the fashion of some of the Indian monuments, owing to which they are called the "Sepulchres of India" or "Oriental Grecian forms." Of sepulchres with temple-shaped façades there are two examples at Orchia, one of them a tetra-styled, the other a distyle in antis. Both partake of the Grecian style of architecture in certain particular, first, in the great height of the pediment; secondly, in the great width of the intercolumnium. What now remains of the columns themselves is only sufficient to show their number and situation; yet that they were hewn out of the rock, like the entablature and pediment, scarcely admits of question.

Vitruvius says nothing on the subject of sepultures and tombs, either Grecian or Roman; yet sepulchral edifices are very numerous throughout Italy, especially in the cities of Greece, and many of them must originally have been very conspicuous objects, and not a little remarkable on account of the studied architectural decoration bestowed on them externally; for besides subterranean sepulchral chambers or vaults which were usually very carefully finished internally, and not unfrequently ornamented with painting and sculpture, and with marble or mosaic pavements, there is another and quite distinct class, consisting of rectangular chambers ranged one above another and approached externally. This may be described as generally of nearly cubical form, though some are of much lofiter proportions. There are bevels varieties of this class, in which either a conical or cylindrical barrel vault is introduced, and this supported by a couple of arches, which then becomes a basement; or else the superstructure is also square, but is distinguished from the lower part by pilasters, pannels with inscriptions, and other architectural decorations: some of these have an upper sepulchral chamber, others a subterraneous one also, or one below the level of the ground.

What is called the 'Sepolcro di Nerone,' near Ponte Molle, may be taken as a specimen of the usual character of Roman tombs partaking of the cubic form. Like the Egyptian, or sepulchral monuments of Etruria, it was executed above ground, the dimensions being 20 feet by 24 in height, or, including its covering, 27 feet. At each angle is a large aerosteriun or tomb, that is, the sarcophagus, presenting two quadratum-shaped surfaces, corresponding at the middle of the edge of two adjoining sides; a species of ornament also found in sepulchra to antient altars and tombs. Of larger tombs of this class there is one in the Via Portuensis, a double cube in height, the measurements being respectively 44 and 80 feet. In the Via Appia, a tomb or mausoleum of this kind is variously said to be seventy feet long, but here it is about a third more, and is also decorated with four pilasters on each side, with a small pediment, not supporting, but placed between the large aerosteriun at the angles. Of circular tombs we have a well-known example in that of Manlius Plancus at Gaeta; a low circular tower (nearly solid within), about 60 feet in diameter, and 10 feet in height, or, at all events, a mausoleum than a mere tomb. The same may be said of that of Cecilia Metella at Rome; which structure, otherwise called il Capi de Bove, from the ornaments in its Doric frieze, exceeds the one just mentioned in size, the height being 90 feet, and the diameter about 130 feet. It does not however partake so much of the character of a mere tower as the tomb at Gaeta, because it consists of two nearly equal masses, viz. a square one with a cylindrical superstructure, and is therefore an example of that compound-form class which we have above pointed out. Among the tombs at Pompeii there is one which is circular in the upper part of its exterior, and internally has walls of veined marble, which does not show itself on the outside, but is cut out of the rock. Other sepulchral structures at Pompeii are very numerous, forming what is called the 'Street of Tombs.' Instead of cemeteries, or public burying-grounds, it was the custom in ancient Italy to erect tombs on each side of the principal roads leading from a city, as was the case with the Via Appia and others in the immediate vicinity of Rome.

The tombs of the middle ages are within buildings, churches, chancies, cloisters, etc. and exhibit almost every variety of form and enrichment, from the primitive stone coffin or Christian sarcophagus, to those lavishly decorated catafalco monuments which are so many piles of architecture.

Some of these tombs are quite flat, and serve for barrows or mounds, others are more elevated, and in order is the Effigy Tomb, first introduced in the thirteenth century, with a recumbent figure of the deceased upon it, extended, with the lids slightly raised, and joined as if in the attitude of prayer. Examples of this kind are very numerous, and highly interesting, both on account of their execution as works of sculpture, and the information they afford in regard to the costume of the times. In some cases there is a small canopy over the head of the figure, placed, according to the custom, at a right or a horizontal direction. This will be best understood from the annexed representation of the monument of Eleanor Bohun, wife of Thomas of Woodstock, duke of Gloucester.

This is not indeed exactly a specimen of the class just referred to, it being a monumental inlaid brass (a species of monument very common in this country during the fourteenth and fifteenth centuries), but although not executed in relief, it will serve to explain the usual character of sculptured recumbent effigies, and the design of the ornamental parts.

Altar and effigy tombs were usually placed between the columns of an arch or a recess in a wall, and in either case the whole tomb was frequently covered by an arch forming a sort of canopy over it; of which kind is that of Aymer de Valence in Westminster Abbey (1334). In course of time this mode of architectural decoration vanishes.
in the church of the Annunziata at Florence. Although they have been abandoned by later architects, the peculiarity of these compositions lies in the simple and natural expression of Christian monumentality, and the beauty of the form is due to the simplicity of the design.

Columns either supporting or placed between them, enclosed the figure on the tomb, giving the whole the appearance of a shrine or screen. Many of the French monuments of the period of the Renaissance are in this style of design, large and lofty insluated architectural masses, with a profusion of highly enriched pilasters and arches, and numerous allegorical figures, beside other statues and bas-reliefs, so that the depasto, or actual tomb, is the least portion of the entire composition.

In Italy there are many examples of what may be called Pagoda monuments, which are extensive architectural compositions, consisting of two or more orders of columns, with pediments, niches, statues, panels, and various other architectural decorations. Of such 'macchine colossali,' as Giorgna terms them, the monument of the doge Valier by Tiral and that of the doge Pesaro by Longhena may be quoted as instances. In both of them the figures are merely accompaniments to the architecture, and that which should be the principal one is almost the most insignificant among them. In the Catafale tomb, even when equally extravagant in point of accumulated embellishment, there is at least a certain degree of character that stamps it at first sight for what it is, whereas in those of the kind just referred to there is nothing to indicate a sepulchral monument. This last remark applies very forcibly to those two celebrated works of Michael Angelo, the tombs of Giuliano and Lorenzo de'Medici, each of which has, besides the figures of those personages, two naked semi-recumbent figures, a male and female, intended or supposed to be intended to express day and night (or sleep), and morning and evening. To say nothing of the obscurity and unmeaningness of such allegory, the statues themselves are very ill calculated to awaken religious sentiment. They are masterly academic productions, the triumph of the artist, the admiration of connoisseurs; but nothing more. Infinitely superior both in feeling and in taste are many other Italian tombs of about the same period, which consist of little more than a simple depasto, or sarcophagus, with either a recumbent or semi-recumbent figure of the deceased upon it; such for instance as those of Giov. Andreo Bocaccio in the cloister of Santa Maria della Pieve, and of Angelo Maria

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concepts into which the artists have fallen, and which render them equally unbecoming the purpose they are designed for and the place where they are erected.

TOMBS, VAULTS, TOMBSTONES, TABLETS. In previous articles (Coffin; Inversion) the various means of disposing of the dead have been discussed; it is our intention here to show what rights the subjects of this country have, 1st, to burial, and 2ndly, to a permanent commemoration of themselves by means of monuments.

It must be borne in mind that we treat here only of parish churches and churchyards, or of the parish burying-grounds subsidiary to the churchyard. The cemeteries which the necessities of an increasing population have caused to be established in the neighbourhood of populous towns, and in the most densely inhabited towns are private property, regulated at the pleasure of the proprietors.

By the 68th Canon of 1603 it is ordered that no minister shall refuse or delay, upon pain of suspension by the bishop for three months, to bury any corpse that is brought to the church or churchyard (convenient warning being given him thereof before), in such form as is prescribed by the Book of Common Prayer, unless the deceased were excommunicated, or communicatone, and no man able to testify of his repentance. The Rubrick further excludes from Christian burial those who have not been baptized or who have died by their own hands; and this latter class are defined to be such as have voluntarily killed themselves, being of sound mind, of which fact a coroner's jury are considered by ecclesiastical authorities to be the fitting judges. Thus the ecclesiastical law not only gives to the clergyman the right, but imposes on him the duty to bury. It is moreover to the parson of the parish in which the interment of the dead shall take place, who holds it only for the benefit of his parishioners, and subject to their right of interment in it.

This right of sepulture however applies only to the body: the Canon 70 (See index) declares that 'Rubrick 9 ; the corpse' alone, never mentioning the coffin. In former times the use of coffins was confined to the richer classes, and these were often of stone or of durable materials (Coffin); but the practice and no doubt the intention was that in the great majority of cases the period of decay, and therefore the occupation of the earth, should not be needlessly protracted. To use the words of Lord Stowell, 'A common cemetery [by which he means a churchyard or parish burying-ground] is not res unius etatis, the property of one generation now departed, but is likewise the common property of the living and of generations yet unborn, and is subject only to temporary occupations.' On this doctrine are based the main points of the law concerning burial.

The establishment of churchyards is attributed to Cuthbert, archbishop of Canterbury, who in the year 750 introduced into this country the custom, then existing at Rome, of devoting an enclosed space for the interment of those who had been entitled to attend or had been in the habit of attending worship within its walls, Thencefore, notwithstanding a canon which forbade it (De canonibus sepulcrorum), the necessary use to be made of peculiar sanctity or importance within the walls of the church, especially in the side aisles of the nave, so as to remind the faithful of their example and of the duty of praying for their souls; and hence the rule that a body cannot be interred in the church without the consent of the incumbent, as he is supposed to be alone able to
judge whether the deceased possessed the qualities which give him a title to that distinction. The churchyard was 
invariably held among the fee simple, and no fees were 
taken for the use of it: nevertheless the payment of fees to 
the clergymen dates, in this country at least, from the 
Reformation, and it is possible that they were charged 
by the ecclesiastical courts a sufficient ground for the 
clergyman to withhold his offices, or at all events to pre-
vent the erection of any monument or tablet for which he 
bad previously given the consent; that consent being sup-
pnosed to imply the payment of the usual or a stipulated 
fee. The fee is regarded by ecclesiastical writers not as a 
price paid for the burial, but as an offering to the minister; 
and this claim to it is founded on custom. The church-
warden and the parson are in the churchyard under a 
licence of the bishop, and upon them falls the expense of repairing the pavement. It is even maintained that an incumbent is entitled to a 
fee upon the burial of his parishioner who has died in his 
parish and is removed for interment elsewhere. Sir H. 
Spelman preserves a vestry constitution of 1627 containing 
a table of fees for burial in the chancel, nave, and the 
churchyard; the entries in the churchyard being differ-
ently charged as they were 'coffined' or 'uncoffined.' 
These fees are not imposed at the discretion of the parson 
or of the parish; they are matter of ecclesiastical juris-
diction, and if they deviate from the amounts established 
by custom, must be approved by the ordinary after con-
sulting the rectory and the corporation of the 
neighbourhood, and in some other populous towns, the 
churchyard or parish burying-ground has usually been 
purchased or enlarged, or at all events is maintained at 
great expense. That this is thought (as we have said) the freehold is in the parson, yet it is unnecessary 
confirmed by usage, parishes have acquired a concurrent 
right over the churchyard, and participate in the burial 
fees, which are greater according as the ground is more 
widely or more permanently occupied. Thus for a brick 
grave a greater fee is paid than for an ordinary grave; 
and Lord Stowell in 1821 approved a table of fees for the 
parish of St. Andrews, Holborn, whereby for the interment 
of a dead body in the parish churchyard, the fee was increased 
10s.: he mentions also in his judgment without 
positive disapprobation that 25l. extra is charged for 
burials in iron coffins by the parish of St. Dunstan’s-in-
the-West. (Haggard's Consistory Reports, 364.)

A vault cannot properly be made either in the church 
or churchyard, without the consent of the ordinary signified 
by a faculty, that is, a licence or permission, for that pur-
pose; and this he does not grant until he has given the 
parson, or parishioners an opportunity of expressing 
their opinions. A vault may be attached by prescription to a 
mansion; or again, the proprietors of a mansion may have 
a prescriptive right to be interred and to erect a tablet 
or tombstone in the churchyard, or upon the church 
ground. But it would seem that the right adheres to the 
mansion, not to the family; who if they cease to be 
parishioners relinquish their right to the vault, the use of 
which will then be regulated by the ordinary. The vault 
and in all cases may maintain an action of trespass at the 
common law against any one, even the parson or ordinary, 
who disturbs the remains, or removes or defaces the monu-
ment of his ancestor, or the hatchment, pennon, or coat 
amour suspended over his grave. In some parishes the 
parishioners have a prescriptive right to place a stone over 
a grave in the churchyard upon payment of a certain fee 
established by custom; but nothing of height can properly 
be erected here. A regular disposal of a deceased person's 
tomb or tombstone be repaired without the leave of the 
churchwardens; although the granting of that leave is a 
more formidable incumbrance on those officers.

The placing of a monument in the church or a tablet on 
its walls is also within the jurisdiction of the ordinary; 
for the fixing of it in the chancel the consent of the rector 
required, yet a lay rector has not a right to erect a 
monument or construct a vault there without a faculty 
to that effect, and the ordinary in such a case cannot 
consent a monument or tablet once erected is an offence 
which subjects to prosecution before the ecclesiastical 
courts the party committing it, even though he should 
have it in his power to take down the tablet and should have 
the consent of the incumbent for its removal.

As the erection of a tombstone, so the inscription upon 
it is a matter of ecclesiastical discipline, and an epitaph is 
unquestionably unlawful which is contrary to the canons 
constitutions of the church in force at the time when the 
inscription is made. Thus when in a recent case the 
inscription 'Pray for the soul of A. B.' was objected 
in the Ecclesiastical Court as recognising the doctrine 
of purgatory, the judge, whilst he agreed that the 
inscription was for the dead and contrary to the canons, and therefore that the epitaph was not unlawful distinctly affirmed the 
doctrine, that any new epitaph opposed to the doctrines 
of the Church of England might be removed, and the inscrip-
tion of such an epitaph should meet the party who insub-
cribed it to ecclesiastical censure.

(Haggard's Consistory Reports, i. 14, 205; ii. 333; 
Curteis's Ecclesiastical Reports, i. 880; Burn's Ecclesiasti-
cal Law, p. 405.)

TOMLINE, GEORGE, eldest son of George and Susan 
Pretymyan, was born on the 9th of October, 1750, at Bury 
St. Edmund's, Suffolk, and was educated at the grammar-
school in that town, which was the place of education at 
the same time the first of Dr. Smith's mathematical 
students. At the age of eighteen he was sent to Pembroke 
Hall, Cambridge. He took his degree of A.B. in January, 1772, 
and obtained the high honour of senior wrangler, and at 
the same time the first of Dr. Smith's mathematical 
students. In the year 1773 he was elected Fellow of his 
college, and was immediately appointed tutor to Mr. Pitt. He 
was ordained deacon by Dr. Younge, bishop of Norwich, 
in the church of St. Peter by Eastcheap, London, on 17th 
November, 1773 he proceeded M.A., and in 1781 discharged the 
important office of moderator in the university. He resided 
in college till 1782, when he left it for the purpose of acting 
as private secretary to Mr. Pitt, an unavailing cancellorship of 
the exchequer. When Mr. Pitt was made first lord of the treasury, Tomline became his secretary, and he continued with him till he became bishop of Lin-
coln and dean of St. Paul's. Dr. Pretymyan's first prefer-
ment was a sinecure rectory of Corwen in Merionethshire 
to which he was collated in 1792; and in 1794 he was 
appointed to a prebendal stall in Westminster, the first 
preferment of which Mr. Pitt had the disposal. In 1796 he 
was appointed to the vacant Bishopric of 
Lincoln and dean of St. Paul's, which were vacated by 
the promotion of Dr. Thurlow to the see of Durham, the 
first bishopric which became vacant after Mr. Pitt was 
minister. In 1813 he refused the see of London, and con-
tinued bishop of Lincoln 332 years, in which time he per-
formed the visitation of that most extensive diocese in the 
world at the regular intervals for 55 years, which was never done by any of his predecessors. In July, 1820, he was translated to the see of Winchester, in 
which he continued till September, 1827, the time of his 
death. His book, 'The Elements of Christian Theology,' in two 
volumes, now a standard work; 'A Refutation of Calvinism,' in 
one volume; and 'Memoirs of Mr. Pitt,' in three volumes, 
were published by his executor, the Rev. Mr. Tomline. 
Marmaduke Tomline, Esq., having, without any relationship 
or connection, left him the valuable estate of 
Rible Grove in Lincolihire.

TOMMASI, GIUSEPPE MARIA, born of a noble 
family at Alcata in Sicily, in 1610, entered the congre-
gation of the Terentii at Palermo, in 1664. He was sent to 
finish his studies at Rome, where he became acquainted 
with Cardinal Francesco Barberii, who, perceiving in him 
the true spirit of the Roman church, in 1678 engaged him 
in a visitation of the churches, and made him 
maestro di scolarita, or director of the school of 
antiquities, encouraged him in this pursuit, and 
for three years, he was sent to Rome, and afterwards 
to Germany, and to France. He published a collection 
of papers for the use of the students in France, 
'Instituzioni dell'Umanistica,' in 1697, and another book also to assist the students of divinity, entitled 
'Inciiculus Instituiionum Theologiarum.' Tommassi 
and his contemporary Cardinal Bona of Mondovi, author of
but which the De
tason we also
out (Tiraboschi,
and
story della Letteratura Italiana, vol. vii,
part. i, b. 2.)
TOMSK. [SIBERIA.]
TOM or TUN. In modern English spelling the ton is a
weight (twenty hundredweight, or 2240 pounds avoirdupois), and
is a measure of water (two pipes, or 252 gallons). Accordingly, some have supposed that the mea-
sure was derived from the weight, and in fact a ton of water weighs about a ton. But a recent consideration of the manner in which tonna and tunna were used is enough to convince any one that the weight was derived from the measure. These words are not classical, but they occur frequently in middle Latin (see Ducange, in corn.), and always as signifying a large cask. The hollow empty sound made by striking a large cask may have given rise to the name: we have often heard them say ton as plain as a
cask could speak. The diminutive is tonnailla, which was
often used, but not much in England; the Commissioners of
Weights and Measures found it only in Cardiganshire, standing for sixteen bushels of lime. The modern
use of the word tunnel is now familiar enough. The old taxes of tonnage and poindage are enough to date a suspicion that ton was originally a measure. This phrase would be
tautology if tonneau meant a tax upon weight: we must understand tonnage and poindage to be a tax on
measure and a tax on weight.
TONGA ISLANDS. [FRIENDLY ISLANDS, vol. x.,
p. 476.]
TONGUE. The human tongue has a very complex
structure, in correspondence with the variety of its offices
as an organ both of sensation and of voluntary motion. The sensations which are perceived by means of the tongue
are of two kinds, namely, that of taste and that of touch or
tact; its motions are chiefly subservient to speech and to
the prehension and swallowing of food. The sensitive
apparatus of the tongue is contained in the membrane
which covers it; its motor apparatus forms its interior.
The form and other external characters of the tongue
may be easily observed by the aid of a mirror. Its surface
is provided with various and diverse construction on the
sides, the upper, and the lower part, with that which lines the mouth and cheeks, and covered by a fine cuticle which is constantly kept
moist by the saliva and by the secretion from the tongue itself. The membrane on the superior surface of the tongue
is thin, smooth, and transparent; at the middle line it forms a
vertical fold which extends nearly to the tip of the tongue,
and is named the frenum linguae. The membrane on the sides and upper part of the tongue is thicker and more vascular, and yields to the
papillae, the most sensitive
parts, which are thickly set over its whole surface.
The papillae of the tongue are of three different kinds:—1. The papillae vallate, or magnum, are usually seven or
nine, and sometimes as many as twenty, and as few as three.
They are situated at the back part of the tongue, in two rows forming an angle, like the letter V, with its apex directed backwards. Each of them has the form of a truncated cone, and consists of a number of form
of ciliated processes, which are scattered at irregular distances from each other
over the whole of the upper surface and sides of the tongue. They vary in form, some being hemispherical, some
many-sided, and some others which support larger summits, so as to have somewhat the shape of mushrooms. These also, like the preceding kind,
are composed of numerous delicate filaments closely united,
3. The conical and filiform papillae cover all the remaining
parts of the upper surface and sides of the tongue. They are so thickly set that at first sight the tongue seems
nearly smooth. They form little elevations on the maxilla
brane with sharp points which are directed backwards, some of them being nearly covered over it from before backwards, but rough when it is pressed
in the opposite direction.
All these papillae are very vascular, and receive fib-
muscles. The sensitive nerves of the tongue, as of other
 Organs, are branches of the vasa nervorum which extend from the sympathetic
system. The cutaneous nerves are branches of the spinal nerves. The
fibres are distributed throughout the tongue.
The interior of the tongue is composed entirely of
muscles, and of the fat and cellular tissue which lie between
the fibres of these muscles. The muscles are named, after their parts to
which they are attached, the hyo-glossi, stylo-glossi, thyro-
glossi, and linguales. The hyo-glossi are the two
muscles which form the outer and lower parts of the tongue.
They arise from the sides of the hyo bone (Larynx, or
Skelton), whence they proceed upwards and outwards,
»w. to the sides and root of the tongue. In the lateral situation
their fibres mix with those of the stylo-glossi muscles,
which arise from the styloid processes of the temporal bone.
The hyo-glossi muscles, when they contract, draw the tongue backwards
and downwards; the former, acting alone, make the upper
surface of the tongue concave; the latter make it convex
those of one side, acting alone, draw the tongue to the
side of the mouth. The genio-hy-o-glossi are two muscles
whose fibres arise from processes on the posterior surface
of the lower jaw; and thence proceed, expanding in a
fan-shaped, nearly straight backwards and upwards, to
the under part and root of the tongue. The greater part
of the fibres of each muscle enter the tongue; but a small
portion of them pass somewhat downwards, and are
fixed to the hyo bone. The tongue is drawn towards
the hyo bone is fixed, to draw the tip of the tongue
backwards and downwards. The linguals are two slips
of muscle lying near the dorsov of the tongue, be-
tween the hyo-glossi and genio-hy-o-glossi, and running
straight from before backwards. Their office is to shorten
the tongue and draw it backwards.
But besides these muscles, and variously intermingled
with their fibres, the tongue has some others irregular
fasciculi, of which no description can be given. It is
also variously influenced by the muscles which move
the soft palate and its arches and the hyo bone. From
these varied points of view, it is certain that the whole of
the tongue is made capable of more rapid, more varied,
and (for instance) more extensive motions than any other organ in the
body; but it is unnecessary to describe them, since each
person may observe them in himself.
At the posterior part of the tongue, numerous other irregular
smalls, the tongue is imbued in its substance. They have a
structure similar to that of the labial, palatine, and other of
the smaller salivary glands, and probably secrete a similar
secretion. They are situated when the passage for the food
from the mouth to the stomach.
For its movements and its double sensibility the tongue
is supplied with three different pairs of nerves:—1. The
motor tongue, a narrow pair of nerves (Brain), are
distributed almost exclusively in the mass of the
nerve; they are its motor nerves; and when they are paralysed,
compressed, or divided, the tongue is rendered immovably
Digitized by Google
out. Its sensations are unimpaired. 2. The lingual (or, as live, take it up there for winter. From 500 to 600 ships come here annually, and the town has 500 inhabitants; these.

and, but, 25,000 touches, and De

minute tongue, nerves, which he which from bark, burning metallic especially the which of the tongue is acute at the back of the tongue and the soft palate, in which the glans-pharyngeal cell is distributed. Much of the uncertainty of this question has arisen from the difficulty of determining whether a substance is merely tasted and when it is felt. In ordinary eating we confound the impressions derived at once from smell, taste, and touch. We speak of the taste of cinnamon-bark and similar aromatic substances as if it was a simple quality; when the aromatic odour given off by the bark, we perceive none of its flavour or odour, but only its hardness and toughness by the sense of touch, and a burning sensation, which is also probably the result of an impression produced on the nerve of common sensation by the essential oil. Many similar examples will present themselves to the reader, who, with a little reflection, will easily analyse the sensations produced by most of the substances that are eaten or drunk.

The definition of substances are capable of exciting the sensation of taste is altogether unknown, nor has even a probable hypothesis been formed. The best examples of merely solid substances are the various saline and metallic acids, but it cannot be shown that with these the sense of taste is found to be subject to many of the same laws as the other senses, and to be especially analogous to that of smell. [Smell.] A certain force of application of the stimulus heightens the perception of it. Men instinctively press the tongue against the roof of the mouth and smack it, to obtain a clear sense of taste, as they inspire quickly in the act of smelling. Con- trast of tastes also commonly makes that which is last perceived more obvious, as the eye takes from one colour to another, or the nose from one odour to another, perceives each in succession the more acutely; and there are subjective sensations of taste, as there are of sight and hearing. With the latter the sense of taste is sharpened by the sense of smell, and vice versa. With the latter the sense of taste is sharpened by the sense of smell, and vice versa.

TONNAGE AND POUNDAGE. [Sundry.]

TONNEINS. [LOT ET GARONNE.]

TONNERRE. [Yonne.]

TONNINGEN, a small town in the Danish duchy of Schleswig, is situated in 54° 20' N. lat., and 8° 60' E. long. near the town of Eider. Since the completion of the canal of Kiel it has become a place of great activity, being the harbour at the western extremity of the canal, where all vessels stop, as Kiel is for the eastern. It has a pretty convenient harbor, and is defended by three batteries: the depth of the water in the

harbour is twelve feet, and many vessels from the Baltic are there for winter. From 500 to 600 ships come here annually, and the town has 500 inhabitants, about 2500 in number, have a considerable export trade in corn and other productions of the country. There are in this town a board of quarantine, an extensive public library, and a school for the instruction of poor children. By the English, in consequence of the occupation of Hanover by the French, gave for a short time extraordinary importance to Tonningen, by making it the channel for the important commerce of Hamburg; all goods consigned to that city being landed at Tonningen, where they were forwarded by land. The hundreds of wagons from Tonningen loaded with merchandise which crowded all the streets of Hamburg both day and night, gave that city an air of bustle and animation, which was probably thought that unexperienced persons might have fancied that its commerce had on all a sudden been considerably increased. The effect of this state of things on Tonningen may be appreciated from the fact that the import duties received at the custom-house, which had previously amounted to 20,000 or 25,000 dollars, rose during the blockade of the Elite to 250,000 in a year. (Stieh, Geographisches Lexicon; H. E. Lloyd, Hamburg.)

TONQUIN, or TONKIN. [China, vol. vii., p. 307.]

TONQUIN BEAN. [CUMBOUTA.]

TONSILS. The tonsils are two complex glands, one of which lies on each side of the fauces, and are called, the tonsils of the soft palate. They are of an elongated oval form, and each is composed of a number of smaller glands aggregated together in one mass, and usually opening by several orifices on the inner side of the tonsils. They form a continuous layer with a great number of similar glands, which are contained in the substance of the palate, in the root of the tongue, and in the space between the tongue and the pharynx; and with these, the tonsils form a complete ring of glands of the tissue are round the aperture leading from the mouth to the pharynx. The nature of the fluid secreted by them is not certainly known. It bears a general resemblance to saliva, and probably serves chiefly to lubricate the food for its passage from the mouth to the stomach. The tonsils are very subject to inflammation. In its acute form this disease constitutes the most frequent kind of sore-throat. It is often called cysenne tonzálica, and may be distinguished from the other kinds by the tonsils being enlarged and forming bright red tumours projecting from the sides of the back of the mouth. Its treatment is the same as that for other varieties of acute cysenne. [Queens.] Either after acute inflammation, or independently of it, the tonsils are also very subject to a chronic enlargement, which gives rise to a permanent difficulty of swallowing, with a peculiar nasal tone of voice, and often accompanied with the habit of sneezing, which is often combined with a peculiar loud snoring during sleep; and, in children, it produces a deformity of the chest by the elevation and increased convexity of the sternum, which are the consequence of the habitually increased efforts of inspiration. This disease is very frequent in scrofulous persons, especially during childhood, and may sometimes be cured by attention to the general health, and by the use of powerful astringent or acid galges; but, in general, the quickest and best remedy is to cut off the prominent portions of the tonsils, an operation which is scarcely painful, and may be performed either with a blunt-pointed knife, or with an instrument lately invented, called a guillotine. With the latter the enlarged tonsil is first passed through a ring, then fixed by a needle which is run through its centre, and lastly is cut off by the stroke of a sharp blade driven through its base. The operation seldom needs to be repeated; the wounded surface heals quickly, and the tonsil ceases to grow. In very acute cases of inflammation of the tonsil abscesses are frequently formed within them. They should be opened early, and the after-treatment may be similar to that for other sore-throats. The tonsils also occasionally partake in the disease of the lymphatic glands, such as cancer, syphils, the local affection in scarlet fever, &c., which attack the adjacent parts.

TONSILS. DISEASE OF THE. [Ovys.]

TONSTALL, C. W. STAFFORD. "C. H. STAFFORD," was born at Hatchford, in Yorkshire, in 1474 or 1475. It has been commonly stated that he was a natural son of a gentleman
of antient family, who, according to one account, was Sir Richard Tonstall. His mother is said to have been a lady of the Conyers family. It has been doubted however whether they ever were so. In 1541 he was elected fellow of King's Hall, and became a fellow of Trinity College. After this he went abroad and studied at Padua; but the plague soon drove him to Cam-
bridge, and he was not to his home till 1547, when he was elected a fellow of King's Hall (now incorporated with Trinity Col-
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lege).
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a curacy in Kent. He entered the church through the wishes of his father, but against his own inclination. He had wished himself to study for the bar, and with this view he entered his name at the Inner Temple in 1756. In 1760 he received his orders; and in the course of the same year, his father procured for him a pension, which his father had purchased for him. He was however never happy in discharging the duties of his profession, and gladly embraced the opportunity of leaving New Brentford for more than a year upon two different occasions, in order to travel on the Continent as tutor to the sons of gentlemen in his neighbourhood. What he thought of his profession may be seen from a letter of his to Wilkes, whose acquaintance he made in Paris in 1769, and to whom he thus writes on one of these occasions: You are now engaged in correspondence with a parson, and I am greatly apprehensive that title should disgust; but give me leave to assure you, I am not ordained a hypocrite. It is true I have suffered the infectious hand of a bishop to pass over me; whose imposition, like the sop given to Judas, is only a signal for the devil to enter. I hope I have escaped the contagion; and, if I have not, if you should at any time discover the black spot under the tongue, pray kindly assist me to conquer the prejudices of education and profession.'

On his second return from the Continent in 1767, Horne took an active part in the political contests of the day, and it was greatly to his credit that he now returned as member for the county of Middlesex in 1768. Horne's opposition to the ministry was unceasing, and he soon became one of the most popular men of the day. It was the founder of the Society for supporting the Benc of Rights; in 1769, he was in the seventh weeks of the House of Commons, and had been a supporter of Wilkes; but in the following year a quarrel took place between them, which led to an angry paper war, in consequence of which Horne lost much of his popularity.

In 1771 he took his degree of M.A., which was presented to him, notwithstanding the opposition of many of the members of the university, and among others of Dr. Paley. His quarrel with Wilkes drew upon him in the same year an attack of Junius, whom he answered with considerable success.

His occupations were now so entirely opposed to the clerical profession, and his dislike to it had become so great, that he resigned his living in 1773 with the view of studying for the bar. That he might not want the means of doing so, four of his friends presented him with joint bonds to the amount of 400l. a year, which were to continue in force till he was called to the bar. While he was studying his legal studies, he afforded great assistance to Mr. William Tooke, an old friend of his, in resisting an inclosure bill, which would have greatly deteriorated the value of some property which Tooke had purchased at Willey, near Great Berkley. In 1775, Mr. William Tooke made him his heir; and it was upon this occasion or shortly afterwards that he assumed the name of Tooke, by which he is commonly known.

On the breaking out of the American War, Tooke vehemently attacked the conduct of the ministry, and opened a subscription for the widows and orphans of the Americans, 'murdered,' as he said, 'by the king's troops at Lexington and Concord.' The ministry prosecuted him for a libel in 1777; he was found guilty, and sentenced to pay a fine of 200l., and to be imprisoned for twelve months. While in prison he published his letter to Mr. Dunning, which is occupied with a critical examination of the ease of 'The King and Lawley,' which had been quashed against him in the House of Lords. This letter leads him to explain the conjunctions and prepositions of the English language. This letter formed the basis of a considerable part of the first volume of the 'Diversions of Purley.'

Shortly after his release from prison in 1779, he was called to the bar, but he was rejected by the benchers on the ground of his being a clergyman. This blighted all his prospects in life, and he soon afterwards retired from London to a farm in Huntingdonshire, which he had never previously published, in conjunction with Dr. Price, a pamphlet against the American War, entitled 'Facts' addressed to the landholders, stockholders, &c. of Great Britain. Tooke did not remain long in Huntingdonshire, and he died soon after. He left behind him an active part in advancing the cause of parliamentary reform, which Mr. Pitt then espoused. He published a letter in
tavour of it in 1782, addressed to his friend Mr. Dunning, then Lord Ashburnham. He continued to advocate Mr. Pitt's party, but for some reason he was never called to power when Mr. Pitt came into power by the coalition ministry, as it was called, he published his celebrated 'Two Pairs of Portraits,' 1788, in which he contrasts the character and conduct of Lord Gordon with that of Lord Holland, and of Mr. Pitt and Mr. Fox, respectively. Two years prior to this he published the first volume of his 'Enea Priorioua,' or the 'Diversions of Purley,' in octavo, the latter of which names was given to the work in compliment to the residence of his friend, Samuel Tooke.

In 1790 Tooke became a candidate to represent the city of Westminster in parliament; and though he spent nothing upon the contest, he polled nearly 1700 votes. In 1794 he was appointed to the charge of his majesty's.treasury, and appears on account of his connection with the 'Constitutional Society.' Nothing however of a reasonable nature could be proved against him, and he was accordingly acquitted after a trial which lasted six days, during which he distinguished himself by his calmness, intrepidity, and presence of mind. His domestic affairs having become very much embarrassed, his friends came forward to his assistance and settled on him a pension of 600l. a year. In 1796 he again offered himself as a candidate for Westminster, and polled on this occasion upwards of 2000 votes. His desire of obtaining a seat in parliament was at length gratified, though not exactly in a way which best accorded with the expectations of a person who had been such a strenuous advocate of parliamentary reform. He was returned in 1801 for the borough of Old Stann by Lord Camelford. He retained his seat till the dissolution of parliament in the following year, but was disqualified from sitting again on account of his seat of parliament which was passed while he was in the house, enacting that in future no one in priest's orders should be a member of the House of Commons.

Mr. Tooke now retired into private life, and passed the remainder of his life at Wimborne, where he had already resided for many years. He had published a second edition of the 'Diversions of Purley' in 1798, in one volume, which was followed by a second volume in 1805. He died on the 18th of March, 1812, in the 77th year of his age. He was never married, but had several illegitimate children, to one of whom he left his property.

Mr. Tooke was a man of great powers and considerable attainments. He was well read in English, French, and Italian literature, possessed a tolerable knowledge of Latin and Greek, and had studied Anglo-Saxon with some diligence. In private he was much beloved, and his character was as much esteemed by all who knew him. He is however principally known in the present day by the 'Diversions of Purley,' a work which has exercised considerable influence upon almost all works of the same description which have since appeared. It is written in the form of a dialogue: the principal speakers in the first volume are Mr. Tooke himself, and his friend Dr. Beadon, the Master of Jesus College, Cambridge; Mr. Whetham Toone is occasionally admitted to take part in the dialogue: in the second volume the only speakers are the author and Sir Francis Burdett. The first volume is divided into ten chapters: the first treats of the Division and Distribution of Language; the second contains some Considerations of Mr. Locke's Essay on the Human Understand ing; the third treats of the Parts of Speech, in which all words necessary for the great purposes of speech are resolved into words necessary for the communication of our thoughts; and the abbreviations employed for the sake of dispatch; in respect to the latter you are told that 'in English and in all languages there are only two sets of words necessary for the communication of our thoughts, and that these are nouns and verbs. The fourth chapter treats of the Noun, and the fifth of the Article and Interjection. The substance of the three next chapters, on the word that, of Conjunctions, and Etymology of English Conjunctions, had been previously given in the first volume. The tenth chapter speaks of verbs. In the second volume, the first chapter treats of the Rights of Man; the second, third, fourth, and fifth, of Abstraction; and the sixth, seventh, and eighth, of Adjectives and Participles. It is impossible to read this work without the pleasure which is obtained from reading the works of great men, and hence several are employed as stomachics and febrifuges; as Khaya Senegalisima, on the banks of the Gambia; Seymida febrilus, in India; and Cedrela freminga in Java, as well as in China which contains many happy explanations and conjectures, but the young student

cannot be cautioned too strongly against receiving all the conclusions of the author. The great fault of the book is the want of proper illustrations of the rules and forms there given, and that historical mode of investigation without which etymological studies are worse than useless. A useful edition of the work has been published by Richard Taylor, with notes.

(Stevens's Life of Tooke.)

TOOKE, REV. WILLIAM, F.R.W., was born on the 18th of January, 1744, and educated at a private academy at Ealington, kept by Mr. Shield, where he had for school-fellows the indefatigable and amiable Mr. Nichols, and Dr. Ed. Gray of the British Museum, Sec. R. S., with each of whom he kept up a close intimate during their lives. He was ordained a clergyman of the Church of England in 1769, and was at first curate in London, and shortly afterwards obtained the situation of minister of the English church at Cronstadt, the naval arsenal and commercial port of St. Petersburg. In 1774 he was ap- pointed chaplain to the factory of the Russia Company at St. Petersburg, in which situation he remained for eighteen years. He often preached in the chapel of the French Pro- testants at St. Petersburg in the French language, of which he was a complete master; and after his return to London he preached on several occasions in that language on be half of the French Protestant School and Workhouse in London. He returned to England in 1792, in consequence of succeeding to a considerable property by the death of a relative. He was known as a strong advocate of national reform. He died in London, November 17, 1820, in his seventy-seventh year, much esteemed by a large circle of literary friends. By his wife Elizabeth, daughter of Thomas Eyton, Esq., of Langhawe in Den- markshire, he had a daughter and two sons, who survived him.

Mr. Tooke was the author of several works, of which the most important are those relating to Russia, namely, 'A Life of Catherine II.,' 3 vols.; 'A View of the Russian Empire,' 3 vols.; and 'A History of Russia, from the Foundation of the Empire to the Accession of Catherine II.' Mr. Tooke was also a joint editor with Archdeacon Nares of the 'Dictionary of the English Language,' 1820, and of the 'General Biographical Diction- ary,' in 16 vols. 8vo., 1789; his portion of the work was the first five volumes. Besides this he published, early in life, 'Othniel and Achab,' an Oriental tale from the Chaldean, in 2 vols., and long afterwards four volumes of miscellaneous essays under the titles of 'Essays and Literature,' and 'Selections from various Foreign Literary Journals.' He translated Zollifkofer's sermons from the German, in 10 vols. 8vo., and Lucas's works, in 2 vols. 8vo. His son William Lucas Toone, the Lucas however is not a translation from the original Greek, but from the ger- land's version; and where the latter did not give the meaning of the Greek, recourse was had to the original.

(Toone's Literary Anecdotes; and Gentleman's Maga- zine, May, 1816; November, 1820; and December, 1839.)

TOON-WOOD is extensively employed in India for making furniture and cabinet-work. It is sometimes called Indian mahogany, and sometimes Indian cedar, on account of its reddish-brown colour and rather coarse-grained. The wood has been named Cedrela Toona by botanists, and is supposed to be the same which yields the so-called cedar-wood of New South Wales, which is also red in colour and coarse-grained. These somewhat resemble what is called Havannah or Barbadoos cedar, which is the wood of another species of the same genus—the Cedrela odorata of Linnaeus. This wood is imported in considerable quantities from the West Indies for the manufacture of drawers and wardrobes. The cigar-boxes from Havannah are sold to be made of this kind of cedar.

The genus Cedrela has been so named from Cedrus, and belongs to the natural family of Cedrelaceae, which is sometimes considered only a variety of the Cypripedium. Many of the Cedrelaceae are remarkable for the excellence of the timber which they yield, as, for instance, the mahogany, the satin-wood, and the chikras of India. Many of the species are remarkable for their aromatic properties, and hence several are employed as stomachics and febrifuges; as Khaya Senegalensisia, on the banks of the Gambia; Seymida febrilus, in India; and Cedrela freminga in Java, as well as in China which contains many happy explanations and conjectures, but the young student

TOONGOOSBS. (Sirius.)
TOPAZ occurs massive, in imbedded and rounded crystals. Primary form a right-angled prism. Cleavage parallel to the base of the primary form, more difficult in the direction of its lateral faces. Structure lamellar at right angles to the axis of the prism. Fracture uneven, slaty. Cleavage, a lamellar, breaking in a line parallel to the electric—positive by friction; those crystals which possess different faces of crystallization at opposite ends, acquire different kinds of electricity at the two extremities when heated. Colour: white, yellow, bluish, and greenish. Luster: vitreous, a silvery.
with one of the ministers. He immediately expressed his indignation and reluctance to dine at the same table with him. A violent contest ensued, and a hostile meeting

was appointed for the following day at a place some miles distant from the capital. Torelli went without a second, and only armed with a light dress-sword. Colonel Skahl used a heavy sword, with which he shivered his adversary's blade at the first onset, and then ran through the heart: he expired in a few minutes, recommend- ing his soul to Heaven, and charging his faithful valet to take his body to Copenhagen, where it was deposed

in a chest, to be delivered to his cousins Kirke; the king himself attended the funeral. The general im-

pression at the time was that foul play had been practised by instigation from a higher quarter.

(Pet. Lom. Laelii, 3 vols. 4to., Kibonen-

ham, 1747; the same in German, Copenhagen, 1753; Peter Suhm's Historie of Dannemarck, Norge, &c., 1 vol. 8vo., Kibenharn, 1787; Histoire de Danemarck, par M. P. Malle, 9 vols. 8vo., Paris and Geneva, 1788.)

TORDEULAS, a small town of the province of Val-

ladolid in Spain, situated on the right bank of the Douro, five Spanish leagues south-west of Valladolid, in 41° 28' N. lat. and 5° 2' W. long. Torellas, which some Spanish

authors suppose to have been called 'Turris Sylla,' is popularly called ' Turris Sylla,' under the Romans, is now a wretched town, scarcely containing 4000 inhabitants, although in the

palmy days of Spain, during the reign of Ferdinand and Isabella, its population is said to have amounted to 50,000. The town is commanded by a fine castle, where the mother of Charles V., Joanna, took up

her abode, and died in 1555. Torellas is the birthplace of the Este Petrus Frederik de Avalandia, the con-

structor of 'Don Quixote.' No other town bore the name of Villalor, the town of the Comuneros under Padilla were defeated by the imperial troops in 1522. (Miiano,

Dizionario Geografico, viii. 472.)

LAELIO, was born at Fano, on the 28th of October, 1489. His family was noble, and had settled in that town about the beginning of the fourteenth century. While yet a mere boy he was entrusted to the care of his

magnificent Costanzi, a deputy of the town of Ferrara, under whom he made a respectable progress in the Greek and Latin languages. He subsequently studied in the university of Perugia, and obtained the degree of doctor in his twelfth year.

From 1511 to 1531 Torelli remained in the civil service

of the Roman government. Soon after taking his degree he was appointed podestà of Fossombrone, and in a short time chanced to have a dispute with a small town. Scanderbeg Comunissari, who had lost his hereditary rights by becoming

a convert to the Roman faith, received from the pope by way of compensation the seigniorage of Fano. By his in-

solent abuse of power he rendered himself odious to his

neighbor, and was expelled by the autonomy, of Fano. Laelio Torelli was the chief. Clement VIII. was at first much irritated, regarding the rebellion as directed against the papal government; but Laelio, by explaining its real object, succeeded in pacifying him, and was soon appointed governor of Benevento. This post he occupied for eighteen months, at the end of which, returning to Fano, he became involved in the contest between that town and the Malatesta family; and about the year 1527

or 1528, found it advisable to seek an asylum in Florence.

In 1531 he was appointed one of the five auditors of the Rota of Florence, and continued from that time till his death in the service of the Mediæ family. During far the greater part of his life he was the first grand-duke of Tuscany, who became duke of Florence six years after his first appointment of Torelli, and died only two years before him (in 1574). From being a member

of the Rota, Torelli rose to be podestà of Florence, and he was subsequently appointed chancellor by the grand-

duke, and in 1546 his principal secretary. His official duties did not entirely withdraw him from literary pur-

suits, for he was a member of the Florentine Acad-

emy, and in 1557 was elected into its council. His repu-

tuation as a statesman and man of letters procured him the honour of being elected a senator: his name was inscribed on the tablet of the patricians of Florence in 1576. He died there in the month of March, having survived all his children.

Torelli published, in 1540, three legal tracts, entitled

Laeli Torelli Juristicus, de Gallium et Legem Velleiam, ad Catoneum et Paulum Enarrationes; ejusdem de Gallum et Legem Velleiam, ad Catoneum et Paulum Enarrationes; ejusdem de Gallum et Legem Velleiam, ad Catoneum et Paulum Enarrationes; ejusdem de Gallum et Legem Velleiam, ad Catoneum et Paulum Enarrationes; ejusdem de Gallum et Legem Velleiam, ad Catoneum et Paulum Enarrationes; ejusdem de Gallum et Legem Velleiam, ad Catoneum et Paulum Enarrationes; ejusdem de Gallum et Legem Velleiam, ad Catoneum et Paulum Enarrationes; ejusdem de Gallum et Legem Velleiam, ad Catoneum et Paulum Enarrationes; ejusdem de Gallum et Legem Velleiam, ad Catoneum et Paulum Enarrationes;
This splendid edition contains the notes of the ancient commentators, and the observations of Torelli himself on the tract 'De Consolidibus et Spheroideibus;' and to these are added the various readings which occur in the manuscripts. Torelli, who had brought together a collection of private letters, which show at least that he wrote elegant Latin, is to be found in a work published by the celebrated Danish historian Peter Suhm, under the title: 'De forn. Torelli, et his familiis,' 4to., Hafniae, 1712; 'Historia Ren. Norvegicorum ad annum 1397; 4 vols. fol., Hafniae, 1711.

TORFAEUS, or TormoDUS, his assumed literary names after having been introduced to the learned world as a Latin author. His real Icelandic name is Thormund ScrophuJarinea, and his mansion was in Skalholdt, a small island off Iceland.

It was born at Engoe, a small island on the southern coast of Iceland, of poor parents, who however were in sufficiently good circumstances to give him an outfit (for the institution, like all public schools in Iceland, was a free-school) for the Latin school at Skalholdt, where, according to Iceland custom, he became a good classical scholar; so much so, that upon his arrival in Copenhagen, his choice and fluent Latin surprised the professors. He therefore have still some affection at the university of Copenhagen, where he remained till the year 1657.

In the year 1650 he was captured and made prisoner by a Swedish privateer on his return from Christiansted. This circumstance appears to have given him some notoriety, for immediately after his release and return to Copenhagen, king Frederick III. appointed him interpreter of Icelandic manuscripts, and a short time afterwards sent him to Iceland for the purpose of collecting manuscripts, which, with much exhibit and his warm friend and patron, Brynhulr. Swenson, bishop of Skalholdt, he accomplished so well, that the collection which he brought back, and which is still preserved in the royal Library in Copenhagen, is one of the most excellent in the world for antient Scandinavian history and literature.

The king gave him, shortly after his return, as a reward for his zeal, and to enable him to pursue his studies, a small appointment at Stawanger in Norway. This office however he resigned in the year 1667, upon being appointed keeper of the king's collection of antiquities. He made soon afterwards another voyage to Iceland, for the purpose of taking possession of some little property, to which he succeeded after the death of his father and of his elder brother; and after his return the same year, he went to Amsterdam for some literary purpose. During his voyage back he was shipwrecked at Skagen; and on his arrival in the port of the town, his shipmates, who deserted him and attacked in a small town in Sceland by one of his countrymen, whom, in defending himself, he accidentally killed. This circumstance caused great excitement. He surrendered himself, and was carried away to the capital, and there condemned to death. However, by an appeal to a superior court, and an appeal to the throne, as it is termed in Danish jurisprudence, his sentence was commuted into a fine, which he paid, and was released but as it was impossible for the king to retain a man in his service with a blemish on his reputation, he was dismissed, and lost his salary. He then retired to a small farm in Norway, the property of his wife, where he lived without any particular advancement.

In the year 1673, having succeeded to the Danish throne, recalled him, and appointed him royal historiographer, and an assessor in the consistory, or board of education, with a salary sufficient to enable him to live independently and to pursue his studies. This appointment he kept till his death. He commenced his most important work, the 'History of Norway,' and finished it as far as the Union of Calmar, when, unfortunately, ill health compelled his retirement. He was frequently visited and Professor Reitz. He was married twice: his first wife died in the year 1655: he married again in 1709; and in the year 1719 he died, very far advanced in years, without issue. His works, printed as Torfaeus, are:—Historia Rerum Occidentalis, libri iii.; fol.; Hafniae, 1715; 'Series Dynastarum et Regum Daniae a Skindio ad Gormum Grandoven, 4to.; Hafniae, 1712; 'Historia Rerum Norvegicorum ad annum 1397; 4 vols. fol., Hafniae, 1711.

PETER RIVOLI, and his later writer, the well-known letter-writer, was an adventurer in Iceland; and in the year 1665 he issued a small book in Latin, entitled 'Regni Islandiae antiquae Gesammlungen.'
miles south of Turin, on the high road to Nice. 5. Car-
magnola, on the right bank of the Po, has 12,000 inhab-
habitants, and is a great market for silk. 6. Chiavassa, a town of
7000 inhabitants, on the left bank of the Po, near the con-
fluence of the river Oco, 12 miles north-east of Turin, on the
road to Mail, in a plain adjoining with the Oco and castle. 7. Rivarolo, in the valley of the Oco, has 5000
inhabitants. 8. Poirino, on the road to Alessandria, has 5000
inhabitants. There are besides these, many towns of between
2000 and 3000 inhabitants in the neighbourhood of Turin,
such as Pinerolo, Caselle, Lanzo, Montanaro, Gasaino,
Vio, Vinovo, and others. The province of Turin is al-
gogether one of the most fertile and thickly inhabited districts
in Italy. (Calendario Sardo; Donina; Neigebaur.)

The valley of the Po is in French the Vallee de Pleimont,
and the residence of the king of the Sardian States, is
situated in 45° 5' N. lat. and 7° 44' E. long., on the left or
western bank of the Po, which here runs in a northern di-
rection, and at the confluence of the Dora Riparia, which
flows from the valley of Susa. It lies in a wide and lofty
valley, between the lower offsets of the Cottian Alps on the
west, and the hills of Monteferrato, which rise immediately
above the right or eastern bank of the Po. The valley
opens to the north-east into the wide plain of Lomberdy.

Turin is one of the most regularly built towns in Europe;
most of the streets being in straight lines and intersecting
each other at right angles, and the squares being also of a regular
shape. The streets are broader than in any other Italian cities,
and are kept in a state of cleanliness, which is also
preserved in the town. The streets are of the largest
width, and the houses are generally of several stories.
The houses are almost invariably built of brick, and
are uniform in height and width. The houses are generally
over two stories high, and are generally at least
30 feet high; those of Thomen II. and of Amunoph II.
and that of Remeses II., or Sesostris, which is considered
one of the handsomest specimens of Egyptian sculpture;
the collection of Egyptian paintings on stone, a quantity of
utensils, articles of dress and ornaments, numerous monu-
tments, statues, and inscriptions, which have been dis-
covered or found in the catacombs of Thebes: among others,
a funerar ritual, 60 feet in length; and the fragments of a cli-
ological table of the dynasties of the kings of Egypt
previous to the eighteenth dynasty.
The university consists of five faculties—divinity, law,
medicine, surgery, and arts. Among the contemporary
professors, Boucheron, professor of Greek and Latin
Peyron, of Hebrew and the Oriental languages; Piana,
who has a great reputation for the range and beauty
of his names. There are also belonging to the university a
museum of natural history, a museum of anatomy, a chemi-
ical laboratory and hydraulic apparatus, and Lastly, a
botanical garden at the Valentino, outside of the town,
near the banks of the Po. About 2000 students attend
the various courses. Altogether the University of Turin
ranks as one of the first in Italy. The Royal Academy of
Sciences, begun as a private society in 1769, and instituted
as an academy in 1783, consists of forty members, besides
non-resident and corresponding members: it is divided
into two classes, mathematical and physical sciences,
and moral, historical, and philological sciences. Lagrange,
Count Balbo, the historian of Savoy, the Revolution
Moison, Count Balbo, the Orientalist Derossi, Count Xavier
Maistre, the antiquarian Fea, Manno, the historian of Su-
dania, Librero, the Chevalier della Marmora, and other well-
known names, are or have been members of this society.
The Academy of Turin was established in 1720. The
Turin has also an academy of the fine arts, a phili-
monic academy, and an agricultural society, * Reale So-
cieta Agraria,* and a military college, * Regia Militar
Academia,* newly founded, and under the patronage of
the Chevalier Saluzzo.

There are communal schools, divided into classes, in each district of the town; and also schools
for drawing applied to the mechanical arts; and schools
for music.

The charitable institutions of Turin are:—1, the Great
Hospital of S. Giovanni Battista, for the infirm; 2, the
Spedale di Carita, an asylum for destitute children and
aged persons; 3, Spedale della Maternita, or lying-in hos-
pital; 4, the Reale Albergo di Varo, a house of indigent
for young men, who are taught various trades; 5, the
house for the insane; 6, Opera di S. Luigi Gonzaga, a
charitable institution, which administers out-door relief to
the poor; 7, the Hospital of the Capuchins, which is a
hospital for persons afflicted with incurable chronic
diseases, which is considered as a model of cleanliness
and proper arrangement; 8, Monte di Pietà, which lend-
men and women the necessary means for the support of
the poor; 9, two penitentaries, one for men and the other for
women.

Turin is an archbishop's see, whose province extend-
over the seas of Alba, Acqui, Asti, Cuneo, Fossano, Mon-
dovì, Ivrea, Pinerolo, Saluzzo, and Susa. The metropoli-
nan diocese contains the chapters of Turin, Monferrato,
Rivoli, Chiari, Carignano, Sandalmazzo, Giaveno, and
Savigliano; and the clerical seminaries or colleges of
Turin, Giaveno, Brà, and Chiari. The archbishop has
ius, or court for ecclesiastical cases, consisting of a vice-
genral and a pro-vicar, a chancellor, pro-chancellor and
notary, a fiscal advocate, a counsellor for the poor, besides
secretaries.

Turin contains a great number of churches, few of which are remarkable for their external architecture. Those
worthy of notice are:—8, Filippo Neri, by the architect
Giurva, with several good paintings; the Consolata, the
Corpus Domini, which is very richly decorated; Santa Te-
resa, Santa Cristina, and La Storta, which are considered
as models of architecture. There are converts of Francisca,
Ducetians, Cistercians, Carmelites, Barnabites, Servites, Somaschi, Jesuits. Fathers of the Oratory, Brothers of the Christian Schools,
Bereandt, Caracciolo, and other monasteries, besides several nunneries. In the suburb, near the right
bank of the Po, facing the bridge, is the fine new church
'Della Gran Madre di Dio,' raised by the municipality
of Turin, in memory of the restoration of the dynasty
of Savoy. Another fine church is 'Sanとともに'; this
church is a vaulted building, with a Roman altar in the
apse, and a finely carved portal. Another fine church
is 'S. Maria della Vittoria'; it is dedicated to St. Mary of
Rome: it is cased with marble, and adorned with marble
pillars. Higher up on the hill is the Capuchin church
The city of Turin has a municipal body, which enjoys considerable privileges, and directs the internal or executive administration of the town; it consists of a Corpo Decurionale, or council of about sixty members; two syndics; a vicario, who is at the head of the police department; a treasurer, and numerous accountable, commissaries, inspectors, and secretaries. The municipality of Turin has considerable revenues; it levies the 'octroi,' or duty at the gates upon provisions, and a tax upon mills; it administers the municipal domains, and the city of Turin is styled in legal documents: under the title of Esclusa della Città di Grugiasco, Signora di Beinasco. There is a board of commissioners, styled 'Consiglio degli Edili,' which superintends all new buildings and streets, and the repairs, embellishments, and additions which are made in the town or suburbs. Turin has two insurance companies and an organized body of firemen.

The manufactories of Turin are of some importance; they consist of woollens, silks, hosery, leather, paper, china, and porcelain. The capital of arms, and a royal manufactury of tapestry or Gobelin.

Turin has several theatres, besides the royal theatre already mentioned: the theatre of Carignano, for the opera; the theatre d'Angennes, for dramatic pieces unaccompamed by music; and the New Theatre. Piedmont has produced some of the best modern Italian dramatists—Alfieri, Federici, Olivieri, Nota, Pellico, and Marchisio. The nobility have a casino, or assembly-room. The coffee-house or boulangeries are not so roomy or elegant as those of Milan or Naples. Besides the buildings already mentioned, the palace of Carignano, by the architect Guarini, is large, but in bad taste. The colossal figure of the true Roman emperor Constantine, by Guinart, is in a better style: and that of the marquis de Pré has a gallery of paintings. The royal country-house called 'Villa della Regina' is a pretty villa finely situated on the hill on the right bank of the Po. The royal hunting palace and park of Stupinigi, four miles from Turin, are very fine; the palace was begun by Guinart, and enlarged by Alfieri, the architect. At La Venaria, once a royal residence, about eight miles north of Turin, is the royal nunnery, or convent, and veterinary college. The King of Sardinia has also palaces at Moncalieri, on the south side of the Po, about five miles from Turin, and at Rivoli, ten miles from the capital, on the high road to Nice and Mont Cenis; besides the royal palaces of Chambers and Genoa, which he uses when he visits those parts of his dominions.

The population of the town of Turin, which at the beginning of the eighteenth century amounted to about 42,000 souls, is estimated at 116,000; and by that of 1833, to 119,009, of which number there were 888 priests, 433 monks, and 227 nuns. (Sessirotti, Statistica dell'Italia.)

Diligences after the French fashion set off from Turin three times a week for Milan, Genoa, and France, besides numerous post-coaches, called 'velociféri,' which run between the capital and most provincial towns of the Savoy, and the territories. Living at Turin is reasonable, provisions of every kind are good and cheap. Coocking is a medium between French and Italian cookery. The manners, habits, and dress of the people partake likewise of French and Italian. The national character is less loquacious, studied, and affected, with the formality and etiquette maintained by the court, which communicates itself to the upper ranks of society. The common language of conversation among the natives is the Sard, the written and official language, and educated people speak both Italian and French. The climate of Turin is colder in winter than that of Genoa or Rome, but is much milder than that of Savoy or Switzerland. Upon the whole, Turin is a pleasant residence, and the climate, which on the threshold of Italy, it is less noticed than it deserves by travellers, who hurry on to the south, to Genoa, Florence, Rome, and Naples, cities more thoroughly Italian than Turin.

The ancient Tururini were a tribe of the Ligures, who inhabited the country between the Po and the Cottian Alps. They are the first people whom Hannibai met after descending the Alps: they appear to have resisted him, and he took them by surprise at the time of the battle near the Ticinus. Livy, xxi. 30.) They and the other Ligurians north of the Apennines were subdued by the Romans about 160 B.C. But their neighbours the mountains, and rivers, and cities were not the spoils of Augustus. Augustus sent a Roman colony to the town of the Taururini, which then took the name of Augustus Taurinorum. Under the Longobards Turin was the head town of the Longobards of Sardinia; and within the limits of the town is the burial place of an important person of these people. It continued the residence of the Capuchin fathers till 1808, and it was ceded to France in 1815, and a garrison was sent to it in 1826. A short time afterward, the French restored it to the king of Sardinia. It is one of the most beautiful and comfortable cities in Europe, and the residence of the capuchins, who are educated there for the missions. In 1826, the town of the Taururini, recently restored to the king of Sardinia, was merged into the city of Turin.

Tesorio has written 'Istoria della Città di Torino,' 1679, with a Continuation by F. M. Ferro, 1712; Rivautella and Ricolli have published 'Marmora Taurinensia Illustrata,' 2 vols. 4to. 1751 and 1752; Milanese, 1798; 'Città ed Abbazia della Torino,' 1826; Parolotti, 'Turin et ses Curiosités,' 1819, a guide-book; Borson, 'Catalogue raïonné du Musée d'Histoire Naturelle de l'Académie de Turin,' 1811; Peyron, 'Papit Gracie R. Taurinensia, Societatis littorae, et viros Illustrium,' 1816; and the Visions Etrangeres in Italy. TOVINUS, ALBUSNO, the Latinized name of Allan Tho, a Swiss physician, who was born in 1490, at Winterthur, in the canton of Zürich. He studied polite literature at Basle with zeal and assiduity, and, after teaching rhetoric for some years, he at last determined on taking the degree of Doctor of Medicine at Montpellier. Upon his return to Basle, in 1527, he was appointed professor of
practical medicine, and soon acquired an extensive practice. He died February 23, 1550, at the age of sixty-one. Like several of his contemporaries, he employed himself in translating the greatest part of the Greek medical writers into Latin, for which he published the following: 'Polubi Opuscula aliquot nunc primam e Graeco in Latinum conversa, nemp de Tuenda Vlaetudine, sive de Ratione Victim Sanorum lib. i., De Seminis Humanis Natura lib. i., De Seminis Plantarum Carpfonii lib. iii., Basil., 1544, 4to.' Alexander Traillianus, Lat., Basel., 1533, fol. The first Latin translation of Paulus Aginetta, Basil., 1532, fol., which was afterwards improved and several times republished, was severely criticised by Winther of Andelmerch (Guinotres Andernacher), which drew from Thorer a very angry and somewhat abusive answer entitled 'Epistola Apologetica, qua Calomanias Impudentissimas refellit,' Basil., 1536, 8vo. The first Latin translation of the works of Theophrastus, with the title 'Philaretii de Pulsum Scientia Libellus, item Theophili de Exacta Retrimentorum Vascularis Cognitione Commentariorum, 'Sc., Basel., 1533, 8vo. In his translation of Theophrastus De Uris, he is charged by Guidet (Not. in Theop. De Urin, p. 234; et Alog. ad Lect., in having altogether omitted the pious epilogue to the work, and having altered two other passages (in the Preface, and at the end) as to destroy the acknowledgment of our Lord's Divinity contained in them. Fabricius mentions also (Biblth. Graec., vol. xiii., p. 44, ed. Vet.), a translation of Theophrastus's 'Commentary on the Aphorisms of Hippocrates,' but this is probably a mistake. (See Fabr., Biblth. Graec., vol. xii., p. 45, ed. Vet.; Cholant, 'Handbuch der Bucherunde fur die Aeltere Medicin.') He also retouched the old Latin translation of Yahia Ibn Seraphin Ben Ithalam (Seraphin), and published it with the title 'Jani De Ascensi Therapeuticae Methodi libri iv., partim Albano Torino, partim Gerardo Cremonensis Mathematicae Metaphrastise,' Basel., 1543, fol. He published a Greek edition, in one volume, of several of Hippocrates's works, viz. Prognost., De Nat. Lib., De Loc. in Hoc., Basil., 1536, 8vo, and prefixed a Life of the author. He included also a Latin translation of the Letter of Diocles Caryostis to King Antochus, De Secunda Vulatae Tuendae, in the second edition of his translation of Alexander Traillianus, Basel., 1541, fol. He also edited a collection of medical works with the following title: 'De Re Medica huic Volumini insunt, Sorani Ephesi Peripatetici in Arte Menendi Isagoge hactenus non vis. Orbisii Sardiani Fragmentum de Victus Ratione, quilibet Annil Tempore Utili, antes nuncum editum. C. Plini Secundi de Re Medica libri iv. accuratiss Circumst, et Nothos se Pseudopigraphis Semotia, ab Innocem Mendarum Millibus Filiis, de Pseudologie Report, l. Apulei de daurense, Philosopho Platonice, de Herbarum Virtutibus Historia.' Accessit his Libellus Utilissimae de Betonica, quem quidam Antonio Musae, nonnulli l. Apulei adscibendas autem, nonre Exscurs., Basil., 1525, fol. The medical works have been improved ed. Re Culinaris, Basil., 1541, 4to.; S. Ephiphanis, De Prophecias Vitas, Basil., 1529, 4to.; Agapeti Scheda Regia, Lat., Basuri, 1541, 8vo, at the end of Onosandri Strategicae, and Emmanuell Chrysolyne, Episteme Grammaticae Graecae.' (See Fabr., Bibliotheca Graeca, vol. xiii., p. 44, ed. Vet.; Biogr. Med.; Choulant, Handb. d. Bucherkunde fur die Aeltere Medicin.)

TORMENTILLA (Potentilla), a genus of plants belonging to the natural order Rosaceae. This genus possesses a 8-parted cyme, of which four parts are external, and apparently accessory; the petals are 4, and inversely heart-shaped; the stamens are 10, and not all included in the calyx; the corolla is small, the carpels are united, the seeds are abundant, the flowers are perfect, and the fruits are subcylindrical, the seeds are large and also cut; the pedicels are solitary, in the bifurcations of the stem: the petals are obcordate, and of a yellow colour. It is abundant in barren pastures, meadows, roadsides in Great Britain and other countries of Europe. It has been occasionally found with five petals, and also with double flowers.

T. erecta, Upright Tormentilla, has an ascending, branched dichotomous stem; ternate leaves, with those on the stem sessile, those on the branches petioled; the apex of the sepals is obtuse; the stamens and styles are numerous; the stipules are large and also cut; the pedicels are solitary, in the bifurcations of the stem; the petals are obcordate, and of a yellow colour. It is abundant in barren pastures, meadows, roadsides in Great Britain and other countries of Europe. It has been occasionally found with five petals, and also with double flowers.

T. repanda, Ceping Tormentilla, has procumbent, slightly branched stems; leaves divided into from three to five
leaflets, which are deeply toothed, and hairy, as well as the petioles; the stipules are lanceolate and entire. It is a native of Europe, in much the same situations as the last. It can certainly attain the last, but has been recorded as growing in many localities in Yorkshire, Essex, Norfolk, and Oxfordshire.

7. Humifusa. trailing Tormentil, is a native of North America. It has short filiform, procumbent stems bearing the branches on the surface. The flowers are small and insignificant, covered beneath with a white tomentum. [TORMENTIL]

Tornado, a whirlwind (from tornar, Spanish, 'to turn'), a sudden and violent storm of wind, accompanied by thunder, lightning, sometimes, and drops of rain; it frequently occurs in the West Indies, on the western coast of Africa, and in the Indian Ocean, particularly about the time of the equinoxxes, or in the latter region of the earth, at the equinoxes of the monsoons. The storm continues in one place for a few hours, afterwards it rapidly moves, it changes its direction; and it is described as blowing at once, or in succession, from all the different points of the compass. Tornado is however a general term, and, besides a whirlwind, it is employed to designate what is called a typhoon or hurricane.

It has been supposed that the electric liquid, when collected in vast quantities in the atmosphere between the terrestrial bodies, acts as a conductor of electricity; and that the rarefaction; the ambient air then rushes towards the region where this rarefaction has taken place, and the particles in their rectilinear course, being struck obliquely by currents flowing in directions which are determined by the range of mountains or the configuration of the earth, are subjected to the laws of dynamics, circular or spiral motions. Thus there is formed a vortex by which terrestrial bodies within its influence are violently displaced, or the ocean is strongly agitated: on land, forests, plantations, and buildings are destroyed; and at sea, ships are engulfed or driven on shore: the effects are of course the greatest near the circumference of the vortex, and the space within which they are felt varies in extent; sometimes the diameter of the area is several miles, and at other times it does not exceed one hundred yards.

From accounts of the tornadoes, the typhoons, or hurricanes which occur on the coast of Africa, it appears that there the approach of the storm is foreboded in the morning by the appearance, over the land, of dark clouds which move towards the sea, while a gentle breeze is blowing towards the shore; soon afterwards the rain comes down in torrents, and the lightning darting from the clouds resembles showers of electric matter. While the tornado is passing over a ship, which may be four or five hours from the first appearance of the clouds, the flashes cease, lives are saved, and the vessel is preserved, which can be explained by the electric fluid descending along the masts, is distinctly heard among the rigging. After the squall has passed beyond the ship, the lightnings again appear to descend in sheets as they did on its approach.

The whirlwind is frequently preceded by a remarkable tranquillity of the atmosphere and a sultry heat; when suddenly, within a circle of one or two hundred yards only in diameter, a revolving motion of the air commences, and is accompanied by thunder and rain: the velocity of the rotation gradually increases, and at length its violence is such as to tear up trees and destroy buildings which may be within the vortex. The whirlwind does not continue longer than half an hour, but in that short time the destruction is immense, and the loss of life is frequently considerable.

Dr. Franklin observed that great storms have a progressive movement on the surface of the earth, and he found that one which occurred in North America in 1740 advanced at the rate of about one hundred miles in an hour towards the north-east; but Colonel Capper, of the East India Company's service, who during twenty years had studied the phenomena of the atmosphere about Madras, first suggested the idea that all storms are tornadoes or whirlwinds of great extent, and showed that it might be possible to ascertain the place of a ship in a vortex from the degree of rapidity with which the wind changes it direction; but by Colonel Capper's observations, discovered subsequently that, while on the coasts of North America hurricanes were blowing from the north-east, storms were raging in the Atlantic, and on the parallel of latitude with the wind at south-west; and his inference is that a revolving tempest takes place at the same time over a considerable portion of the earth's surface.

This subject has been frequently studied by Lieut.-Col. Reid of the Royal Engineers, who has ascertained that all great storms have both progressive and revolving motions. Having obtained access to a number of ships' log-books, he compared the observations made by himself in the English Channel, with those which had at the same times been made in the open seas, and he has traced the courses of many storms both in the northern and southern hemispheres. This officer found, as had been before remarked by Mr. Redfield, that the winds of the North Atlantic Ocean the direction of the air in a vortex is from north-west directly to the west; from thence to the south, and round by the east towards the north: and he discovered that in the southern hemisphere the order of the motion is contrary to that of the northern, that which has its head in the north, its tail in the south, its edge round by the east, the south, and the west, and returning to the north. He found also that the storms in each hemisphere revolve invariably in the same direction within a circular space whose diameter is not less than one thousand miles; and that occasionally, in advancing towards either pole, several different vortices closely follow each other: when this happens in the northern hemisphere the northern part of each is blowing from the west, and in the northern part from the east, it follows that the northern part of each vortex, on arriving at the spot which the vortex immediately preceding it had quitted, brings with it a wind blowing in a direction exactly contrary to that which had just before been felt.

Lieut.-Col. Reid has ascertained from two instances, of which alone he could obtain well-authenticated accounts, that in the opposite hemispheres of the earth the contrary is true, the water-spout revolve in contrary directions; and it is remarkable that these directions are contrary to those of the great storms. Some connection is supposed to exist between the intensity of storms and that of terrestrial magnetism: the sun has a remarkable influence in its motions are felt about St. Helena, where the magnetic intensity is the lowest, and that they occur with great violence in the West Indies and the Sea of China, in which regions the terrestrial meridians pass through the magnetic poles of North America and Siberia. It ought to be observed, however, that on the southern coast of Africa and in the Indian Ocean, where the magnetic intensity is low, storms rage with the greatest fury.

TORNEA. [Finland.]

TORNEA-ELP. [Bothnia.]

TORO, the capital of a province of Spain, formerly called Zamora, but this name is supposed to be the Sarabris of Ptolemy. It is a large town, an ancient settlement on the right bank of the Douro, on a gentle eminence which commands a view of an extensive plain, formerly called Campi Gothici, now Tierra de Campos; in 41° 40' N. lat. and 5° 37' W. long. It was the ancient capital of Zamora, one of the most antient in the peninsula. The collegiate church is a handsome Gothic building, the erection of which is ascribed to Alfonso VIII. of Leon. There are also the remains of an ancient castle, said to have been built by the Infante Don Garcia, forming a square of 143 feet, with a round tower at each angle. The bridge on the Douro, entirely built of freestone, and resting on a stone embankment, is a remarkable piece of architecture. Near Toro was fought, in 1476, a battle, where the Portuguese under Alfonso V., surnamed ‘O Africano’ (the African), were defeated by the Castilians.

The population of Toro is about 10,000. (Milano, Dizionario Geografico de España, viii. 490.)

TORONTO, formerly York, and lately the capital of the province of Upper Canada, in North America, is situated on the north shore of Lake Ontario, about 40 miles from the west end of Burlington Bay, the bishop, suffragan of Toronto, and the Vicar-general of the Diocese of Huron, apparently without any knowledge of Colonel Capper's observations, discovered subsequently that, while on the coasts of North America hurricanes were blowing from the north-east, storms were raging in the Atlantic, and on the parallel of latitude with the wind at south-west; and his inference is that a revolving tempest takes place at the same time over a considerable portion of the earth's surface.

This subject has been frequently studied by Lieut.-Col. Reid of the Royal Engineers, who has ascertained that all great storms have both progressive and revolving motions. Having obtained access to a number of ships' log-books, he compared the observations made by himself in the English Channel, with those which had at the same times been made in the open seas, and he has traced the courses of many storms both in the northern and southern hemispheres. This officer found, as had been before remarked by Mr. Redfield, that the winds of the North Atlantic Ocean the direction of the air in a vortex is from north-west directly to the west; from thence to the south, and round by the east towards the north: and he discovered that in the southern hemisphere the order of the motion is contrary to that of the northern, that which has its head in the north, its tail in the south, its edge round by the east, the south, and the west, and returning to the north. He found also that the storms in each hemisphere revolve invariably in the same direction within a circular space whose diameter is not less than one thousand miles; and that occasionally, in advancing towards either pole, several different vortices closely follow each other: when this happens in the northern hemisphere the northern part of each is blowing from the west, and in the northern part from the east, it follows that the northern part of each vortex, on arriving at the spot which the vortex immediately preceding it had quitted, brings with it a wind blowing in a direction exactly contrary to that which had just before been felt.

Lieut.-Col. Reid has ascertained from two instances, of which alone he could obtain well-authenticated accounts, that in the opposite hemispheres of the earth the contrary is true, the water-spout revolve in contrary directions; and it is remarkable that these directions are contrary to those of the great storms. Some connection is supposed to exist between the intensity of storms and that of terrestrial magnetism: the sun has a remarkable influence in its motions are felt about St. Helena, where the magnetic intensity is the lowest, and that they occur with great violence in the West Indies and the Sea of China, in which regions the terrestrial meridians pass through the magnetic poles of North America and Siberia. It ought to be observed, however, that on the southern coast of Africa and in the Indian Ocean, where the magnetic intensity is low, storms rage with the greatest fury.
Trento; but the name given by Governor Simeoe to the town, which he laid out on a regular plan, was York, which it retained till 1834, when Sir John Colborne raised it to the rank of a city, and changed the name to that of the district, Toronto.

The situation of Toronto is low and swampy, the ground rising gradually into the back county, which is covered with forest. The site seems to have been chosen chiefly on account of the spacious and beautiful harbour, or rather bay, which is protected almost entirely by a long horn of sand sweeping round in a sickle shape, and leaving only a narrow entrance, which now forms the mouth of the harbour. The wharfs and piers however are narrow, inconvenient, and unobstructed, and the vessels are often landlocked and exposed at night, they are also dangerous.

The city consists of six main streets, about two miles long, and parallel to the shore of the lake, crossed at right angles by other streets which run inland about a mile. Most of the houses are still of wood, but as frequent fires destroy them, they are replaced by others of brick, stone being scarce, and the subsoil of the whole district a good clay. The principal street of the six long ones is called King Street; it begins to have a handsome appearance; it has many good brick houses, several of the shops having large plate-glass windows; it has side pavements of flags, and a large sewer under it. The general appearance of the streets is somewhat indistinct, and there are few public buildings worthy of notice for their architecture.

The principal structures are the Parliament Buildings, the Bank of Upper Canada, the City Hall and Market-house, the Upper Canada College, the Lawyers' Halls, and the English, French, and Scotch churches and chapels. A new court-house and gaol are probably now completed, as well as new barracks at some distance from the town. Building-ground in the principal streets is excessively dear, and house-rent is also expensive; but provisions are abundant, and at moderate prices; and wines, fruits, and other luxuries, not dear. The fuel is chiefly wood, and is mostly burned in stoves, though coal is also sold. The water is mostly brought out of the Welland Canal, and sold at about 1s. 6d. a bushel. The water of the Welland is brackish, the strata at forty feet deep being apparently saliferous rock.

Toronto has a Court of Chancery, with a vice-chancellor, and a Court of Queen's Bench with a chief justice and four puisne judges; it has also a district court, in which minor offences are tried, a court of requests, a mayor's court, and a police court.

Toronto returns two representatives to the Legislative Assembly of the Province of Canada. For municipal government the city is divided into five wards, each of which returns annually two aldermen and two common-councilmen among a mayor chosen annually.

Besides the established Church of England, which has its Bishop of Toronto, there are Roman Catholics, Wesleyan Methodists, Baptists, members of the Church of Scotland, and many other sects.

The Court of Indicting at Toronto, supported by voluntary contributions, in which, in 1841, there were between 70 and 80 inmates, and which gave relief to about 250 out-door pensioners. There is also an hospital; and there is a savings bank, in which the amount of deposit by each person is limited to 500. currency.

Of establishments for education, the chief is the College of Upper Canada, with a principal, five masters, and five tutors. It is of the utmost importance in the National School of Upper Canada, on the system of Bur and Lancasters, and there is a Board of Education for the supervision of the common schools.

There is a mechanics' institute, a commercial news-room, and a literary club, the last being under the patronage of the vice-chancellor, but no other literary societies of any importance. There is no regular theatre. There are seven or eight newspapers published in the city, one of which is the Wesleyan Methodist.

The population of Toronto has advanced at the following rate:—in 1817 it was 1200, in 1820 it was 1677, in 1836 it was 9652, in 1837 it was 11,500, in 1839 it was 12,900, and may now (Oct. 1842) probably amount to 18,000.

Toronto is about 560 miles from Quebec, 390 from Montreal, 180 from Kingston, 130 from London in West Canada, and 75 from Niagara, travelling distances. Steam-vessels sail regularly from Kingston to Toronto, and thence to Hamilton, about forty miles farther to the west, at the head of Burlington Bay.

When the act of parliament 25 & 26 Vict., c. 355, which united the provinces of Upper and Lower Canada, to form the Province of Canada, one Province of Canada was carried into effect, on the 23rd of July, 1841. Toronto ceased to be a capital city. Kingston (Canada, vol. vi., p. 214), at the north-east extremity of Lake Ontario, is now the capital town.

(The Canadas in 1841, by Sir R. H. Bonnycastle: Winter Studies and Summer Rambles in Canada, by Mrs. Jameson, Encyclopædia Americana.)
cases or cases charged with explosive and combustible matter. These were to be applied to the vessels to be destroyed by means of a kind of submarine boat, in the working of which Fulton attained considerable success. He arranged for the expense of the previous experiments, withdrew his support, and the scheme was never brought into practical operation.

TORQUETI, [Oxford, 1697-1783], FLORE, DELLA, or TORRIA'NI, a powerful family of the middle ages. [LOMBARDY AND LOMBARD CITIES.]

TORRE, FILOMARINO, DUKE DELLA, a Neapolitan nobleman who lived in the second half of the eighteenth century, and applied himself studiously to the study of physics. His name is known in history chiefly for his melancholy end. In the first insurrection of the people of Naples, who, being broken, by the king and court and all the principal authorities on the advance of the French invading army, rose tumultuously in January, 1799, to defend the town and at the same time to destroy those whom they suspected of being favourably inclined towards the French, the Duke della Torre, who lived in great retirement and does not appear to have meddled with politics, was denounced to the popular committee by a memental who had been a letter written to the Duke by, a nobleman, lately minister, in which he had recommended him to the French general for protection in the event of Naples being stormed by the French army. This was sufficient to persuade the ignorant lazzaroni that the duke was a secret Jacobin, and his doom was fixed at once. The mob went to his palace, pillaged it, destroyed his library, his collection of natural history, and his cabinet of physics, threw the furniture out of the window, seized the duke and his brother the Marchese Filomarino, known for his artistic talent, and dragged them to the Marina of the Carmine, where they killed both of them. At the same time it must be observed that the leaders of the mob showed some regard for the women and children of the house, for they put the duke's wife and her children in it, and told them to drive to some friend or relative's, after which they set fire to the palace. The two brothers Filomarino were the most distinguished victims of the first or lazzaroni insurrection of 1799.

(Comella, Storia del Regno di Napoli; Cuceto, Saggio Storico sulla Rivoluzione di Napoli; Sketches of Popular corr.]

TORRE DEL GRECO. [NAPLES, PROVINCE OF.] TORRENTIUS LEVI, whose original name was VAN DEN BEREN, was born at Ghent in 1525. He studied at Louvain, and was in the town when it was besieged by the celebrated Maximilian. Rose from the city, and was of the successful defence of the inhabitants, Torrentius composed a Latin poem, which was highly thought of at the time. He subsequently travelled to Italy, and spent some time at Bologna; at one period he appears to have been a pensioner of the Duke of Urbino, and studied Roman antiquities there with great diligence. He enjoyed the friendship of the Cardinal Baronius, Antonius Augustinus, Fulvius Ursinus, and other celebrated scholars during his residence at Rome; and he also made there a fine collection of ancient coins and works of art. On his return to the Netherlands, Torrentius filled successively various ecclesiastical dignities, and was at length appointed to the bishopric of Antwerp, where he laboured with great zeal in discharging the duties of his office. He was said to have been also employed in various embassies and political negotiations. In 1593 he was appointed archbishop of Mechlin, but before the documents arrived he was forced to resign on account of his age. Upon his new dignity, he died at Brussels in the seventieth year of his age. He was buried in the cathedral-church of Antwerp. He left his library and collection of antiquities to the college of Jesuits, and Torrentius was a secure scholar, and well acquainted with Roman antiquities, but he did not write much. The only work of his which was published in his lifetime is a Commentary on Suetonius, which originally appeared at Antwerp in 1578, and was reprinted in 1592; it is also contained in Graevius’s edition, published in 1672. This Commentary is also interesting from the many woodcuts it contains, representing coins of the Roman emperors and other antiquities. His Commentarius in Commentarius de Lece Juliam et Pappini de Matrimonio Ordinariis. Besides these Commentaries, Torrentius also published in his lifetime several Latin poems, of which a collection appeared at Antwerp in 1576, 8vo., under the title of ‘Pomunita Sacra.’ Torrentius was called by his contemporaries the Christian Horace; and his poems are distinguished by great elegance. He also edited the posthumous works of J. Goropius Becanus, Antwerp, 1598, with an apology for Becanus, who had been attacked by Scaliger. (Foppens, Bibliotheca Belgica; Stow, Omomastica.

TORRES STRAIT, named by the Spanish navigator Luis Vaez de Torres, who was the first to pass through it, which event took place in 1605. It is situated between the most north-easterly point of Australia and the southernmost coast of Papua or New Guinea. As the large peninsulas which projects from the main-land of Australia northward between the Pacific and the Gulf of Carpentaria grows narrower as it proceeds northward, and terminates with a coast extending not much more than 30 miles from east to west, Torres Strait, in a geographical point of view, does not exceed that distance in its direction from east to west, and is situated between 142° and 142°40' E. long. The southernmost point of Australia, Cape York, is in 10°42' S. lat., and the opposite coast of Papua, which has only been seen from a distance, and not visited by navigators on account of the numerous dangers with which it is beset, is laid down on sea-charts in 10°40' S. lat. Thus the extent of the strait from south to north is about 100 miles. Navigators however give to the strait a much greater extent, as they consider it to begin on the east with the Pandora Entrance, situated between extensive reefs near 142°40' E. long. On the western side of the strait, the Torres Strand extends from 142° to 142°40' E. long., and 180 statute miles from east to west. They have been induced to adopt the Pandora Entrance as the beginning of the strait, because the danger of the deep sandhills that bound them on all sides, and do not cease until they have passed to the west of 142° E. long. The reefs, which lie on the south and north of Pandora H.2
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Entrance, are isolated, and surrounded by a deep sea, which extends westward about 30 miles. At that distance however, the largest or the most extensive reef does not cover in all the strait, except the southern islands and reefs, the northern extent of the strait, and rests with all the vessels and reefs on the islands, shoals, rocks, and reefs of various but not great extent. Between them are the narrow winding passages by which the vessels pass through the strait. It is easily comprehended that such vessels cannot remain unaided during the night. The islands are neither large nor numerous, except in the narrowest part, between the most northerm part of Australia and the southern coast of Papua, where there are several islands of moderate extent, which is considered as one great group, and comprehended under the general name of Prince of Wales Islands.

Since the establishment of the English colonies in New South Wales, Torres Strait has frequently been navigated, notwithstanding the dangers which are encountered in passing it, as it offers a much shorter route between these colonies and Hindustan than the eastern and western routes, of which the former passes to the east of the Coromandel, by the Bay of Biscay, to New Guinea and Papua, and the western round the continent of Australia, or more commonly round Tasmania. By these two routes vessels usually reach the Indian Archipelago and the Haurian Islands three weeks later than by the route through Torres Strait, and which occurs in many cases, the dangers of the strait are now better known and easily avoided. But the strait can only be traversed between March and September, during the south-east monsoon, in either six months of the year, or during the period of the north-west monsoon, the fogs prevail in the strait to such an extent, that no vessel can venture to enter among its almost innumerable reefs and rocks. Besides, Torres Strait is only navigated by vessels bound from New South Wales to Hindostan, and not by those which sail in an opposite direction. The latter would have to contend against contrary winds; for when the south-east monsoon terminates, the trade winds begin, and blow steadily and with considerable force all the rest of the year. This last circumstance greatly favours the passage of vessels from Sydney to Hindustan, but must render it almost impossible to reach Sydney by the same route.

Two different routes are taken by vessels in sailing to Torres Strait, and in passing through it. They are distinguished as the Inner and Outer route. The Inner route lies between the coast of Australia and Torres Strait. The Great Barrier Reefs. These reefs begin, according to Flinders, in 22° 50' S. lat. and 152° 40' E. long., and extend nearly parallel to the coast of Australia to Torres Strait, that is, in 20° 15' S. lat. and 152° 40' E. long., and are as long as to length not equalled in any other part of the coast. These reefs seem to be about 50 or 60 miles in their southern part, but diminishes to the northward. At a low-water part of them is from 8 to 10 miles wide, and there are numerous small black rocks on them, but at high-water very little of them is seen. Only a few narrow openings occur in these barrier reefs, and one large one, which is found at 18° 52' S. lat., and which is about 30 miles wide. The arm of the sea enclosed between the barrier and the coast is from 60 to 80 miles wide towards the south, but it contracts gradually to 20 miles near the great opening, and is still narrower farther north. Numerous islands are scattered in this enclosed space, but no coral-bank occurs except those which surround some of the islands. Being sheltered from the strong swell of the Pacific by the barrier, the water is smooth, and it also offers the advantage of regular soundings, its depth not being very unequal, and varying only from 60 fathoms at the southern end to 30 fathoms at the great opening, to 20 at Cape Tribulation. Though those who first investigated this part of the Pacific had to encounter numerous difficulties, and were more than once in imminent danger, it seems that it offers, the safest route for vessels which are not very large, and it appears that it has lately been adopted as the common route of communication between Sydney and Essington, the newly established settlement in New South Wales, by this track pass through Torres Strait by sailing round Cape York and through Endeavour Strait. The last-mentioned strait is formed by the mainland of Australia and some of the islands belonging to the Prince of Wales Islands, and constitutes the southern part of the strait. It runs from two to six miles wide, and offers a safe passage for vessels of good size.

The Outer route, which lies through the Coraliean Sea, is dangerous, owing to the great number of reefs which are scattered between Sydney and Torres Strait. The passage through Pandora Entrance the vessels enter Torres Strait by sailing north of the long reef, situated at the entrance of the strait (144° E. long.), to Murray Islands, and travels through the strait by a sea-way between innumerable low islands, shoals, and rocks. They do not enter Endeavour Strait, but keep at the distance of 20 miles from it to the northward, until they have passed on the north of Wednesday Islands and islands, when they leave the Indian Ocean and comprehend the Indian Sea.

(Cook's First Voyage; Flinders' Voyage to Terra Australis; Horsburgh's Indian Directory; Earl's Account of a Visit to Kees, in London Geographical Journal, vol. xi.; Torres Vedras, a town of Portuguese Estremadura, about twenty-five miles north-north-west of Lisbon, and about eight miles from the sea-coast. The small river Zinzande flows in a ravine by Torres Vedras, separating the town from the mountainous country which Lisbon is situated, from the lofty ridge called Serra de Baraguda, which runs from north to south in a direction almost perpendicular to the former. [Terremadora.] Pugentura].

Zinzande is a become an historical name in consequence of the lines of defence constructed by Lord Welington along the sinuosities of the hilly tract which extends from the Tagus to the sea, so as to protect the defences of the city of Lisbon from the enemy. The work was started and finished during the autumn of 1810. The line of defence was double: the first, which was 25 miles long, began at Alhandia on the Tagus, crossed the valley of the river, and passed through the south-east corner of the city of Lisbon, which was then garrisoned by an English army. The line of defence was carried on to the skirts of Monte Agara, where there was a large and strong redoubt; it then passed across the valley of Zibelnia, and skirted the ravine of Rona to the heights of Torres Vedras, which were still in the hands of the English. The line was completed by the construction of several forts, batteries, and barracks, which were passed along the lines. About 60,000 men, between English, Portuguese, and Spaniards, were posted along the first and second lines. A flotilla of gun-boats flanked the right of the position.

(The Military Life of the Duke of Wellington, in Knight's Store of Knowledge.)

Torgiell, Evangelista, a learned Italian mathematician, was born 1619. At Piacenclodi in Romagna, and being, probably at an early age, an orphan, he was supported by an uncle who resided at Fenza. At this place, and in a school of the Jesuits, the youth received a mathematical education, and he speedily distinguished himself by the progress which he made in acquiring a knowledge of the sciences.

At twenty years of age his uncle sent him to Rome, where he became intimately acquainted with Benedict Castelli, who was then professor of mathematics at the University of Rome, and by whom his studies were directed. The Dialogues of Galileo appear to have particularly engaged Torgiell's attention, and he composed two tracts, one on the subject of mechanics, and the other on the method of finding the roots of equations. The former was published with the rest of his mathematical works in 1663. Torgiell seems to have been the first who established the principle, that when two weights are connected by a string through any position their common centre of gravity neither ascends nor descends; those
weights are in equilibrio; and on this principle he investigated the ratio between two weights when they are in equilibrio on a double inclined plane. He also investigated the nature of the parabola, and showed that the parabolas situated within one curve which is a tangent to all of them, and is itself a parabola. In the tract on the motion of fluids, he assumes that water will flow through an orifice at the bottom of a vessel with a velocity equal to that which would be thought to be observed if the vessel were to be made to pass through the height of the fluid in the vessel, and he endeavours to establish the principle by the supposed fact that water so flowing ascends in a vertical tube connected with the vessel at the orifice, and which is partially filled with water, to the level of the upper surface of that which is in the vessel; he hence concludes that the velocities of effluent water must vary with the square-roots of the pressures.

Recently, having received copies of the tracts above mentioned, was desirous of becoming acquainted with the author, and he pressed the latter to join him at Florence. Torricelli, having formed connections at Rome, at first hesitated, but at length decided to accept the invitation; he found the climate agreeable, and the society and conversation contributed to soothe the last days of the venerable philosopher, who was then infirm and blind, and who died at the end of three months from his arrival. The year 1637 was the date of the appointment of professor of mathematics in the Academia, Torricelli became the successor of Galileo in the institution, and he resided at Florence till his death, which happened in 1647.

About the year 1637 Roberval, in France, discovered a method of determining the area of a cycloid, and seven years later Torricelli published a solution of the problem in an appendix to the collection of his works. As the Italian artist Vasari has left a description of Roberval's method, it is unnecessary to enter into the details of the process. Torricelli, for convenience and brevity, has given the name 'torricellian vacuum' to the space enclosed by the lower edge of the column of mercury, and has thus been able to give an approximate idea of the pressure of the atmosphere.
him to make a copy of it. The payment promised for it seems also to have been made, though the artist fancied it was about to be rendered wealthy for the rest of his days; so great therefore was his indignation on discovering that the vast heap of marravedis sent home to him amounted to no more in value than thirty ducats, that he went and broke the banker's windows. On this occasion the Duke caused himself to be imprisoned in the Inquisition as a sacrilegious heretic who had impiously destroyed a figure of the Holy Virgin. He was accordingly condemned by that tribunal, but avoided the execution of his sentence by refusing to take any food; preferring starving himself to death in the more ignominious end which else awaited him. Thus perished, in 1532, an artist of more than ordinary talent: a victim partly to his own violence and imprudence, and partly to the mismanagement of a most odious and sanguinary tribunal. (Vassari, Vita; Vita di Benvenuto Cellini.)

TORRINGTON. [DEVONSHIRE.]

TORS. By the natural weathering of rocks exposed to atmospheric vicissitudes, the perishable parts are removed and the more resisting portions remain. In rocks which manifest peculiar arrangements of joints or natural divisions, the blocks and masses defined by their intersections often appear in cubical, subcubular, and other characteristic shapes. To masses more or less characteristic in figure, left by the decay of surrounding parts in prominent situations, the name of 'Tor' is applied in the granitic tracts of Devon and Cornwall. Examples may be seen in almost every district of granite, millstone-grit, and massive conglomerate, such as that which forms the top of the old red-sandstone near Monmouth. In some instances the weathering process (which proceeds most rapidly to waste the stone in Sheerred parts) undermines the mass of rock, so as to leave it standing on a narrow pedestal (Brigham rocks in Yorkshire, for example, or the 'Backstone' near Monmouth). Finally, this pedestal is worn away, and the stone falls to take a new position. It may happen, owing to the figure of the stone and the place of the centre of gravity, that in its new situation the stone may rest upon so narrow a base as to be easily displaced to a small extent by the hand. It is then a 'rocking-stone,' such as occur in the Lake district in Yorkshire, and in other situations where the labour of Drauid has been invoked to account for a simple operation of nature. (MacCulloch, in Grol. Trans., 1st series, vol. ii.: De la Beche's Manual of Geology: Phillips's Geol. of Yorkshire, vol. i.]

TORSCHOK is a considerable town of European Russia, in the government of Twer: next to the capital, it is the most important town in that government. It is situated on the right bank of the river Twerza, on the high road between St. Petersburg and Moscow. It is divided into two parts by the river which runs through it, and over which there is a bridge of boats. It is surrounded with palisades, and has broad streets and spacious market-places, which however are considerably clogged with the habits of the Tartars. In the town there are no inns but the inns, which are planted with birch and converted into public walks. The houses are partly built of brick; and there are twenty-three churches, among which the cathedral, which has been rebuilt within these few years, is worthy of notice. From the castle on the hill there is an extensive and beautiful prospect. The town is large, and has a striking effect when viewed at a distance; the interior does not correspond with the exterior appearance. It is very old, and has always shared the fate of Novgorod; after being frequently pillaged by the Tartars and the princes of Twer and Moscow, it has always recovered itself, and is partly indebted for its agreeable appearance to Catherine II., who relieved it after a great fire in 1789. The population of Torschok is stated by Hassel, above twenty years ago, at 15,000; yet Schmitzler, in 1835, thinks that estimate much too high. The inhabitants manufacture boots, slippers, caps, port- folios, and other articles of embroidery for commerce. For most of the year no travellers pass through this city without purchasing some articles of this kind, and they pay a higher price on the spot than in St. Petersburg and Moscow, where very large quantities are sold. The boots and caps of Torschok are sold as the manufacture of Turkey and Persia.

(Schmitzler, La Russie, la Pologne, et la Finlande; Stein, Geographisches Lexicon; Horselmann; Hassel; Cahierich.)

TORSSELLINO. [TORSSELLINI.]

TORSION is that force with which a thread or wire returns to a state of rest when it has been twisted by being turned round and round, which is suspended vertically, is attached at the upper extremity some object, and at the lower extremity a weight with a horizontal index, or a stirrup, which is to carry a needle or bar in a horizontal position.

Let $Z Y$ be the wire. We then weight or stirrup, and $A B$ an index or needle, and let $b,c$ be part of a graduate! ring on the same level as the needle; then, on turning the object $W$ round till a mark on the extremity $A$ of the index is brought to any point, on the ring, the wire becomes twisted; and when the power by which $W$ is turned is removed, the elasticity of the wire causes the point at $b$ to oscillate within the ring through an arc, as $b,ac,$ which continually diminishes till the index rests in its original position.

In the article Elasticity (p. 327) there is given an investigation from which it is proved that, while the force of torsion is moderate, its intensity is directly proportional to the angle or arc through which the extremity $A$ of the index is moved in twisting the wire. It is also proved that $T,$ the time of a complete oscillation, is constant, or that the vibrations are isochronous, like those of a pendulum which is acted upon by gravity; and further, that when a body, as $W,$ is suspended, the squares of the times of vibration vary directly as the momentum of the body's inertia, and inversely as the force of torsion: consequently when forces and weights of suspended bodies are the same, the force of torsion varies inversely with the square of the time. With respect to the effects which a variation in the length of the wire will cause in the force of torsion, it may be observed that in proportion as the length of the wires are increased, points at the lower extremities must be turned, about the axis, through greater arcs, in order to produce equal degrees of torsion at equal distances from the points of suspension; and hence, if the number of revolutions be equal, the force of torsion will be inversely proportional to the length of the wire: it follows therefore that the time of a vibration varies directly with the square-root of the length of the wire.

These deductions from theory are confirmed by their agreement with the results of the numerous experiments made by M. Coulomb with an apparatus similar to that which is above represented; the times in which a certain number of isochronous vibrations were made with wires of different lengths, and carrying at their lower extremities cylinders of different weights, being observed. By comparisons also of experiments on wires of the same length and of different diameters, consequently of different weights, Coulomb found that the times of vibration were inversely proportional to the weights, or to the squares of the diameters of the wires; and since the force of torsion varies inversely with the squares of the times, it follows that when the wires are of the like material and of equal lengths, the force of torsion varies directly with the fourth power of the diameter. M. Poisson, in a memoir on the
equilibrium and movement of elastic bodies, which is given in the 'Mémoires de l'Académie des Sciences' (vol. viii.), has deduced the same law from purely theoretical considerations.

In order to be convenient to compare the force of torsion with that of gravity, and for this purpose it will be necessary to observe merely that the time in which a pendulum, whose length is l, makes a complete oscillation in a very small arc is expressed by \( \frac{4}{\pi} \sqrt{\frac{l}{g}} \) [Pendulum, p. 406], where g represents the force of gravity: then the time in which the vibrates once on its axis being made equal to the time in which a simple pendulum vibrates, we have (using the formula in Elasticity),

\[ \frac{k}{v} = \frac{\pi}{4} \]

therefore as the moment of inertia for a torsion wire suspending a body of a given form can be computed, and as \( \pi \) may be found from the observed time of a vibration, the value of \( n \) (the coefficient of the force of torsion) can be ascertained from this equation.

The torsion of slender wires was first employed by Coulomb for the purpose of determining the intensities of forces in nature and the laws of their action in circumstances which render direct methods inapplicable: his experiments were performed with an instrument which he called 'a torsion balance' and which he described in the article ELECTROMETER there is given a description of the instrument and of the method of employing it in finding the laws of electric attractions and repulsions; and it will therefore be sufficient in this place to explain its use for the determination of the force of gravity. For this purpose Coulomb adapted to the suspending wire, which was of copper, a small stirrup, as W, also of copper, in which could be placed a magnetized needle of steel. Before this was done however, a copper needle equal in weight to the magnetized needle which was to be used in the experiment, was placed in the stirrup, and the plate D at the top of the glass case was turned round till one extremity of the copper needle, which turned with the plate, was in a primary station, on the horizontal circle \( \hbar \alpha \) in the case, the suspending wire being in an untwisted state: the whole case was afterwards turned round till the needle, still pointing to zero, was in the direction of the magnetic meridian, which had been previously determined. The copper needle was then taken away, and the magnetized needle put in the stirrup; and as soon as it was at rest in the magnetic meridian, the suspending wire was twisted by turning the stem \( E \), to which it is attached at the upper extremity of the case, till the index there had passed over some given number of degrees, which in one experiment was 300. The suspended needle was thus made to deviate from its previous position. The needle's station was at 214\degree. The angle of torsion magnetism was in equilibrio with the force of torsion; and the angle of torsion was then equal to 493\degree \( (=300\degree-103\degree) \). On turning the index in \( E \) through two revolutions, the needle was observed to rest between the opposing forces, at 214\degree from its original place, when consequently the angle of torsion was 598\degree \( (=720\degree-214\degree) \). Obtaining in like manner several other angles of torsion with the corresponding deviations of the magnetic needle, and comparing them together, Coulomb found that the forces of torsion are constantly proportional to the sines of the deviations of the needle.

In order to discover the law of magnetic action with respect to the distances between attracting bodies, which were in motion, Coulomb placed a magnetized needle in the stirrup of the balance, and after twisting the wire by turning the micrometer stem at \( E \) on its axis through a certain number of degrees, he observed where the needle rested between the lines. On turning the needle, the horizontal component of the magnetic force was found to be proportional to the sine of the angle of torsion, and also to the sine of the angle of torsion, and also to the sine of the magnetic meridian, and the angle of torsion was expressed by 35 degrees. The wire being then untwisted, and the magnetized needle placed in the magnetic meridian, Coulomb introduced the glass case, in a vertical position, and also in the plane of the magnetic meridian, a magnetic needle, which had been used in the Aculeus experiment, the needle being observed to remain in its actual position, the suspended needle was repelled 24 degrees, and consequently it was prevented from returning to the zero point by a force of torsion expressed by the suspension 4 degrees, and the horizontal force of 'cessational revolution' \( (=24\times35) \), and thus the whole force of magnetic repulsion was expressed by 864 degrees. In a second experiment, the wire being twisted by making the stem at \( E \) perform three revolutions \( (=1080\degree) \) in a direction contrary to that of the 24 degrees before mentioned, the needle rested at 17 degrees from zero; the force of magnetic repulsion was then expressed by the sum of 1097 degrees, and the value of terrestrial attraction \( (=17 \times 35\degree, or 300\degree) \); that is, in all, 1692 degrees.

On comparing together several experiments of the same nature, and also several similar experiments in which the poles of a contrary denomination were presented to each other, Coulomb found, neglecting small differences which may be supposed to have arisen from the extent and configuration of the needles, that the forces of magnetic repulsion and attraction vary inversely as the squares of the distances.

The 'bifilar magnetometer' which was invented by M. Gauss, is a species of torsion balance: it is described briefly in the article TERRITORIAL MAGNETISM, and at length in Taylor's 'Scientific Memoirs,' vol. ii., part 6. The apparatus with which, by the oscillations of two balls of lead suspended on a torsion wire, he determined the magnetic meridian, Mr. Cavendish determined the average density of the earth, was also a balance acting on the same principle.

[Attraction, p. 68.]

For the strain of torsion in machinery, see MATERIALES, STRENGTH OF.

TORTENSON, [Thirty Years' War.]

TORTI, FRANCIS, an eminent Italian physician, was born at Modena, December 1st, 1655. Having finished his studies at Padua in 1675, he was called to Vienna for the legal profession; this however he soon abandoned, and embraced that of medicine, which he studied under Antonio Frasconi. He took the degree of Doctor of Medicine at Bologna in 1678, and upon his return to Modena, at the early age of twenty-three, he obtained one of the medical professorships founded by the duke Francis II. Soon afterwards he was chosen to be one of the physicians in ordinary to the duke, an appointment which he owed partly to his accomplishments in music and literature, as he was the composer of several oratorios, and also wrote a Latin letter under the assumed name of L. A. Cotin, in defence of Tasso against Bouhours. Upon the death of his predecessor, the emperor Charles II. made him one of the physicians in ordinary; he was also prevailed upon by his representations to found an anatomical amphitheatre at Modena, in which Torti was entrusted with the office of director. He had previously taken two dissertations of Ramazzini in carrying on some researches concerning the barometer, the results of which were published by the latter under the title 'Ephemeredes Barometricae Medicines,' Modena, 1691; and again 'Deeaps circa Mercuriri Motiones in Barometro,' Modena, 1698. But Torti's most important and celebrated work did not appear till 1709, under the title 'Therapeutica Specialia ad Febras quadam Periniciosas, inspissatis nee ponderis speculaturis,' where in China Chirch. of Medicine,' op. cit., and 'Deeaps circa Mercuriri Motiones in Barometro,' 8vo. This work placed him at once in the first rank among practical physicians, and still continues to be highly esteemed. It has been several times reprinted, the last edition being published in Paris, 1821, 8vo., in 2 vols. The publication of this work gained him the friendship and applause of various learned men, and also the title of corresponding member of the Royal Society of London, and of the Arcadian and Philologic Societie of Valenza in Italy. In 1717 he took up some criticisms from Manget and Ramazzini, to which he replied he had spoken with some degree of bitterness and warmth. In 1717 he was offered the professorship of Practical Medicine at Turin, and in 1724 he received the same at Padua, but he preferred living at Modena, where he had honours and emoluments heaped upon him by the duke. An inexcusable
bling of the hands having rendered him unable to feel
the pulse of his patients with sufficient accuracy, he gave
up practice some years before his death, and passed the
remainder of his life in honours considerable
by a journey from all parts, and spending much of his
leisure time in the pleasures of the chase, to which he had
always been much addicted. Having been summoned by
the prince of Parma, in 1731, to attend Henrietta d’E
he was engaged by a sudden attack of hemiplegia, brought
on probably by heat and over-exertion. For some time after-
wards he lost the use of his right side, but gradually
recovered, and lived for ten years after the attack. He
latterly became derisive, and died in March, 1741, at the
age of eighty-two. He was twice married, but having no
children, he left part of his fortune to found another
medical professorship at Modena.

Biographie Medicole.

TORTOISES (Testudinata), a numerous and highly
interesting order of Reptiles, generally considered the first
by herpetologists. They are also termed Chelolontas, from
chelos (chelon), the Greek name for a tortoise, and are
distinguished at the first glance by the double shield in
which their body is normally enclosed, whether they are
terrestrial, fresh-water, or marine: they were all comprised
by Linnaeus under his genus Testudo.

Organization.

Skeleton.—The surface of the shell in these reptiles is
continuous, being without any movable articulations, as is
the integument of the body; and during its growth it
is constantly renewed. But whilst this character prevails in all the genera
of which the order is composed, many of those genera differ
much in their cranial structure, and it becomes necessary to
compare the differences, in this respect, with those much greater
than those which exist in the crania of the Crocodiles.

In the Terrestial Tortoises the head is oval and obtuse
anteriorly; the interval between the eyes is large and
convex; the aperture of the nostrils is large, higher than
it is wide, and is a depressed half-cylinder. The orbits
which are large, are nearly round, complete throughout,
directed sideways, and a little forwards. The parietal region
terminates backwards in a large projecting occipital spine,
and has on each side two large temporal fossæ, under
which are enormous tympanic cavities; behind these cavi-
ties, and a little above, project two large mastoidean protuber-
cances, and beneath them are the apophyses, which
serve for the articulation of the under jaw. These apophyses
descend vertically, and are not directed backwards,
as in the Crocodiles. Underneath, the basiary region is
flat, the palate concave; and upon the anterior part of
this last the osseous posterior nostril opens, there being no
palatine bone, and the palate and bone of the maxillaries
being open up to the anterior fourth of the muzzle; a
condition rendered necessary by the mode of respiration in
these animals, and which as much resembles that of the
Pelaúres. In this respect the skull of Testudo differs
from that of the Chelone, in which the anterior part of the
occipital region is in its totality vertical, although the occi-
tepal spine, the mastoidean protuberances, and the articular
condyle of the skull, which is a very projecting tuberose,
rather than very uneven.

The first remarkable feature in the composition of the
head of the Tortoises, remarks Cuvier, from whose obser-
vations the osteology of the order is principally taken, is
the absence of nasal bones. In the recent animal the ex-
ternal bone nostrils are extended by cartilage posterior nostrils,
which represent these bones; but in the skeleton is found
immediately at their upper border the anterior frontal bone,
which takes its ordinary place in the frame of the orbit,
and is articulated also, as ordinarily, to the antorbital apophysis
of the maxillary bone, descends within the orbit,
forms the anterior septum, which separates the orbit from the
nose, and is articulated below with the palate and the
witness, leaving between it, the maxillary, and the palate
an air cavity to the nose, similar to that of the Tulipine.
The osseous cavity of the nose is oblong, and formed by the
maxillaries, the intermaxillaries, the vomer, the two an-
terior and the two principal frontals. The extent of the anterior
frontal is the same as that of the nostrils. They are
the causes that the first articulate with each other, and
that they extend above the orbit and outside the principal
frontals up to the posterior frontals in Testudo Indica, or
very near it in some other species. The intermaxillaries
have no ascending apophysis. They form, as ordinarily
the termination of the muzzle, and are directed backward
in the palate between the maxillaries, and even between
the anterior principal frontals. There are two large
apertures closed on each side in the middle
of the nasal cavity behind the maxillaries, the inter-
maxillaries, the vomers, and the anterior frontal bones.
The nostrils are nearly square, and the nasal cavity
is divided by a septum, which extends from the
basal cartilages behind the principal frontals; this septum
is closed behind by the principal frontals, which leave a large
aperture between them closed by a cartilage which per-
mits the passage of the filaments of the olfactory nerve.
Lower and laterally there is, between the frontal, the ant-
orbital, and the vomer, a continuation of the same cartilage, which rep-resentsthe
nasal scale. In the terrestrial tortoise there is no inter-
nasal septum, which is entirely simple cartilaginous, or nearly none; but in the marine it is often replaced by cartilage, in very little of the nasal cavity, because they are short
and together form a lozenge wider than it is long. The
parietals form together a pentagon, the most acute angle
of which proceeds to unite itself with the occipital spine
They cover more than half of the cranial chamber, and
are directed backwards by means of a series suture on the
occipital bone and on the petrous bone. On each side the
parietal bone descends very low into the temporal fossa
there it occupies nearly all the space which the temporal
wing of the sphenoid bone occupies in the crocodile, and
in the tortoise there only remains a very small portion of
this bone, which unites on one side to the descending por-
tion of the parietal; on the other to the palate, the in-
ternal narial aperture, and the sphenoid bone, the tympanic
cavity, and the os petrosum.

In the Chelone Mydas (tortue franche) it is still smaller
and joined to the descending part of the descending portion
of the parietal; on the side of the temporal fossa
ordinarily, with the external and posterior angle of the
maxillary bone. It is narrow and continued under the
orbit, behind which it encounters the posterior frontals
and this, which completes the frame in this part, and the
sphenoid bone, which forms itself the whole zygomatic arch, as may be seen in view of the
Cetaceus. The temporal bone widens to unite itself
to the tympanic cavity, which is extremely large. It form-
a frame which is nearly completely bony for a large tym-
panum; and below this frame it descends in form of an
apophysis for the articulation of the lower jaw. This frame
leads into a vast cavity, completed only at its upper posterior
gnathal angle by the mastoid. At the bottom of this cavity
is a hole through which passes the osseous auditus, which
arrives at a second cavity, formed externally by the bone of
the tympanic cavity, on the internal side by the petrous
bone and the occipital bones, below a little by the sphenoid
bone which completes the frame in this part. The forma-
tion of the tympanic part of the tympanic cavity which is thus divided by a
constriction, of which we have examples among the mam-
mals, especially in the genus Felis, but the communication between the tympanic cavity
and the mastoid is obliterated. The tympanic bone forms besides a considerable part of the posterior walls of the temporal fossa. Between it and the parietal the petrous bone shows itself in this same temporal fossa, and the cranium is closed behind by the
occipital bone, which is here divided into four bones; for the lateral occipitals are each divided into
two parts, the most external of which Cuvier terms the
external occipital. The fenestra ovalis is, he observes
continuation of the tympanic bone, and is similar to
as, in the crocodile, it is common to the petrous bone and
the ordinary lateral occipital: the fenestra rotunda, on
the contrary, is pierced in the external occipital, as it is pierced
in the lateral occipital of the crocodile. The two bones
contribute to the formation of the cell of the labyrinth
with the upper occipital, as the petrous bone and the lat-
eral occipital contribute to it in the crocodile. In both
genera the great aperture for the exit of the fifth pair
of nerves is placed behind the lateral part of the temporal ala. In the Turtle this hole is between the petrous bone and the descending part of the parietal bone. The osseous auditus is simple, as in the crocodile, and forms part of the external occipital bone. In the Tulipine analogy is the same, but it is
formed in the cartilage of the nasal bone, and has a more
approximation to the fenestra ovalis, and which is there
applied by a round and concave surface, so that it has
nearly the figure of a trumpet. The external end of the
stem, placed in the external part of the cavity, is, in great
part, cartilaginous, and terminated by a plate of the same substance and of lenticular form, which is encased in the membrane of the tympanum, and which may be considered as the analogue of the malleus. The Eustachian tube is entirely cartilaginous or membranous. It commences in the external chamber of the cavity, above, by a large notch of the posterior border of the tympanic bone, near the edge of the tympanum itself, and is directed obliquely within, passing between the bone of the cavity and the depressor muscle of the lower jaw, to a notch of the lateral and posterior border of the pterygoid bone, whereby it penetrates into the back of the fauces, on the side, close to the articulation of the lower jaw, but far enough from its congener, and especially very far behind the internal nostrils. On the palate, or rather, behind the roof of the back of the mouth, may be seen the orifices of two tubes, under the form of two small holes separated from each other.

Reverting to the lower surface of the cranium, behind the maxillaries and the frontals, posterior to the two sides of the vomer, are the palatines, surrounded behind and externally by the pterygoid bones, which last extend along the external border of the palate to the maxillary bones. The rest of the pterygoids covers the lower surface of the cranium between the two tympanic cavities and the two temporal alae, leaving exposed behind only a triangular part of the body of the sphenoid. Here, Cuvier observes, the palatines have only their upper portion, that is to say, that which, in the mammifers, separates the back nostrils from the orbits, and they want that recurved part which prolongs the roof of the palate behind the maxillaries: he adds that when he wrote he had found it impossible to discover the lachrymal bone in the tortoises, any more than in the seals and dolphins, though he had recognised a vestige of it in the whales, and he says that he does not see that Ulric or Bojanus had found it more than he had done, but he had observed towards the point of junction of the anterior frontal, the palate, and the maxillary bones, an aperture which might well perform the functions of a lachrymal hole. The olfactory and optic nerves have their exit by the cartilaginous sepa of the cranium, and not by any particular opening in the skull. Cuvier thinks that it is the same with the third and fourth pairs; the sixth goes forth by a small canal of the body of the sphenoid bone.

The fiftieth pair has a great hole between the petrous bone and the temporal ala divided into two externally. There is at the external border of the palate bone a hole analogous to the pterygo-palatine.

Internally, the cerebral cavity is higher than it is wide; the bottom of it is very large: but, in front, in the sphenoid, there is a deep fossa for the pituitary gland, a kind of saddle. From the sides of this part spring the cartilaginous septa, which in going to form a junction with the antero-cerebral partition of the frontal bone, close the cavity of the cranium, support the whole anterior part of the encephalon, and occupy the place of the cribiform plate, of the orbital ala; or otherwise, the anterior sphenoid, and the greater part of the temporal ala, of which another considerable part is replaced by the descending portions of the parietal, so that what remains does not participate in the formation of the chamber of the cranium except a little in front of the hole for the fifth pair of nerves. There is no more bony trace of the anterior sphenoid than in the crocodile.

Cuvier observes that this description, taken from Testudo Indica, sufficiently agrees with the other terrestrial tortoises properly so called.

In the Emys, or ordinary fresh-water tortoises, the same author remarks that the head is more flattened. The principal frontals, although they are wider than they are long, do not reach to the border of the orbit, as is, for example, the case in the Testudo (Cistudo) Europaeus; the posterior frontal is wider. The frame of the tympanum is not complete, and in lieu of a hole there is a passage for the passage of the ossicles audita from one hollow of the cavity to the other. The basiary and palatine regions form but one plane; the palatines not being even concave. Cuvier observes that Testudines scripta, nicta, sebra, durata, centrata, clausa, and virgulata, belong to this category. Certain Emys, he remarks, Emys expansa for instance, tend to the Sea-tortoises or Turtles and the fresh-water tortoises, and yet exhibit characters peculiar to themselves. The head is depressed, the muzzle short, and the orbits small and placed very forward. It
wards the bony vomer, so that its two back nostrils form but one aperture in the skull. Its palatines want the palatine portion. The frame of the first chamber of its tympanic cavity is complete; this chamber communicates only by one narrow hole with the mastoidoscelous, and the Eustachian tube takes its origin by means of a slit, which is an extension of the hole by which the ossicular passes into the second chamber. The temporal bone is covered, as in the turtles, by the parietal, temporal, jugal, and posterior frontal lags; this last is very narrow; it is on the posterior part descending into the temple, which, uniting to an ascending part of the jugal bone and to a re-entering portion of the jugal bone, forms a partition which separates the orbit from the temporal fossa, not leaving in this way a trace except on one side of the temporal bone, the hole near which becomes a tympanic cavity. This accounts singularly for the palate and jugal bones, and not with the maxillary, which does not reach so far backwards. Its external border is curved with the neighbouring portion of the jugal bone, and thus forms in the lower part of the temple a kind of canal, which takes its commencement at the hole of communication of the temple with the orbit. Its posterior angle on the contrary is directed a little downwards, descending more than the articular facet for the lower jaw, and leaving between it and the elevated part of the external auricular notch, a wide notch. This angle and the articular facet is a fossa, hollowed in the tympanic, in the sphenoid, and the pterygoid bones. The mastoidian tubercles are depressed, very much projecting backwards, and pointed; their point is formed by the mastoidan and the pterygoid bones. At each side of the tympanic cavity the lower border of the skull has a wide notch cut in the temporal, the jugal, and the lower maxillary, as in the Land Turtles. The sphenoid shows itself below on a surface much wider than in the Land Turtles, and the basi-sphenoid appears less. The lateral occipital parts are also very small, and are promptly anchored with the basi-sphenoid bone. The tubercle for the articulation with the atlas is less, than the mastoidian apophyses. In the Testudo (Emysura*) serpentina, Cuvier no longer found at a certain age the external occipital distended. It was united to the lateral occipital; whilst in the Land Turtles it is the upper occipital that it is, rather, united. The skull of the Testudo serpentina is, he observes, depressed anteriorly, the muzzle very short; the orbits moderate and approaching the muzzle; the temple covered only at its anterior part by a lamina of the parietal bone, less complete than in the turtles, and by an enlargement of the posterior frontal and of the jugal bones. The palatines have no palatine lamina; the palatine and pterygoid regions is very flat. The analogous holes of the maxillaries are very low, and of the maxillaries the passage of the osseous auditory is made by a hole, and not by a fissure. In the Triopsyx, or Soft Turtles, the skull, Cuvier observes, is depressed, and elongated backwards; the muzzle, pot-bellied (that of the species is short and rounded in some others. The intermaxillary bones are very small, and have neither nasal nor palatine apophysis; there is behind them a large incisive hole. The maxillaries unite upon the palate for a rather long space, so that the posterior nostrils are more backward than in the Land Turtles. The palatines do not unite below to prolong the palate; they are hollowed into a semi-canal anteriorly, and less extended than in the Land Turtles. This cavity of the sphenoid is divided up into two passages between two pterygoid bones, which do not unite, but extend from the lateral occipital, between the tympanic cavity and the basi-sphenoid bone, and to the sides of the posterior parietal and mastoidian and maxillaries, a conformation which renders the whole of the basi-sphenoid and palate regions wide and flat. Above, the anterior frontals advance between the maxillaries and supply exactly the place of the proper bones of the nose, without any distinct separation. When they need to form a point on the external aperture of the nostrils, as the bones of the nose often do in the mammals. The principal frontals form nearly a square; they reach to the base of the orbits. The intermaxillaries are a part of the posterior and lower border of the orbit, and nearly the whole of the zygomatic arch, of which the squamous portion of the temporal bone forms only a small part in front of the tympanic cavity; this last has its frame complete. The osseous passes by means of a hole to enter a second chamber of the cavity, which, as in the other tortoises, is closed behind by a cartilage only. The Eustachian tube commences by a notch of the posterior border of the temporal fossa, very narrow, but much broader in descending again towards its apophysis for the lower jaw. The temporal ala is placed below and in front of the great hole of the fifth pair of nerves, and the descending part of the parietal bone makes itself visible in it. If therefore enters more into the composition of the cranium, and is more easily recognised, than in the other tortoises. Cuvier found no osseous trace of the anterior sphenoidal mor of its ala; a rather delicate membrane occupies its place, and closes on each side the front of the cerebral cavity. The principal character of the Marine Tortoises, or Turtles (Cheloniens as they have been generally termed) by Cuvier, remarks, that a lamina of their parietal, their posterior frontal, their mastoidian, their temporal and their jugal, unite together, and with the tympanic cavity by a peculiar conformation of the skull; it forms a bony roof, which has no solution of continuity. This muzzle being shorter than in other tortoises, and their orbits much longer;* their nasal cavity is smaller, and as wide as it is long and high. Its posterior wall belongs entirely to the maxillaries, and the transversal sutures, at which the auditory nerves are introduced. The bony tubes of the back nostrils commence in the lower part of this posterior partition, and, like the palatines, have a palatine part or lower lamina; these tubes are rather longer, more directed backwards, and bear less resemblance to simple holes. It results also from the size of the orbit that the inter-orbital membrane, membranous or cartilaginous space is more extended in this order of animals than in any other. Chelone Chelone, of the species Chelone Chelone, oblonga, which he observes, singularly small in Chelone Mydusa, entirely at the external surface, and simply resting on the sutures of the descending part of the parietal and pterygoid bones. In Chelone Cergita and Chelone Cauauna Cuere could not find even a vestige of it. The osseous auditory does not pass by means of a hole, but of a large notch from the first chamber of the tympanum into the second and this second is cartilaginous throughout its posterior partition; it is by the same notch that the Eustachian tube descends towards the back of the mouth. The first chamber of the tympanam is slightly concave; there is no mastoidial bone so called; but the mastoidean bone is large, a tympanic capsule whose passage extends its cavity. The hole of the fifth pair is oval and very large between the descending portion of the parietal, the pterygoid, and the petrous bone; for the rest, the skull of the species Chelone resembles that of the preceding turtles. Cuvier believes, inasmuch as no one in one of the species (a young Chelone Mydusa) a vestige of a suture that might separate a bony skull from the orbital part of the maxillary bone: it was however only as indication scarcely so strong as that which marks the intermaxillary of man. But, Cuvier observes, the most heterocline skull among the tortoises is that of the Matamata (Testudo fmbrilinata, the Eutamata, or Homeo. or, at least, it is reduced to a simple vestige. The two small orbits are close to the end of the muzzle. The posterior region of the cranium is elevated, and the two tympanic bones, in form of small trumpets, widen on the lateral side of the cranium. The tympanic is a wide horizontal fossa, not deep, and not all covered, except behind by the union of the posterior angle of the parietal with the mastoid bone; and, what is peculiar, Cuvier observes, to this subgenus, this fossa is not tympanic; it is a wide depression of the same form, or, at least, it is reduced to a simple vestige. The two maxillaries form together a transversal arch, in the middle of which, below, is a single intermaxillary, and, above, the maxillary of the orbit. The bony tube is not deep, and does not unite to a small fleshly proboscis. The two palatine bones, and, between the vomer, fill below the concavity of this arch, and have in front the two back nostrils well separated, but which the palatines do not enucleate below. At the
posterior border of the palatine is a rather large pterygo-palatine hole. The anterior and posterior frontals form the upper part of the orbits. The principal frontals advance between the anterior frontals to the edge of the external nostrils. There is no more nasal bone than in the other tortoises. The jugal proceeds from the posterior angle of the orbit between the maxillary and posterior frontal, beyond which it does not go, touching a little behind and below the pterygoidean; but not forming any projection behind to border the temple. This last is in this manner separated from the orbit by a postorbital branch of excessive width, and which takes in the totality of the posterior frontal and the jugal bones. The posterior frontal articulates itself to the pterygoidean by its external posterior angle. The rest of its posterior border is free, and is continued with that of the parietal to cover a wide and flat canal of communication, proceeding from the temple to the orbit, and formed below by the pterygoidean and palatine bones. The two pterygoideans are enormous. They form the greatest part of the base of the cranium and of the bottom of the temple. Their external border is curved in its anterior part for its continuation with the free border of the posterior frontal: there are neither orbital nor temporal alae. The parietal bones, which form above a great rectangle, unite by their descending portions to the palatines, the pterygoideans, the petrous, and the upper occipital bones. They form by themselves nearly the whole roof of the cranium. Following the pterygoidean, the temple is bounded behind by the tympanic bone or the tympanic cavity, which resembles in part a trumpet. The frame of the tympanum is complete. A hole in the posterior wall suffers the ossicular to pass into the second chamber, which, in the skull, is only a long groove of the posterior surface of the cavity, which terminates in a hollow, in the formation of which the petrous bone, the external occipital, and the lateral occipital concur. It is not closed behind, except by cartilage and membranes; and in the wall of the side of the cranium are pierced the two fenestrae, as ordinarily. Above this hole of the first chamber, by which the ossicle passes, is another which conducts into the mastoidian cellule, which, on account of the outward projection of the tympanum, is found within and not behind. The occipital spine is a short vertebral crest, and the mastoidian tubercles are transversal crests, which run entirely to the mastoidian. Even in large individuals the six occipitals ordinary to the tortoises may be distinguished. Below, the smooth and nearly plane cranium presents a sort of regular compartment, formed of the intermaxillaries, the maxillaries, the vomer, the palatines, the pterygoideans, the sphenoid, the petrous bones, the tympanic cavities, the basal, and the lateral and external occipitals. Behind the ceiling of the temple the petrous bone forms a square compartment between the pterygoidean, the tympanic cavity, the external occipital, the superior occipital, and the parietal bones.

The lower jaw of the tortoises is divided in a manner which it is not very easy to refer to that manifested in the crocodile, to which, Cuvier observes, that of the birds has a much more striking relation; but the bird’s jaw he adds, also approaching to that of the tortoises, aids us in referring it to a common type. The space occupied in the crocodile by the two dental and the two opercular bones is filled in the marine tortoises, the fresh-water and land-tortoises, as well as in the Triops, with a single bone only, the analogue of the two dental bones. Cuvier never saw in all these subgenera, even in their youth, any trace of synphysis; the bone is continuous in the tortoises, as in birds. The Malacoma, or Chelys, on the contrary, preserves in every age a division at the anterior part. The opercular bone always exists, as in the crocodile, at the internal surface; but it is carried farther backward, and attains to the posterior extremity. Beneath it is the angular bone forming the lower edge of the jaw. That which Cuvier names the surangular bone occupies the external surface of this part of the jaw, and proceeds also to its posterior extremity, but only touches the angular bone quite behind, and in becoming separated on the two anterior thirds by a long point of the dental bone. Above, and towards the back part, between the opercular and surangular bones, the articular bone is situated, as in birds; but in the tortoises it is reduced to smaller dimensions, only serving for the articulation and for the insertion of the depressor muscle, or the analogue of the digastricus muscle. The coronoid apophysis does not belong at all to the surangular bone in this order, but to a bone placed between the dental, the opercular, and the surangular bones; and in front of the aperture by which the nerves enter the jaw, an opening, which is here found at the upper border, instead of being, as in the crocodile and the birds, at the internal surface. This bone, which is not found in the birds, can only respond to the complementary bone in the crocodile,
Cuvier saw in the *Emys* _exposus_ the armature, the opercular, and the articular bones anchylosed, and their sutures effaced, at a period when all the others were still visible. The general form of the bony jaw corresponds nearly to what is seen externally. More pointed in the *Trionyx* and *Chelemydes*; more obtuse in the *Tortue*; *Emys*, and the land-articulates; semicircular in front of the coronoid apophyses in the *Mituana*; it differs also in the furrow with which it is hollowed: this furrow is narrow, deep, and equally wide in the land-articulates; where the (to from) and symphysis in the *Emys*, *mydax*, is and is entirely wanting in the *Trionyx*, *Chelemydes*.

The os hyoideas of the tortoises is more complicated than that of the crocodiles, and varies singularly in form from one genus, and even one species to another. It is in general composed of a body itself, sometimes subdivided into many pieces, and of two, sometimes three pairs of horns; and under the anterior part of its body is, besides, suspended a bone or a cartilage, sometimes double, which is the true bone of the tongue analogots to that seen in the birds, but articulated in them in front of the body of the os hyoideas, whilst in the tortoises it is suspended below it. The greatest horns (the anterior pair when there are only two, the middle, when there are three, representing the styloidean bones) embrace the eosophagus, and mount behind the muscles which are the analogues of the digastric; under the lowest without any fixed otherwise than by their proper muscles. The land-articulates have the body of the os hyoideas wider, its anterior portion longer, and want the small anterior horns, whilst the cartilage is very much diminished. The disk of the disk are two round spaces, which in certain tortoises, the *T. Indice* for example, are only more delicate; but which in the others, *Testudo reticulata* for instance, are absolutely membranous.

In some fresh-water tortoises, *Testudines posteriores* and *causa* for example, the body of the bone is longer than it is wide; and has in front a small membranous space, and at the angles the small lateral horns. Sometimes two or even four ossicles of this form are there formed.

The os hyoideas of *Trionyx* differs still more. Its body is composed in front of a cartilaginous point, under which is suspended a great lingual oral cartilage. At the base of this a rhomboidal ossicle adheres on each side, which piece represents the anterior horns, and afterwards four others forming a thick disk, concave above, wider in front, and notched on the sides and behind. At the anterior angles of this disk adhere the middle horns, and to the posterior angles are attached the posterior horns: all four are bony. The middle are formed by a long piece, which is compressed, arched, and terminated by a styloidean horn; others are elongated by a cartilage, in the substance of which are encrusted in a row from five to six bony nuclei, which are round or oval, very hard and very distinct; so that the extremity contains twenty different osseous pieces, which appear to remain distinct for a long time.

The most singular of all these is that of the *Chelys*, and is very early entirely ossified. Its body is composed of a long, narrow, prismatic piece, hollowed above by a canal where the trachea runs. In front this piece is dilated, and carries on each side two angular portions, four in all, without counting the piece itself. The two intermediate ones unite in front, leaving between them and the principal bony membranous space on which the larynx repose. The lateral portions, Cuvier observes, represent perhaps the small anterior horns. It is on this piece that they form with the dilatation of the principal body that the sutures are articulated; these last are very strong, prismatic on their internal moiety, and then slender, and terminated by a bony and pointed piece, distinct from the rest of the horn. The posterior horns are articulated at the posterior extremity of the prism formed by the two lateral portions. They are long, strong, slightly compressed, and curved into an arch.

Under the anterior and dilated part is suspended the true bone of the tongue, formed in front of a semicircular cartilage, and in the form of a bony piece, which lies under the prismatic body of the os hyoideas.

In the Turtles (*Chelemydes Caretta* for instance) the body of the bone is in the form of an oblong buckler, concave above for the support of the larynx and the commencement of the trachea, and drawn out in front into a point which penetrates into the flesh of the tongue in passing upon the lingual bone. It presents on each side an angle for carrying the cartilage of the hyoidea, and is curved into an obtuse angle for going round the eosophagus and jaw, more bony than all the rest of the apparatus, is articulated to the middle of the lateral border of the body of the bone, and its free or upper extremity is terminated by a small but singular artihion. The two horns are articulated to the posterior angles. They are cartilaginous, flat, rather wide, and scarcely arched.

**Bones of the trunk: Dorsal buckler, or Carapace.**—The wide differences prevalent in the modification and arrangement in the bones of the head in this order lead one to expect, as the great French zoologist observes, proportional differences in the rest of the skeleton. The cranial differences are, as he remarks, greater perhaps than obtain among the whole of the mammals, and most certainly are more extensive than can be found in the whole class of birds.

The general distinguishing character of the tortoises, that which separates them from all the *Vertebrata*, is the external position of the bones of the thorax, enveloping with a cuirass or double buckler the muscular portion of the frame, and serving also as a protection for the shoulder-sinews and ribs. The same principle of construction prevails in the integument of the fresh-water tortoises.

The dorsal buckler is principally formed of eight pairs of ribs, united towards the middle by a longitudinal succession of angular plates, which adhere to the annular parts of the coxal articulation. These ribs he considers as paired; but it is remarkable that these annular portions alternate with the body of the vertebræ and do not correspond directly with them.

The ribs are divided by means of sutures into these plates; they are also united with each other, on the whole or a part of their length, according to the species, and even in each species according to the ages of the individuals.

There are eight anterior vertebrae which do not enter into this consideration, and they are free in their movements. The eighth, which may be regarded as the first dorsal, is placed obliquely between the last cervical and the first of the fixed vertebræ of the dorsal buckler, which shortens it anteriorly; behind, its apophysis is elongated, and enlarges a little to attach itself by spondylosis to a tubercle of the first of the plates of the intermediate series of the plastron.

The first of these fixed vertebras; its second dorsal, is still rather short, and carries also its proper annular part, the spinous apophysis of which, shorter than the preceding, attaches itself to the second plate by a cartilage. Its second plate, narrower than the first, forms but one bone, and an annulus or series of which the anterior portion is articulated by two small apophyses with the articular apophyses of the second dorsal. This, properly speaking, is the annular portion of the third dorsal, and in the third body of the vertebrae, is articulated by its anterior moiety with the posterior moiety of this third annular part, and by its posterior moiety it is articulated to the anterior moiety of the fourth annular portion; and this alternative continues, so that the body of the fourth vertebrae responds to the annular portions of the third and the fourth, the body of the fifth to the annular portions of the fourth and fifth, and so on to the tenth.

But it is necessary to distinguish in the ribs the plate included in the buckler, and a small branch which proceeds from its lower surface, and which represents what is termed the head of the bone in the ordinary ribs. This head is always articulated between two bony vertebræ. The first of all these ribs has only this small branch, without having any plate belonging to it in the buckler, excepting only in some of the *Emys*, where may be seen between the first and the second distinct plate, or the first or second broadened rib, a small piece which can only represent the enlarged portion of this first rib, but which does not belong to its head. It is articulated between the eighth vertebrae or first dorsal, and the first fixed vertebrae, and by its other extremity to itself to the internal surface of the second rib. This last has a plate which incorporates itself by its anterior border with the first of the longitudinal series, by its spinal border.
with the second piece of that series or the annular portion of the third vertebra, and by its head between the body of the second vertebra and that of the third. The succeeding ribs observe the same law, are articulated by means of their head between the body of one vertebra and that of another vertebra, and secure themselves by means of their dilated part with the plate which represents the annular portion of the second of these two vertebrae: and this, Cuvier observes, is a return to the general law; for it is found in the Sauropsida the ribs are articulated by their head between two vertebrae, and, by means of their tuberosity, with the transverse apophysis of the second of the two. The dilated portions of these ribs are the point of contact of the plates they incorporate with the plates of the longitudinal series. Consequently, then, the tuberosities of the ribs of mammals. The ninth plate of the longitudinal series, which belongs to the tenth dorsal, is the last with which a pair of the dilated ribs is incorporated, and this last is the ninth in all or the eighth of those which enter into the composition of the dorsal buckler. It is directed from its posterior border backwards, and embraces again the succeeding plates, with the external edges of which it becomes incorporated: but these three plates do not, any more than the first, serve to complete the vertebral canal.

The tenth rib, attached between the bodies of the tenth and eleventh vertebrae, produces no plate and enters not in the composition of the dorsal buckler. Like the first, it has only a portion of the head, and is joined by its other extremity to the internal surface of the ninth. The eleventh vertebra above the cervical is the only one that can be termed lumbar; it carries two ribs. In the Turtles, its annular portion again gives a plate to the longitudinal series of the dorsal buckler, and is the tenth and the smallest of the pieces of this series. The twelfth and thirteenth is odd and always placed between the four anterior ones, with the two first of which it generally coheres, when it is not articulated with the four. These nine pieces vary much in figure according to the genera and species.

In the Land and Freshwater Tortoises and in Chelys they only leave vacancies between each other in early youth, when they are formed by bony rays shooting in various directions in the still cartilaginous disk of the plastron, like the bones of the cranium in the fetus of mammals; but, with age, these rays join each other from every side, and form a disk compact in all its parts, which unites itself by a more or less considerable extent on each side to the dorsal buckler.

The Turtles or Cheloniens, and in the Trionyxes or Soft Tortoises, these radiating expansions do not unite throughout; and even when the four pieces on each side unite together and the odd piece is joined to those of the first pair, there remains in the middle, between them all and on each side between them and the dorsal buckler, great spaces which are filled up by cartilage only.

Again we must refer for the various modifications of the pieces of the breast-plate to Cuvier's works, and here give representations of one or two of them.

Vertebrae.—The atlas is composed of four pieces. The two first, united above in a slight spina prominens, after having surrounded the vertebral canal, and each having given backward its articular apophysis, concur with a third very small one in the formation of a ring for the reception of the condyle of the head: Cuvier calls it a ring, because the modifications of its form is as if in the skull of this fossor is open, and its bottom filled by a fourth piece, which is a true body of a vertebra without the annular portion, and which, presenting an anterior convex surface in the space here noticed, is articulated behind by a concave surface on the body of the axis. This piece, analogous to what we have already seen in the crocodile, represents, he observes, the odontoid apophysis of the axis of mammals. At their junction, there is besides, attached below, a small bone formed nearly like a patella (tibia), which is placed between the third and a first part of the fourth in this state.

In the freshwater Tortoises and in Chelys, the buckler is entirely filled up in time, and the ribs incorporate themselves throughout their length, between each other and with the marginal pieces. The ossification proceeds still faster in the Land Tortoises, and it is only in their youth that vacant spaces are observed between the external parts of their ribs.

In the Museum of the Royal College of Surgeons in London, No. 131 of the Physiological Series is the carapace or dorsal shell of a very young Turtle (Chelone Mydas), showing the state of ossification, which is continued from the first to the last vertebra, but still distinctly marked off from each other, until they meet and become joined by indented sutures similar to those of the cranium.

The buckler is more or less convex according to the species, and various are the modifications by which it undergoes; but our limits will not permit us to go further into details, for which we must refer the reader to Cuvier's work.

Carapace of Trionyx, seen from below.

The sternum, plastron, or breast-plate is always composed of nine pieces, of which eight are pairs, and the ninth odd and always placed between the four anterior ones, with the two first of which it generally coheres, when it is not articulated with the four. These nine pieces vary much in figure according to the genera and species.

In the Land and Freshwater Tortoises and in Chelys they only leave vacancies between each other in early youth, when they are formed by bony rays shooting in various directions in the still cartilaginous disk of the plastron, like the bones of the cranium in the fetus of mammals; but, with age, these rays join each other from every side, and form a disk compact in all its parts, which unites itself by a more or less considerable extent on each side to the dorsal buckler.
and of two transverse short apophyses, articulated on each side on the suture, which joins the body to the annular ring. Cuvier counted twenty-three caudal vertebrae in *Testudo graeca*, *Jodcra*, and other land-tortoises, and many as twenty-seven in *Testudo radiata*. He states that there were, only eighteen in the fresh-water and marine tortoises which he examined.

**Horns of the Extremities.—** Under the singular necessity, says Cuvier, which compelled nature to place the bones of the shoulder and pelvis within the trunk, and there attach the muscles, she seems to have made efforts to deviate as little as possible from her general plan.

The bone which goes from the dorsal buckler to the sternum is suspended by a ligament, under the dilatation of the second rib, but in front of the first, which, as we have seen, consists only of a head articulated under the second; so that, in some respects, this bone is outside the thorax. There is sometimes in the ligament by which it is attached one, and even two, peculiar bones. Cuvier refers to the description and representation of *lac* on the European Tortoise by Bojanus; and Cuvier himself found it also, but in the cartilaginous state. In an American Box Tortoise he observed two; but he satisfied himself that there were none in the great Land Tortoise, and he never saw any in those Marine Tortoises which he dissected.

This bone is at first nearly cylindrical; it proceeds backwards, and after having afforded on its external surface a portion of the articulating facet which receives the head of the humerus, it goes, with a more or less strong inward bend, to attach its exterior to the internal surface of the sternum, towards the lateral angle of the odd pair.

Cuvier saw in a very young Marine Tortoise this sternum branch divided by a suture, so that the portion of it which joined the sternum appeared a distinct bone; but, he observes, if this is general, it must unite to the other, very early period; for he never found this suture in extremely young Land and Freshwater Tortoises. The rest of the facet for the articulation of the humerus is furnished by another bone, which is directed more or less obliquely backward and towards the mesial line, widening into a fan-shape, and which thus lies nearly parallel to the sternum. The osseous branch which comes from the bony buckler is, according to Cuvier's self-corrected opinion, the shoulder-blade, and the part which it offers beyond the articular fossa is its acromion. The flattened bone which is directed backwards is, he adds, incontestably the coracoid bone; and he further remarks that all the muscles which proceed from these bones to go to the arm are respectively the same as in birds, whatever changes they have undergone in their position relatively to the horizon, in their size, and in their figure. Cuvier considers that it remains to be known whether there is a clavicle or not. If, he remarks, the suture which he had observed in a Marine Tortoise were constant, there would be no difficulty; one might make the clavicle of the sternal extremity of the bone which goes from the carapace to the sternum, which would unite to each of them, as it were, and attach itself to the odd piece (piece impairé) of the sternum: but if this occurrence be merely an accident, then one must suppose that the clavicle is wanting, as in the crocodile, or seek for it in the anterior pair of the ster- nal pieces, the position of which is, in fact, relatively to the odd pieces, sufficiently like that of the clavicle of the Sau- nians and of the Orithyliacnths.

This three-branched shoulder, this nearly cylindrical shoulder-blade, this annular portion nearly equal in for- mite to the rest of the shoulder-blade, are, says Cuvier, characteristic of the Tortoises. There is nothing parallel to this conformation in the other animals, because there is no other shoulder situated with the horns of the other forms of these parts afford, Cuvier observes, very good characters for the subgenera; and he details the modifications characteristic of the Marine Tortoises, the Land Tor- toises, the Freshwater Tortoises, *Chelys*, and *Trionyx*.

The horns of the land tortoises are shaped to turn singularly upon its axis, in order to place the forefoot in the position required by the bony curvatures, which only leaves a narrow passage for it. The result is that its internal tuberosity becomes internal and also posterior. The head of the bone goes out of the axis more than in any other animal, and that towards the posterior face, which, in the ordinary position, is the superior one.
It presents the segment of a sphere, and is very convex. The two tuberosities are very large, very projecting, and leave, between a concavity, as there is one, backwards, between the condyles of the humerus in the greater part of the Mammals. The internal tubercuity—become, as has been stated above, anterior—is the largest. It has the form of a long obtuse crest, analogous to the deltoideum, and which receives the same muscles. The other tuberosity forms a crest also, but much shorter. Both are near the head. The tubercle of the head is the asteragalus, and is convex, which, in man, would be anterior, is ordinarily found inferior. The opposed surface is convex. Above it is a small hollow opposite the end of the fossa, which is between the two tuberosities. The lower part of the bone is expanded horizontally, as in the Cetacea. On the external border is a furrow, not much developed in the Land Tortoises; deeper in the Emys, the Chelys, and the Trionyæ; and which, in the Marine Tortoises, nearly separates the lower head of the bone into two unequal parts. This furrow, Cuvier observes, is perhaps the best character for distinguishing the lower part of the humerus from that of the femur, which is without it, but which, in every other point, offers only very slight differences. Its lower head, transversely obtuse and of uniform convexity, receives the bones of the fore-arm, but without offering two distinct facets.

The Trionyæ do not differ from the Land Tortoises, excepting in having the tuberosities more apart. Other differences are manifested in Emys and Chelys, for which we refer to Cuvier's work, but the humerus of the Marine Tortoises cannot be passed by without particular notice, for it differs from all the others in the same horizontal, but much shorter; also in having its great tuberosity (the analogue of the small or internal tuberosity in man) longer, overreaching the head, and resembling an olecranon; and, lastly, in having the other tuberosity shorter, and representing a chevron-shaped crest.

There are always two bones in the fore-arm, but they have little motion one on the other. They are placed, however, so that there is a space between the external and the radius the internal border of the arm.

The radius has a semicircular, slightly concave, upper head, a somewhat slender body, and the lower head compressed and cut. as it were, obliquely, so that it is shorter on the ulnar side. The ulna is compressed. Its upper head is triangular and cut obliquely, so that its external border is longer upwards than the radial border, without having a true olecranon. This border is truncated. The lower one is cut square. Differences occur, as in Trionyx and the Cheloniæ or Marine Tortoise, in the Belica or Freshwater Tortoise. The belica is composed of three distinct bones, contributing, as in the quadrupeds, to the composition of the cotyloid fossa, viz. an elongated os ilium, which attaches itself by ligaments to the transversal processes of the vertebrae, and the two other bones, viz., an ischium and pubis, which are directed, widening as they proceed, towards the plastron, and are each united to its similar piece. At the point of union for the formation of the cotyloid cavity, each bone has three faces; one for each of the two others, and one for the cavity. On the rest of the length of the os ilii is oblong, the ischium proceeds, widening as it goes, directly towards the symphysis, Trionyx, &c. When the bone itself is directed forward, makes a curve towards the symphys, and widens also to reach it. Various differences occur in this part of the skeleton in the Land and Marine Tortoises, in Chelys and in Trionyx.

The femur might be easily mistaken for the humerus of a mammiferous quadruped. Its oval head leaves the body of the bone, without being precisely separated from it, by a narrow neck. In lieu of the trochanter there is a small, large, crest, separated by a space, behind the head, by a semicircular depression. The middle of the bone is delicate and round, and the lower part compressed from before backwards, widening by degrees to form the long hollow, which is transversal, slightly oblique, little flatter, in the Testudinata.

Differences of modification occur in the Freshwater and Marine Tortoises. In the museum of the Royal College of Surgeons, No. 235 A, of the Physiological Series, exhibits the os innominatum and femur of a large Tortoise (Testudo Indica, Vosmaer). The hip-joint is laid open to show that the ligamentum teres is deficient, a simple form of joint which obtains at the hip in all the Testudinata.

The two bones of the leg are nearly straight. The tibia is larger and more slender, being about slightly larger below; the fibula is more compressed and wider below. The first presents a slightly concave uniform surface, the other one which is slightly convex and rhomboidal. The modification occurs in the Land Tortoises, in Chelys, in Trionyx, and in the Cheloniæ.

Bones of the Fore-foot.—The differences in the mode of progression required corresponding variations in the bones of the fore and hind feet especially. Accordingly we find that in the Chelys, and in the Cheloniæ, fore and hind foot are one piece. In the land tortoises, the first row are two bones adhering to the ulna, and in the last row five smaller ones, supporting the five bones of the metacarpus. There is besides an intermediate bone under the first ulnar bone, and upon the second and third of the last row. Cuvier observes that this would seem to correspond with that dismembered tarsal bone which is found in the monkeys. Lastly, there is a great semi-lunar bone out of the rank, adhering to the external border of that which is above the metacarpal of the little finger. It is a true pisiform bone, although a little descended. Between that which is on the radius and the radius proper, is a furrow, which has a long time nothing but ligaments, and one does not see the great semilunar scaphoid which may be observed in other subgenera: but with age, remarks Cuvier, a small radial bone shows itself in this place. Very large individuals of this bone are found in the tortoiseshell. The bones of the metacarpus and those bones of the carpus do exist. This settled, there are found in the carpus a great radial and semi-lunar scaphoid, two ulnar bones nearly square, five bones of the second row supporting the five metacarpals, and an intermediate bone placed between the great radial, the first cubital or ulnar, and those which carry the third and fourth metacarpals. This intermediate bone, according to Cuvier, is only elongated, especially the middle finger; and the whole result is a pointed hand, which has the ungual phalanx of the thumb and forefinger only armed with a claw.

In the Land Tortoises there are but two phalanges on each finger, unless, Cuvier observes, one may suppose that there is wanting either the last row of the bones of the carpus, or that all the metacarpals are deficient, which is not admissible, because one may well see by the forms, and by comparison with the Freshwater Tortoises, that the metacarpals and those bones of the carpus do exist. This settled, there are found in the carpus a great radial and semi-lunar scaphoid, two ulnar bones nearly square, five bones of the second row supporting the five metacarpals, and an intermediate bone placed between the great radial, the first cubital or ulnar, and those which carry the third and fourth metacarpals. This intermediate bone, according to Cuvier, is only elongated, especially the middle finger; and the whole result is a pointed hand, which has the ungual phalanx of the thumb and forefinger only armed with a claw.

In the Freshwater Tortoises the three mesial fingers have their three phalanges well developed; the last only two belonging to the thumb and the little finger. The metacarpals are rather long, and the two external ones are carried on a single bone of the carpus: nevertheless the last row consists also of five bones, because there is one, very small, externally on the side of the thumb. In the first row the ulna, in the European Tortoise at least, carries four bones—two large ones, a small intermediate one, and another small one out of the rank; but there are other species, for instance, the land tortoises, where these two bones do not appear. The great radial or semilunar scaphoid passes partially under the two ulnar bones.

The Cheloniæ have the hand formed nearly like the Freshwater Tortoises, much elongated, and re-enters towards the inside of the carpus at the side of the bone named by Cuvier intermediate; and that little finger has, like the three intermediate ones, three phalanges.

The Trionyæ have also the radial bone re-entering at the side of the intermediate bone. Their three first fingers have their three phalanges large, wide, and pointed to carry the claws; the fourth has four phalanges, all rather slender; and the little finger has none.

Hind-foot.—Cuvier remarks that in the Testudinata, generally, the calcaneum is without any backward prominence, so that their tarsus is flat like a carpus. In the Cheloniæ it is composed of six or seven bones, if
the first of the little toe be counted: two in the first row, of which the largest, nearly rhomboidal and answering equally to the tibia and fibula, is the astragalus; the smaller, which is square and articulated only to the fibula, is the sole vestige of a calcaneum. In the second row there are four; three wedge-shaped for the metacarpals of the great toe and the two next toes, and one larger for the two last metatarsals. The bones of the metatarsus of the great and little toes are shorter than the others, and singularly wide and flat. That of the little toe, however, may be taken for one out of the rank of the tarsus. In this last case the little toe would have but two phalanges, otherwise three like the others. The great toe has but two. It carries a claw, and so does the next toe. The two succeeding toes have still their last phalanges rather large, although without claws, but the last has that phalanx very small.

In the Land Tortoises the bone analogous to the astragalus is larger and thicker; and the fibular bone on the analogue of the heel is smaller. The four other bones exist, and that here called the metatarsal of the little toe is also united to the suite by its own metatarsal, sometimes carries a vestige of a toe formed of one piece, which seemed to Cuvier to be wanting in many species. The metatarsal of the great toe is very short and not flat. The others are rather long; one of the four existing toes has more than two phalanges.

The tarsus of the Freshwater Tortoises is nearly the same, except that the fibular ossicle, or calcaneum, when it is not united to the astragalus, is larger; that the ossicle which serves as a vestige of the little toe is longer; and that the three toes which succeed the great toe have their phalanges very distinct.

In the tarsus of the Triozones the fibular bone descends outside the three cuneiform or wedge-shaped bones, and carries half the head of the third metatarsal and the whole of that of the fourth. At its external border a large square bone adheres, that about which Cuvier expressed a doubt whether it was a metatarsal bone or one out of the rank. It carries the first metatarsal on the first phalanx of the little toe; but in this case the little toe would have three. It is true, Cuvier adds, that the fourth toe has four, without counting its metatarsal. The great toe has two, and the two succeeding toes three each. In all three the head is large, wide, and pointed to carry a claw. In the fourth and fifth toe this last phalanx is very small and without a claw.

In the Testudinae (Chelys) the fourth toe is, like the two preceding, composed of three phalanges and armed with a claw; the fifth also has three phalanges, and it would even have four if one regarded the bone as to which Cuvier has expressed his doubts as a tarsal bone; but the last is very small, cartilaginous, and without a nail. The tarsus is the same as in Triozones, with this difference, that the analogues of the astragalus and calcaneum are divided transversely each into two bones; so that what is detached from the calcaneum forms a fourth cuneiform bone for the fourth metatarsal, and that which is detached from the astragalus is a true scaphoid, which carries the three first cuneiform bones.

Muscular system, particularly as relating to locomotion.—We have seen that the shoulder-blade is internal in the tortoises, that is, it is placed on the inside of the ribs: the muscles, consequently, of the head and neck, instead of being attached upon the ribs and spine, as in the vertebrata, are attached beneath them; the same observation holds as to the bones of the pelvis and the muscles of the thigh, so that, to use Cuvier's expression, a tortoise may be termed, in this respect, an animal retourné, an animal turned inside out, or rather, so to speak, outside in.

The progressive movements to be accomplished by the bony and muscular apparatus of the tortoises are those of walking, and swimming or paddling.

The walk of a tortoise is proverbially slow, such as might be expected from a reptile whose limbs are so imperfectly developed. Short, and placed at a great distance from the centre, they form a sort of short crutches, calculated to drag the unwieldy body gradually along, and if the animal be turned on its back it becomes almost helpless. The feet are little better than stumps, the toes being only indicated externally by what may be termed a collection of hoofs, placed, as in the elephants, on the circumference of the apophyses or bones, and which serve, so to speak, as a sort of grappling to hold on the surface of the ground and drag the armed trunk onwards. We hardly need add that progression in a vertical direction is impossible; but many tortoises can burrow with some difficulty.

Nor is this slowness out of place: the preservation of the animal is provided for by the very strong bony carapace and plastron protecting the whole body, and only suffering the head, tail, and four feet to be protruded from its anterior and posterior part and its four angles: these protruded parts can be withdrawn into the shell upon the approach of danger, and the animal then rests secure in its portable arched castle, leaving the enemy to the helpless task of besieguing a garrison that can remain for months without food. A large land tortoise can defy the whole animal world except man, from whom nothing is safe.
The most complete defence is made by the Box Tortoises; for in them the pieces which form the sterno are moveable, and may be compared to doors or hinged lids, which shut upon the carapace and thus form a sort of closed cleft in which the head, neck, tail, and feet, in short, the only exposed parts, can at will be enclosed far more securely than in any other kind.

But this slowness is confined to the Terrestrial Tortoises; for the aquatic species swim with great facility on or below the surface; and some, Chelone and Sphaerites for instance, with rapidity. But the well-developed flipper that enables the Marine Tortoise to oar its way with swiftness, is even a worse organ for land progression than the clumsy foot of a Land Tortoise. Not but that they will shuffle back to the sea, which they have only occasion to leave for a short time. Otherwise, if they see any one approaching, they will deal heavy blows with their flippers to those who attempt to stop them (for they, as well as the Land Tortoises, are very strong), as those who have been folled in this way turtles have known to their cost.

But however powerful the muscles which act upon the head, tail, and extremities are developed in this order of reptiles, those of the abdomen, as might indeed be expected, have little extent, and those of the ribs, as might also be expected, have little visibility in vain: but the square muscle of the loins, whose principal office in mammals is to move the lumbar vertebrae, acts in the tortoises, which have those vertebrae fixed, in another way: the two flanks being moveable os ili; and the straight muscle (rectus abdominis) which extends from the pubis to the sternum, moves the whole haunch in the greater part of the Testudinata.

Digestive System.—The Testudinata have no teeth, though there are often a median groove and denticulated projections and hollows: but the mandibles are covered with a horny case, as in the birds. The Chelydse and the Trionyces, though they have the horny covering, have the mouth furnished with soft skin so as to form a kind of lips. The muscles that work the lower jaw, which is the only moveable one, are very powerful in many of the species, and move the lower jaw, like that of the turtle, but not the other Cheloniæa grasping a solid body in their vice of a mouth is prodigious. The Chelydæ are the only Testudinata which have the jaws flat and the gape of the mouth very wide.

The food with which the Testudinata have to deal is various, and there are modifications in the digestive organs accordingly. The Chelone and Testudinæa generally prefer a vegetable diet. The Trionyces and Chelydæ prey upon flesh, which is of a different character from the vegetable, and so attack the weaker animals, such as crustaceans, insects, worms, and mollusks.

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which is composed of two distinct auricles and one ventricle, and that, as in the Frog, in the middle line of the body. The pericardium has been in great part removed; its serous layer is continued upon the fibrous layer from the apex of the heart, as well as from the great vessels at the base. No. 919 exhibits the liver, stomach, and intestines of the European fresh-water tortoise (Emys Europaea, Schopf.). The two lobes of the liver are united by a very thin strip below the heart; and the left lobe, like the lobulus epiglottis of mammals, is seen adapted to the lower curvature of the stomach. The thickness of the pericardium being removed, the form of the heart is shown. The ventricle is transversely oblong; the two auricles rent upon its basis posterior to the three arteries, which arise close together, and are frequently remote from their origins by dense cellular membrane. The right and posterior artery gives off the carotid and brachial arteries, and its trunk is continued over the right bronchus to the posterior part of the abdomen; the middle vessel, as in the snake, winds over the left bronchus, and joins the opposite aorta in the abdomen. The left vessel is the pulmonary artery; its two branches communicate in the feto with the two aortae by two ductus arteriosi, and afterwards are exclusively distributed to the lungs. The bronchial tubes, owing to the high division of the trachea, are of great length in the Tortoise. No. 919 exhibits the heart of a Chelone Mydas, with the auricles laid open to show the complete septum by which they are separated, and the auricular and ventricular reticulate muscular structure of their parietes, &c.; and No. 920 shows the ventricle of a Testudo Indica with its two chambers of small size compared with the bulk of the ventricle. Nos. 936 to 982 A. both exhibit preparations of the Vertebrata; & Nos. 983 to 973, both inclusive, preparations of the veins of individuals of the same order. No. 23 exhibits the coagulated blood of a turtle.

Respiratory System.—Cuvier remarks that the quantity of respiration in Reptiles is not fixed, like that of Mammals and Birds, but varies with the proportion of the diameter of the pulmonary artery compared with that of the aorta. Thus, he observes, the Tortoises and the Lizards respire on one another.

The lungs are of great extent and placed in the same cavity with the abdominal viscera. We have seen that the thorax is immovable, in the greater number at least, and the inhaled fixed ribs can give no assistance in respiration in the full-grown normal forms. It is therefore by the play of the parts about the mouth that the Testudinata respire, and here the complicated os hyoides is called into prominent action. The first movement elevates and depresses the os hyoides; the second movement compels the air to penetrate into the lungs. In the Testudinata, the air comes down the air necessary for their respiration like the Frogs.

John Hunter, in his MS. Catalogue, observes that the vessels of the lungs of those animals whose whole blood passes through them are confined to the lungs, and lungs only, as distinctly as if the lungs were a separate animal; but this, he adds, is not the case with the Amphibia, for, says he, 'we find the veins of the lungs of the Tortoise communicate with those of other parts, such as the vessels of the oesophagus, which shows that the blood of that part is not so perfect in them as in others. From this it must appear that the lungs are not of that consequence in this class of animals that they are in the more perfect for the lungs themselves appear to share in common with the other parts. Some of the blood which just came from the lungs returns back again to them, which would appear to amount no purpose; and, on the other hand, a considerable quantity of the blood which has come into the general circulation (and therefore would appear to require refinement) just returns through the same course. It would appear from this admixture, that it was not necessary that a great deal of the blood of the Tortoise should have undergone a thorough change for its greatest motion; yet we do not see why the lungs should have a part of their blood of the perfect kind. The cells of the lungs of the Amphibia seem to have undergone the same process as those of the heart, so that the trachea and its ramifications bear no proportion between them and the cells.'
plexus choroides is also seen in the ventricle. The ventricle of the nates is exposed, and a white bristle is placed in it: as is the ventricle of the cerebellum, with a black bristle lying in it. At the lower part of the ventricle is a continuation of the pharynx, which is the ventricle makes part of the ventricle. In the angle or quadrangle made by the cerebrum and nates, &c. is a duct or canal like the infundibulum leading from the upper part of the skull to the ventricle of the nates. The canal thus described is the cavity of the body which occupies the place of the pineal gland, and which is shown entire in the preceding specimen. The bodies termed nates, he said, were of different materials: but since the publication of the works of Arnaoyes, Serres, and Desmoulins, their analogy to the binaural bodies or optic lobes of mammalia has been generally admitted.

No. 249 of the same series is a longitudinal and vertical section of the cerebral ventricle of a tortoise, in which the motions of the neck are much freer than in the Turtle; the articular surfaces of the bodies of the vertebrae being covered by cartilage, and surrounded by synovial membrane. The anterior surfaces of the first three vertebrae are convex, the posterior concave. The fourth vertebra, which is the principal centre of motion in the neck, has both the articular surfaces convex. Of the remainder the anterior surfaces are concave, the posterior convex. The canals are small, but the cavity of the portion where the motion in this part of the spine is most extensive.

Here we must notice the experiments of Redi, which were the means of curing these mastigias than the Redi's. Most are familiar with the length of time that a turtle will move after its head is off, and the snip of the jaws which the severed head will give; but there is reason for believing that there is more of irritation than sensation in such motions; and the state of Redi's tortoises must have been analogous.

Redi, in the beginning of November, made a large opening in the skull of a Land Tortoise, extracted the brain, and drew out the tongue. He then set the animal at liberty, and it groped its way freely wherever it pleased, as if it had not been injured. Redi makes use of the term grouping (branquioardo), because he says that when the tortoise was deprived of its brain, it closed its eyes, which it never again opened. The wound which was left open skinned over in three days, and the tortoise, continuing to go about and execute other movements, lived to the middle of May. On a post mortem examination the cavity which the brain had occupied was empty and clean, with the exception of a small, dry, and black clot of blood. He repeated this experiment upon many other Land Tortoises in the months of November, January, February, and March, with this difference, however, that some more locomotive at their pleasure, whilst others, though they made other motions, did not move about: he found the same results when he treated Freshwater Tortoises in the same manner. This is a curious fact, and one that requires further investigation. He states his belief that the Marine Tortoises would live a long time without their brain, for he received a turtle which he treated in the same way, and though it was much spent and faint from having been long out of the sea, it lived six days. In November he deprived a large tortoise of its head, without which it continued to live twenty-three days: it did not move about as those did whose brain had been taken out, but when its fore or hind legs were pricked or touched, its body moved, but it did not execute many other movements. To assure himself beyond all doubt, that life, such as it was, continued in such cases, he cut off the heads of four other tortoises, and on opening two, twelve days afterwards, he saw the heart beat and the blood circulate and kept it.

We have already had occasion to call attention to the great length of time during which these reptiles will live without food, and the facts above recorded afford additional proofs of this life— a low grade of life, that is true—in the Testudinae.

Touch.—In the greater part of this order skin, properly so called, does not exist at all on certain parts of the body, or at least it is but a very thin film. A small papula peristium on the bones of the head and on the external parts of the vertebrae of the back, the ribs, and sternum. The soft tortoises (Trionyx and Sphargis, or instance) are the only ones that differ in this respect. Never-thless the neck, the feet, and most frequently a considerable part of the tail, are covered with a true flexible skin. This skin in the Testudamina is fringed or furnished with moveable appendages on the lateral parts of the head and neck. They do not doubt the theory of that portion of the cover-ion which will indicate to a Trionyx, or even to a Marine or Land Tortoise, the differences of temperature that affect the medium wherein it moves, is present in the Testudamina. The true Testudinae are also very much blunted in them. Some have their toes united down to the nails, or rather hooks, and absolutely inmoveable; others have them flattened and forming a sort of paddle, as in Chelonae and Sphargis. The true Testudinae, however, by a sort of slapping action, rounded like that of the elephant, the presence of the toes being only indicated by those nails or hooks, as in the Land Tortoises. Others, it is true, have, Eonyx, Trionyx, and Chelys, for example, have their toes very distinct, but they are nevertheless united by membranes, and in general their feet seem more adapted for the different modes of transport than for touch. The Testudamina, indeed, has its nose prolonged into a sort of moveable proboscis; but the head is not directed more to favour the required mode of respiration, than to give the animal that sort of perception exercised by the snout of swine and the muzzles of mules and some shrews. (Dum. and Bibr.)

Taste.—The senses of taste and smell are more acute in the true Testudinae. The tongue, with its distinct papille, like those of Mammals, seems well calculated for tasting vegetable and animal juices after the food is minced up by the horny mandibles; the fleshy lips on the outside of the Triuranum, as well as on the surface of the tongue, are well adapted for retaining these juices. The Testudamina, which from the width of its gape and unarmored mouth is supposed to swallow its prey whole, may yet have time while it is present in the jaws, previous to deglutition, to enjoy its savour. In the museum of the College of Surgeons, Nos. 1459 to 1463, inclusive, are preparations giving very good information respecting the state of these organs in the Testudamina. In No. 152 the fibres of the olfactory nerve are seen lampooning upon the tympanum. One is a bony canal, and the other is a bony plate, and of the second this substance is found a more or less bony plate, the external termination of a single osicle prolonged into a slender stylet, into the interior of the cavity, where it enlarges anew, to close the foramen ovale, or opening of the canal which leads to the internal ear, and is called the vestibular or the cochlea.

Hearing.—In the Chelonians, Eonyx, and Testudinae is found, under the solid scales with which the lateral and posterior parts of their head are furnished, a portion of loose connective tissue, a bony canal, and the external termination of a single osicle prolonged into a slender stylet, into the interior of the cavity, where it enlarges anew, to close the foramen ovale, or opening of the canal which leads to the internal ear, and is called the vestibular or the cochlea. In all the other tortoises the cavity of the tympanum communicates very freely with the throat or back of the mouth, and in the interior of the ear, which is often contained in the cranial cavity, as in the tortoises. Nos. 1532 to 1535, both inclusive, are preparations giving very good information respecting the state of these organs in the Testudinae. In No. 1523 the fibres of the olfactory nerve are seen lampooning upon the tympanum. One is a bony canal, and the other is a bony plate, and of the second this substance is found a more or less bony plate, the external termination of a single osicle prolonged into a slender stylet, into the interior of the cavity, where it enlarges anew, to close the foramen ovale, or opening of the canal which leads to the internal ear, and is called the vestibular or the cochlea. In all the other tortoises the cavity of the tympanum communicates very freely with the throat or back of the mouth, and in the interior of the ear, which is often contained in the cranial cavity, as in the tortoises. Nos. 1532 to 1535, both inclusive, are preparations giving very good information respecting the state of these organs in the Testudinae. In No. 1523 the fibres of the olfactory nerve are seen lampooning upon the tympanum. One is a bony canal, and the other is a bony plate, and of the second this substance is found a more or less bony plate, the external termination of a single osicle prolonged into a slender stylet, into the interior of the cavity, where it enlarges anew, to close the foramen ovale, or opening of the canal which leads to the internal ear, and is called the vestibular or the cochlea.
extremities. A female Turtle will lay as many as a hundred at one time. The plastron of the males of many species of Testudinata is concave, that of the females being convex, whereby the abdomen is rendered more capacious. The time employed in the coitus is very long.

MM. Duménil and Bibron say that it has been seen to be prolonged in the Cheloniens and Anomurous Batrachians from eighteen to thirty-one days and more, before the male has quitted the female.

With regard to the integument of the carapace and plastron, the number, colour, and shape of the investing plates of horn or shell, as it is termed, vary considerably. The subjoined cuts will convey a better notion than words of their arrangement in a land and marine species; but it must be considered that these are mere examples, and that the variety is almost infinite.

**Systematic Arrangement and Natural History.**

The general arrangement of the Testudinata is found in the article Reptiles, so that we shall here have only occasion to notice the details of some of the principal systematicists.

Aristotle has mentioned three principal groups of Tortoises, and divided them into many subgenera, under the names of χελώνας ιεραίας (Chelone cerasus) for the Land Tortoise; χελώνας βαλλατίας (Chelone Thalattias, or Thalassia) for the Sea Tortoise or Turtle (Hist. Anim., ii. 17); and μῆσας (Enys) for the Freshwater Tortoise (Ibid., v. 33). Genner remarks that there are three 'summa genera' of Tortoises: the 1st, terrestrial; the 2nd, living in fresh waters; and the 3rd, in the waters of the sea. MM. Duménil and Bibron copy his 'Corallium de Testudinibus in genere,' to show how far it accords with their own arrangement, as follows:—

**Linnæus placed the form at the head of his Amphibia Reptilia, under the generic name Testudo.**

Cuvier divides them into five subgenera—1, the Land Tortoises (Testudo, Brom.); 2, the Freshwater Tortoises (Enys, Brom.), including the Black Tortoises (Testudines Merrem; Kistosternos, Spix; Cistudo, Fleming); 3, the Marine Tortoises; 4, the Chelydans (Testudo fimbriata); 5 the Soft Tortoises (Trionyx, Geoff.)

Mr. Bell (Soc. Journ., vol. iii.), whose labours on this
branch of natural history are deservedly praised by MM. Duméril and Bibron, thus arranges the order:—

Testudinidae.

Family 1. — Testudinidae. (Terrestrial. Herbivorous.)
Family 2. — Emydidae. (Fluvial or lacustrine. Carnivorous.)

6. With a moveable sternum.

b. With an immovable sternum.
Family 3. — Trionychidae. (Fluvial. Carnivorous.)


Family 4. — Sphenidae. (Marine. Herbivorous.)
Genera. — Sphenis, Merrem.
Family 5. — Cheloniidae.

Genera. — Chelonia, Brongn.
The Prince of Camino, in his Amphib. Europea (Memorie della Reale Accademia delle Scienze di Torino, serie ii., tom. ii.), makes the Testudinata the second section of his first subclas, Abdomen. The Chelonia form the fourth order of that section, and the Cheloniidea the fifth family, the Trionyceidae the sixth, and the Testudinata the seventh.

Cheloniidea.

Subfamily 6. — Cheloniinae.

Genera 2. — Caretta, species. Caretta imbricata. (Hawk’s-bill Turtle.)


Subfamily 11. — Emydinae.

Genera 5. — Terrapene, species. Terrapene Cipaciensis; Terrapene Sigriz.


Subfamily 12. — Testudinata. 


Genera 8. — Chersus, species. Chersus Ierana; Chersus marginatus.

N.B. The arrangement stands thus in the 'Speciesem Synopsis' but in the 'Tabula Analysis'; 'Monopenis' is the name given to the first subclass.

Mr. Swainson (Classification of Reptiles, 1849) gives the following as the list of genera:—

1. Testudinidae. Land Tortoises.

Genera. — Testudo, species. Testudo Littium; Chelonia, Merrem. Gray; Hemopus (Hemopus must be meant), Dum. and Bib. Pygys, Bell; Kinixys, Bell.

2. Emys. River or Emy Tortoise.

Cistudo, Gray.—printed as a genus, and so is the next, Kinixynsnon, Spix, with the subgenus Sternotherus, Bell; Chelodina, Fitz.; Hydrepactis, Bell.


Genus. — Trionyx, Geoffr., with the subgenus Emys, Gray. 


Genera. — Chelonia, Gray. Chelons, Bell.

Genera. — Chelydra, Swainson. Long-tailed or Crocodile Tortoises.


Mr. Gray (Synopsis of the Contents of the British Museum, 1839) makes the Cherida, the third order of Reptiles in his arrangement, come under his second section, Cryptotraeta, the Squamata being the first.

Family 1. — Testudinidae.

Genera. — Testudo. Chersis, Kinixys, Pygys.

Family 2. — Emydidae.


Family 3. — Chelydidae.


Family 4. — Trionyxidae.


Family 5. — Cheloniidae.


MM. Duméril and Bibron, in their elaborate and highly valuable Erpitolognia, divide the Tortoises, or Cheloniennes, into the following families:— 1st, The Chersien, Chelonia, or Land-Tortoises; 2nd, The Emydien, Emydien, or Marsh-Tortoises; 3rd, The Potamites, Potamites, or River-Tortoises; 4th, The Sphenidae, Tartesien, Sea-Tortoises or Turtles.

Of these groups the authors observe that Chelonia is not perfectly limited, for some of the species arranged by them under the succeeding family (Emydien) seem to form a natural passage to the Land and Marsh Tortoises. Such are Cistudo Catalogus, or Emy, Mihlenburgii, which are in reality Paludines, or Marsh-Tortoises, with distinct toes, though they possess only very short membranes and but slightly palmeted feet.

The principal characters which distinguish the Chersien or Chersienia from the three other divisions of the order Cheloniennes are thus defined:—Body short, oval, convex, covered with a carapace and a plastron; four feet; no teeth. But MM. Duméril and Bibron remark that the principal distinction may be enumerated by this simple term drawn from the conformation of the limbs, which indicates perfectly the manner of life of the group—swampy feet (des Emydien on moisien wollte); this would indicate the condition of those feet, namely, that they are short, unshapely, though nearly of equal length, with toes but little distinct, nearly equal, immovable, united by a thick skin, and conical in form. They are to be distinguished from those which are very short, and not attached to the sides of the carapace by a strong cord or band. The outer surface is often covered by a calcareous deposit in the periphery, on the outside of which one only distinguishes horny cases, a sort of hoofs which, for the most part, correspond with the last phalanges they imbrice, and would consequently show that these animals live only on the land, never in the water. The other three groups differ from the last and from each other in the form of the feet.

The Sphenidae, or Sphenidae, have the carapace very much depressed, and their two pairs of feet, unequal in length, are flattened into the form of oars or solid fins, because their toes are always conjoined and hardly distinct from each other, incised as they are in these paddles.

The Emydien, or Emydien, have the toes separate, or rather separately moveable, furnished with crooked claws, most frequently palmed or united at their base by membranes, nearly as in the Ducks; but the transition of these last three families is so smooth, insensible on the one side between the species of the genus Cistudo, and on the other between Chelys and all the species generally known as Soft Tortoises.

These last, the Potamites, or Potamites, have also the toes palmed or connected by membranes; they have pointed claws, three in number on each foot; their pointed and tridentant beak is constantly furnished external with folds of the skin, like lips, appendages which have hitherto been only observed in this family. In addition their bony carapace is covered with a coriaceous skin, the edges of which in the greater number remain flexible and floating on the sides of the body.

1st Family. — Chersien, or Land-Tortoises.

Family Character. — Cheloniennes, with a very convex carapace; limbs short, equal; feet in the form of rounded, callous stumps, with indistinct ungualated toes.

2. Moveable behind, where it is, as it were, artculated.

Immovable; four only.

nails on the thumb in front moveable.

3. Anterior feet the plastron immovable 1. Testudo.

Genus. — Testudo. Characters. — Feet with five toes, hind-feet with four nails only; carapace of a single piece; sternum not moveable anteriorly.

This genus is divided by MM. Duméril and Bibron into three sections, or subgenera:—

1. Those species which have the posterior portion of their plastron moveable: these correspond with the genera Chelona, of Wagler; Testudo, of authors; Chelys, or Gray.

2. Those species whose plastron is solid in all its parts, or of a single piece covered with twelve plates.
In April, 1780, White again writes to Mr. Barrington.

'The old tortoise that I have mentioned to you so often to become my property. I dug it out of its winter dormitory in March last, when it was enough awakened to express its want of cover, and, for the sake of feeding, and, assigning, and, packing it in a box amongst earth, covered it with straw. The rattie, and hurry of the journey so perfectly roused it, that when I turned it out on a border, it walked twice down to the bottom of my garden; however, in the evening, the weather became cold, it curled itself in the loose straw, and continues still concealed. As it will be under my eye, I shall now have an opportunity of enlarging my observations on its mode of life and propensities, and, perhaps, may even be able to form a tolerable judgment on the species. It opens a breathing-place in the ground near its head, requiring, I conclude, a free respiration as it becomes more alive.

This creature not only goes under the earth from the middle of November to the middle of April, but sleeps great part of the summer; for it goes to bed for the longest days at four in the afternoon, and often does not stir in the morning till late. Besides, it retires to its cave for every shower, and does not move at all in wet days.

When one reflects on the state of this strange being, it is matter of wonder to find that Providence should bestow such a profusion of days, such a seeming waste of longevity, on a reptile that appears to relish it so little as a turtle, squander more than two-thirds of its existence in a joyless and waste consummation for months together in the profoundest of slumberers.

While I was writing this letter, a moist and warm afternoon, with the thermometer at 50°, brought forth from the earth, as from a deep well, its respective inhabitants, and its favorite comforters. In a neighbours' village one man was kept, till by tradition it was supposed to be a hundred years old—an instance of vast longevity in such a poor reptile.'
large and fat, that no pullet cats more pleasantly. The day on which Mr. Darwin visited the little craters in the Galapagos Archipelago was glowing hot, and the scrambling over the rough surface, and through the intricate thicket, was very fatiguing. But, says Mr. Darwin, 'I was well repaid by the Cycloplegus.' He met two large tortoises, each of which must have weighed at least two hundred pounds. One was eating a cating of cactus, and when I approached, it looked at me and then curiously examined my face. The other gave a shake of his head, and drew in his head. These huge reptiles, surrounded by the black lava, the leafless shrubs, and large cacti, appeared to me like some antediluvian animals.

Mr. Darwin assures us that these tortoises are found in all the islands of the Archipelago; certainly in the greater number, and thus continues his description:—

'• They frequent, in preference, the high dump parts, but likewise inhabit the lower and arid districts. Some individuals grow to an immense size. Mr. Lawson, an Englishman, who had, at the time of our visit, charge of the colony, told us that he had seen several so large that it required six or eight men to lift them from the ground, and that some had afforded as much as two hundred pounds of meat. The old males are the largest, the females rarely growing to so great a size. The male can readily be distinguished from the female by the greater length of its tail. The tortoises which live on those islands where there is a good supply of water, and where the vegetation is most luxuriant, chiefly feed on the succulent cactus. Those which frequent the higher and dump parts eat the leaves of various trees, a kind of berry (called guaynita) which is not very nutritious, and the cactus, and some lichen, that hangs in tresses from the boughs of the trees. The tortoise is very fond of water, drinking large quantities, and wallowing in the mud. The larger islands alone possess springs, and these are always situated towards the central parts, and at a considerable elevation. The tortoises, therefore, which frequent the lower districts when thirsty, are obliged to travel from a long distance. Hence, broad and well-beaten paths radiate off in every direction from the springs, the inhabitants, and the Spaniards, by following them up, first discovered the watering-places. When I landed at Chatham Island, I could not imagine what animal travelled so methodically along the well-chosen tracks. Near the springs it was a curious spectacle to behold many of these great monsters; one set eagerly travelling onwards with outstretched necks, and another set returning, after having drunk their fill. bulls the tortoise arrives at the spring, quite regardless of any spectator, it plunges its head into the water, wets its eyes, and greedily swallows great mouthfuls, at the rate of about ten in a minute. The inhabitants say that each animal stays three or four days in the neighbourhood of the springs; which, I think, is true. As for the tortoises, they differed in their accounts respecting the frequency of these visits. The animal probably regulates them according to the nature of the food which it has consumed. It is however certain that tortoises can subsist even on those islands where there is no other water than what falls during a few rainy days in the year.

'I believe it is well ascertained that the bladder of the frog acts as a reservoir for the moisture necessary to its existence; such seems to be the case with the tortoise. For some time after a visit to the springs, the urinary bladder of these animals is distended with fluid, which is said gradually to decrease in volume and to become less pure. The tortoise appears to get its sustenance, and overcome with thirst, often take advantage of this circumstance, by killing a tortoise, and if the bladder is full, drinking its contents. In one I saw killed, the fluid was quite limpid, and had only a very slightly bitter taste. The tortoise always drinks from the crater of the pepericadium, which is described as being best. The tortoises, when moving towards any definite point, travel by night and by day, and arrive at their journey's end and much sooner than would be expected. The inhabitants, from observations on marked individuals, consider that they can move a distance of about eight miles in two or three days. One large tortoise which I watched, I found walked at the rate of sixty yards in ten minutes, that is, 300 in the hour, or four miles a day—allowing also a little time to walk to the crater.

During the breeding season, when the male and female are together, the male utters a hoarse roar or bellowing, which, it is said, can be heard at the distance of more than a hundred yards. The female never uses her voice, and the male only at such times; so that when the people hear this noise, they know the two are together. They were at this time (October) laying their eggs. The female, where the soil is sandy, deposits them together, and covers them up with sand; but where the ground is rocky, she drops them indiscriminately in any hollow. Mr. Bynoe found seven placed in a line in a fissure. The egg is white and spherical; one which I measured was seven inches and three-eights in circumference. The young animals, as soon as they are hatched, fall a prey in great numbers to the buzzard with the habits of the caracara. The old ones seem generally to die from accidents, as from falling down precipices. At least several of the inhabitants told me they had never found one dead without some such apparent cause. The inhabitants believe that these animals, are absolutely deaf; certainly they do not overhear a person walking close behind them. I was always amused, when overtaking one of these great monsters as it was quietly pacing along, to see how suddenly, the instant I passed, it would draw in its head and legs, and uttering a deep hiss fall to the ground with a heavy sound, as if struck dead. I frequently got on their backs, and then, upon giving a few taps on the hinder part of the shell, they would rise up and walk away; but I found it very difficult to keep my balance. The flesh of this animal is largely employed, both for food and leather, and a beautiful leather oil is prepared from the fat. When a tortoise is caught, the man makes a slit in the skin near its tail, so as to see inside its body, whether the fat under the dorsal plate is thick. If it is not, the animal is liberated; and it is said to recover soon from this strange operation. In order to secure the tortoises, it is not sufficient to turn them like turtles, for they are often able to regain their upright position.

'• It was confidently asserted that the tortoises coming from different islands in the Archipelago were slightly different in form; and that in certain islands they attained a larger average size than in others. Mr. Lawson maintained that he could at once tell from which island any one was brought. Unfortunately, the specimens which came home in the Beagle were too small to include any certain comparison. This tortoise, which goes by the name of Testudo Indica, is as present found in many parts of the world. It is the opinion of Mr. Bell, and some others who have studied reptiles, that it is not improbable that they all originally came from the Archipelago. When it is known how long these islands have been frequented by the buccaneers, and that they constantly cook and eat these animals, it seems very probable that they should have distributed them in different parts of the world. If this tortoise does not originally come from these islands, it is a remarkable animal, being one of the last of nearly all the other land inhabitants seem to have their birthplace here.'

Geographical Distribution of the Species of Testudo.—The last-quoted observation of Mr. Darwin is worthy of much attention.

MM. Duméril and Bibron, who, to prevent the confusion hitherto arising from the application of the specific name Indica to more than one species, have eliminated that name altogether, give the following as the localities of the species of Testudo so far as they are known:—Asia, 5; Europe, 3; common to Europe and Africa, 1; Africa, 7; common to Africa and America, 1; America, 6.

Testudo Indica will be an illustration of this genus: it is the species assigned to Africa and America and to a?.

M. d’Orbigny is said to have himself collected
the young of Testudo sultana in Patagonia, where, according to hum, the species is very common. MM. Duméril and Bibron declare that other specimens come without doubt from Africa.

Genus Homopus, Dum. and Bibr. Characters.—Four toes only on each foot, and all ungulate; carapace and sternum of a single piece.

Species. Homopus arcelatus (South Africa, Madagascar); Homopus sigmatus (South Africa).

Genus Pyzis, Bell. Characters.—Feet each with five toes, the posterior ones with four nails only; carapace of a single piece; sternum moveable anteriorly.

This genus is the only Land Box Tortoise; but an analogue (Sternotherus) occurs among the Marsh Tortoises in the division of Pleurodertae Elodians.

The anterior portion of the pleurodon of Pyzis, which is susceptible of motion, is of very small extent, for it only reaches, backward, to the space of the two first pairs of sternal plates, and consequently it is under the strongly indicated suture of the second with the third pair that the clastic ligament which performs the opening of a hinge is seen. By means of this sort of moveable door or lid, the Pyzis can, by lowering it at will, protrude its head and its fore-feet, and by raising it, shut itself up in a sort of box, for the edges of this hinged operculum closely fit those of the carapace, which serve it as a door-case. The animal then has nothing to fear, because its sternum protects itself, by its enlargement, the space by which the feet and the tail can be put forth and deeply drawn up.

But the Pyzis is not less remarkable for the extraordinary elongation of its carapace, which becomes sometimes more than double that of the Old World. (Continent of India, and the islands of the Indian Archipelago.)

Genus Kinixys, Bell. Characters.—Feet with five toes, the posterior ones with four nails only; carapace moveable beneath sternum of a single piece.

MM. Duméril and Bibron observe that this is the most curious of the family Chersites. The Cheloniens that compose it alone enjoy the faculty of moving the posterior part of their carapace in order to lower it and apply it against the plastron, so as completely to close the cervices behind, as the Pyzis does theirs before when they elevate the moveable anterior portion of their plastron. But, as we have seen, the mobility of the anterior part of the sternum is in Pyzis due to the presence of a ligament which performs the opening of a hinge, whilst in Kinixys the carapace offers no really moveable articulation; the bones, the vertebrae, and ribs are the parts which bend. In consequence of this elasticity of the bones and their thinness, the carapace can be moved down to approximate the sternum. The sinuous line on which this flexion operates is indicated externally by a slight space, which is filled by a sort of fibro-cartilaginous tissue. This undulated line exists between the penultimate and the penultimate margino-lateral plate.

The three known species have not, like all the other Chersites, the abdominal plates much more extensive than the other horny plates of the sternum, which, joined to the enlargement and the rounded contour of the plastron behind, approximate them in a certain degree to Cistudo, the first genus of the Elodians.

Species.—Kinixys honamana (Guadaloupe, Demerara); Kinixys erosa (Demerara); Kinixys belliana (locality unknown: warm parts of America probably.

Pauanias notices a Land Tortoise in the woods of Arcadia, whose shell was used to make lyres.

II. Family Elodians—Marsh Tortoises.

Geographical Distribution of the Family.—MM. Duméril and Bibron observe that of the four families which compose the order Cheloniens, that of the Elodians is the most numerous in genera, and above all in species. For Marsh Tortoises have been found in the Old World and in the New, and even in Australia, where hitherto no one species of Chersites has been detected. America produces more species of Elodians than all the rest of the world put together; for, of the seventy-four species which compose that family, forty-six are exclusively American, and the remaining twenty-nine are divided between Australia and the Old World. The cause of this disproportion rests in the vast body of water, which, in the lakes, ponds, and marshes, covers a certain portion of the American continent, as well as in the great rivers and tributary streams which traverse it in all directions. Africa, where the territory differs so much from that of America in its resources as well as in so many other respects, has but six species, three of which have at present been found only in Madagascar, one at Bourbon, and another at Cape Verde; whilst this same Africa is rich in Land Tortoises. Of the twenty-nine Elodians which are strangers to America, two only, Platemys Macquaria and Chelodina Nova Hollandiae, are natives of the last-mentioned country. These belong to Europe, six to Africa, and the eighteen which remain out of the total number come from the East Indies or the Oriental Archipelago; that part of Asia, in short, which is most watered. But of all the Indian Elodians not one has the pelvis anchylosed to the plastron as well as to the carapace, and consequently immovable; nor the neck retractile under one of the sides of the buckler; whilst the two New Holland species and the African Elodians are, on the contrary, in that condition; that is to say, Pleuroderea, which subfamily has its head-quarters in South America; for, out of twenty-three species of Elodians which there inhabit, five Cryptoderes only were known to MM. Duméril and Bibron, but not a single Pleuroderea existing in North America: the six African species belong also to Cryptoderen.

Habits of the Elodians.—These live very much after those of the other three great groups of Cheloniens. The Marsh Tortoises have not the slowness of the Land Tortoises. They swim with facility, and on land make much quicker progress than the Chersites. They frequent small
Genus Emysura, Dum. and Bibr. Characters.—Head large, covered with small plates; muzzle short; two barbles under the chin; plastron immovable, eruciform, covered with 12 plates; three sterno-costal scales; five nails on the fore feet, four on the hind feet; tail long, surmounted by a sealy crest.

**Species.**—*Emysora serpentina* (North America; where it lives in lakes and rivers, feeding on fish, and, as it would seem, on young birds). This is *Talisio serpentina*, Lam.: *Chelydra serpentina*, Schweig.: and *Chelomera serpentina* of Bay, &c.

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**Genus Saurotherium, Wagler.** Characters.—Head sub-quadangular, pyramidal, covered in front with a single very delicate scale only; jaws more or less hooked; barbles under the chin; twenty-three limbar scales; sternum thick, eruciform, moveable in front, furnished with eight or ten limbar scales, and inguinal scales, some placed on the sterno-costal sutures; anterior feet with five nails; posterior feet with four only.

**Species.**—*Saurotherium triroratus* (Mexico; River Alvarado); and *Neuratherium odorus*, so called from the musky odour which it is said to exhalate (North America, where it lives in marshes and muddy currents, feeding on small fishes, worms, and mollusks).

The *Pleuroderes*, as their name indicates, have, all of them, the neck retractable upon one of the sides of the anterior aperture of the carapace; but they are never able completely to draw it in between their fore-feet and under the middle of the buckler and plastron, like the *Cryptodera*.

**Genus Peltoccephalus, Dum. and Bibr.** Characters.—Head large, subquadangular, pyramidal, covered with large, thick, slightly imbricated plates; jaws extremely strong, hooked, without dentilations; eyes lateral; plates of the carapace slightly imbricated; no nuchal plate; feet slightly palmated: two large rounded scales at the heels; nails straight robust; tail ungulate.

**Species.**—*Peltoccephalus trocazi* (South America; Ceyanne, Brazil).

**Genus Podocennius, Wagler.** Characters.—Head slightly depressed, covered with plates; front hollowed with a large longitudinal furrow; jaws extremely arched, without dentilations; two barbles under the chin; no nuchal plate; sternum wide, immovable; feet largely palmarized, the posterior ones carrying at the heels two large but delicate rounded scales; tail short, not ungulate.

**Species.**—*Podocennius empanata* (South America; Ceyanne; where it lives in streams and rivers); *Podocennius Dumeriliana* (same locality).

**Genus Pentortylus, Dum. and Bib.** Characters.—Head large, depressed, covered with plates; muzzle rounded; jaws slightly arched, trenchant; two barbles under the chin.

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**TOR**

**Genus Emysura, Dum. and Bibr.**

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**Cryptodera** are not only distinguished from the *Pleuroderes* by the power of completely concealing their cylindrical neck with its sheath of loose skin under the middle of the carapace; but also by their head, which is nearly equal in width to its height at the occiput. The eyes are always lateral, and their orbits so large that the diameter of the cavity nearly equals a fourth of the total extent of the carapace, considered with regard to its length. The jaws of the *Cryptodera* are stronger than those of the *Pleuroderes*; sometimes they are simply trenchant, sometimes more or less dentilated on their edges, which are sharp, or sometimes smooth. In the greater number of species the anterior extremity of the upper beak offers a large notch, on each side of which may be seen pretty constantly a rather strong tooth; in which case it is rare for the corresponding extremity of the mandible not to curve upwards towards the muzzle in a sharp point. In short, in such cases the upper beak closely resembles that of the *Falcoindae*.

1st Subgenus.—The *Clausiles*.  

**Genus Cistudo, Fleming, reformed by Gmelin.** Characters.—Feet with five toes, one with only four claws only; plastron wide, oval, attached to the buckler by a cartilage, moveable before and behind on the same transversal mesial hinge, furnished with twelve plates; twenty-five marginal horny plates or scales.

**Species.**—*Cistudo Carolina, Cistudo Ambiensis, and Cistudo Trifasciata*.

2nd Subgenus.—The *Gapers*.  

**Genus Emys, Dum. and Bibr.** Characters.—Feet with five toes, the posterior with four nails only; plastron wide, immovable, solidly articulated upon the carapace, furnished with twelve plates; two auxiliary and two inguinal shells; head and neck of ordinary size, tail long.

**1st Group.**—European Emys.

**Species.**—*Emys Caspica*: *Emsy Sirezi*.

**2nd Group.**—American Emys.


**3rd Group.**—African Emys.

**Species.**—*Emys Spergleri*.

**4th Group.**—Oriental Emys.

**Species.**—*Emys Trenchi, Emys Ricci, Emys Hamiltori, Emys Tonzi, Emys Tuncia*, *Emys Bealii*, *Emys crocialia*, *Emys spinosa*, *Emys occluta*, *Emys trivialia*, *Emys Duvarelli*, and *Emys linca*.

**Genus Tetraonyx, Lesson.** Characters.—Five toes, one of them without a single nail; sternum solid, wide, furnished with six pairs of plates; twenty-five marginal scales.

**Species.**—*Tetraonyx Lessoui* (East Indies), and *Tetraonyx Bocki* (East Indies).

**Genus Platysternon, Gmelin.** Characters.—Head armed or shielded, and too large to enter under the carapace: upper jaw hooked; sternum wide, immovable, fixed solidly to the carapace, with short slant; three sterno-costal scales; five nails only on the posterior feet; tail very long, scaly, without a crest.

**Species.**—*Platysternon megacarpum* (China).
the species belonging to this family live constantly in the water, only coming out occasionally.

Geographical Distribution of the Potamans.—MM. Duméril and Bibron state that no species of this family have been observed in European rivers. All those which have been described and whose country is known, come from the streams, rivers, or great fresh-water lakes of the warmer regions of the globe—from the Nile and the Niger in Africa; from the Amazon and Ganges in Asia; and from the Mississippi and Ohio, some of the latter flowing into them, in America: but MM. Duméril and Bibron add that we are far from knowing all the species, for they have been a long time confined under one name (Trionyx).

Habits, &c., of the Potamans.—It would seem that individuals of this family attain a large size. MM. Duméril and Bibron quote Pennant as mentioning some which weighed 70 lbs.; one which kept three months weighed 29 lbs., and its hulk was 50 inches in length, and reckoned the neck, which measured 13 inches. The mode of life and habits seem to have great similarity. They swim with much ease both on the surface and under water. The lower part of their body is generally pale, white, rosy, or bluish; but their upper parts vary in tints, which are most frequently brown or grey, with irregularly marked, dotted, or occluded spots. Straight or sinuous brown, black, or yellow lines are disposed symmetrically on the right and left, principally on the lateral parts of the neck and on the limbs. During the nights and when they believe themselves to be secure from danger, the Potamans come to repose on the islets, the rocks, the fallen trunks of trees upon the banks, or floating timber, whence they precipitate themselves into the water at the sight of man, or at the least alarming noise. They are very voracious and agile, and pursue, as they swim, reptiles, especially young crocodiles and fishes. Their flesh being esteemed, they areangled for with a hook and baited with small fish or living animals, or with a dead bait, to which the angler gives motion and apparent life: for they are said never to approach a dead or immovable prey.*

When they would seize their food or defend themselves, they dart out their head and long neck with the rapidity of an arrow. They bite sharp with their trenchant beak, and do not let go till they have taken the piece selected: so that their life is much dreaded, and the fishermen generally cut off their heads as soon as they have caught them.

The males appear to be fewer in number than the females, or, at least, they come less frequently to the banks of rivers, where the females rest or deposit their eggs in hollows, which contain from fifty to sixty. The number varies according to the age of the females, which are less fruitful in proportion to their youth. The eggs are spherical, their shell is solid, but membranous or slightly calcareous.

Genus Gymnosp., Dum. and Bibr. (Trionyx, Geoff.; Aspidoceutes, Wagler). Characters.—Carapace with a cartilaginous circumference, very large, floating behind, and

* This must be taken to apply to living animals only, for the Potamans are said to feed not merely on the young of the crocodiles, but also to be great destroyers of their eggs in the Nile and the Ganges.
deprived of bone externally; sternum too narrow behind to hide the limbs completely when the animal draws them up under the carapace. *Trionyx* and *Testudo* fora of authors.

Species.—*Gymnopus spiniferaus* (North America, the rivers of Georgia and Florida, as well as the lakes situated above and below Niagara. Those sent to the Paris Museum by M. Lesueur were fished up in the Wabash, a river which enters the territory of Indiana and of the Illinois, and falls, a little before its junction with the Mississippi, into the Ohio).

M. Lesueur states that towards the end of April, or most frequently in May, the females of this species seek out on the river-banks sandy spots for the deposit of their eggs; steps of ten or fifteen feet elevation deter them not when they are choosing places exposed to the sun. Their eggs are spherical, and their shell is more fragile than that of the eggs of the species of Edelians living in the same waters; their eggs amount to from fifty to sixty. M. Lesueur counted in the ovary twenty ready for laying, and a great quantity of others of variable dimensions, from that of a pin’s head to the much greater volume which they attain when they are covered with their calcareous coat. The retreats of these tortoises are on rocks and on the trunks of trees overthrown in the river. They may be taken with hook and line baited with a little fish; they are very voracious, and bite their captors, so that the prudent cut off their heads. M. Lesueur was often bitten by these he had; they dart out their heads like lightning. The young begin to show themselves in July. The flesh of this species is very delicate.

**Gymnopus spiniferaus.**

**Gymnopus mutus.—Trionyx mutus,** Lesueur, Leconte, and Gray. (Same localities as *G. spiniferaus.*)

**Gymnopus aegyptiacus.—Trionyx aegyptiacus,** Geoffr., *Trionyx Niloticus,* Gray. (The Nile and, as it seems to MM. Dumeril and Bibron, other African rivers; for the *Trionyx labiatus* of Bell, which in their opinion is this species, has been sent from Sierra Leone.)

This is supposed to be the *Iephy* (Emys) of Aristotle (*De part. anim.* v. 19).

**Gymnopus Duracelli—Trionyx Gangeticus,** Cuv. *Trionyx Harun,* Gray (the Ganges); *Gymnopus ocellatus,—Trionyx ocellatus,* Hardwicke, *Trionyx Harun* (the young), Gray (the Ganges); *Gymnopus lineatus,—Trionyx lineatus,* var. Harwick, *Trionyx Indicus,* Gray (Ganges); *Gymnopus Javanicus—Trionyx Javanicus,* Schwiegk. (Java); *Gymnopus subplanus—Trionyx subplanus*, Geoff. (Ganges); *Gymnopus Ephraticus—Trionyx Ephraticus,* Geoff. (Tigris and Euphrates).

**Genus Cryptopus, Dum. and Bibr. (Trionyx, Wagl.); Eunota, Gray.** Characters.—Carapace with narrow cartilaginous borders supporting above the neck and behind the thighs small bony pieces; sternum large, forming in front a moveable door or lid which can hermetically close the aperture of the oseous box. The posterior part of the sternum furnished right and left with a cartilaginous operculum, shutting the aperture which give passage to the hind feet; there is a third operculum, besides, to stop the opening whence the tail issues.

Species.—*Cryptopus granatus,—Trionyx granatus,* Schweigk. (Potom,); *C. vulgaris,* that, common in the coast of Coromandel; lives in fresh-water meers; the flesh is eaten); *Cryptopus Semnaleanus.* (Seneclal)

4th Family—Thalassians, Sea Turtles, or Tortoises. (Clematolus, Gray; Caretta, Flurlinger; *Halychione,* Ritten; *Glaucopend Tortoises,* Wagl.)

This family is at once distinguished from all the others by the comparatively depressed carapace, and the long and broad paddles, the anterior of which are very much prolonged when compared with the posterior ones. Indeed, their limbs are entirely so modified as to become swimming organs.

**Geographical Distribution of the Family.—** The *Thalassians* are found in all the seas of warm climates, but principally towards the equator, and in the warmest parts of the ocean, on the shores of the Antilles, Cuba, Jamaica, the Caiman Isles, and St. Domingo, in the Atlantic Ocean, at the Cape de Verdi and Ascension Islands; in the Indian Ocean, at the Isles of France, Madagascar, Scichelles, Rodriguez; at Vera Cruz in the Gulf of Mexico; and at the Sandwich and Galapagos Islands in the Pacific Ocean.

**Habits of the Thalassians.**—The turtles hardly ever leave the sea, excepting for the purpose of laying their eggs; but some accounts state that they will crawl up the shores of desert islands in the night, and clamber up the edges of isolated rocks far at sea, for the purpose of browsing on certain favourite marine plants. They have been seen in smooth water, as far as seven or eight hundred leagues from the land, floating motionless on the surface of the sea, as if they were dead, and it has been supposed that they are then asleep. They dive well, and can remain beneath the surface a long time, as might be expected from the extent and volume of their arbitrary lungs capable of retaining and furnishing a sufficient quantity of air while they are submerged.

MM. Dumeril and Bibron speak of the *Polamunias* and Turtles as exceptions to the rest of the Testudinata, which, generally speaking, can produce no other sounds than hisses: we find however from Mr. Darwin's account above seven, that the *Caretta* loves to bellow loudly at the pairing season. The cries of the *Polamunias* and of some *Chelona* have been noticed by observers, and especially those of the Coraciaceus Turtle or *Sphyurus.* Individuals of this last genus, when harnessed in nets or variously wound, have been heard to utter loud roars, from which they derive their name. *

The food of the *Thalassians* consists principally of marine plants; but it appears that some of them, especially those which exude a musky odour, are particularly relished. For instance, feed also on crustaceans and many species of mollusks, the cuttlefish especially. Their jaws are robust, like the beaks of birds of prey; solidly articulated and worked with highly developed muscles; and their horny beak, hooked above and below, is fleshy on the edges, and most frequently serrated, so as to assist in securing a slippery prey.

The circumstances which precede or accompany the act of continuing the young are far from being precisely known; the epoch of fecundation is pretty accurately fixed, and ordinarily takes place in the spring. The conjoncture of the sexes is of long continuance, but authors are not agreed as to the mode of the *ovulage*, as it has been termed; nor as to its duration, some stating the time at fourteen, others at fifteen days, and others assigning twice that period. One point seems certain, that the union takes place in the water; but some say that the male remains on the carapace of the female the whole time; others that the two pla—

\footnote{\textsuperscript{2}}
trons have been seen in contact, and the heads of the two animals out of the water. Others, again, assert that the union being effected, the two individuals remain reversed somewhat.

The circumstances attending the deposit of the eggs are better known. To reach the destined spot, the females have often to traverse the sea for more than fifty leagues, and the males accompany them to the sandy beaches of the shores of mitred ridges. As they arrive at the spot, they bolt down the eggs, and then return. When the tide is falling, some of the eggs are collected, and the next tide brings them to the beach, where they are washed up, and the females return to the sea. When the tide is rising, a few of the eggs are left on the beach, and the females return to the sea, leaving the remainder.
TOR

straight edges without dentilations, curved slightly towards each other at their extremities. Two nails on each fin.

Species.—*Chelone imbriata*, The Hook's-Bill Turtle of Catesby and Brown (Indian and American Oceans, the Isle of Bourbon, the Seychelles, Ambuyn, New Guinea, the Havannah). Flesh bad. Eggs very good.

3rd Subgenus.—*Chelone Canuanae. Logger-head Turtles.*

Characters.—Plates of the carapace not imbricated. Fifteen plates on the disk. Jaws slightly curved towards each other at their extremity.

Species.—*Chelone canuana, the Logger-head Turtle of Gatsby (the Mediterranean, also the Atlantic Ocean, Rio Janeiro); Chelone Dumerilii—Chelonia olivacea of Eschscholtz (China Seas and Malabar Coast).

Genus *Sphargis*, Merrem (Coriudo, Flem.; Dermatochelys, Blainv.). Characters.—Body enveloped in a coriaceous hide, tuberculous in young subjects, completely smooth in adults. Feet without nails. (Erpétologie.)

Species.—*Sphargis Coriacea—Testudo Lyra, Dond., and Bechst.; Tortue Luth of the French; Coriaceous and Tuberculatus Tortoise of Pennant. (Atlantic Ocean.)*

This turtle has been taken on many of the European coasts; several of large size (700 and 800 lbs. in weight) have been captured on those of Britain. One case, where the capture was effected off the coast of Scarborough, should be a warning not to use it rashly as food. Pennant relates that one of the three taken in 1748, or 1719, was purchased by a family who invited several persons to partake of it. A gentleman present told the guests that the flesh was unwholesome, but one of the company persisted in eating of it, and suffered most severely, being seized with dreadful vomiting and purging; and yet the Carthusians, Pennant tells us, are said to eat no other species. It would seem, then, that the severe effect above noticed must have been accidental, and the animal may have been in an unhealthy condition. It is said to grow very fat; but the flesh is reported to be coarse and bad. The French name is given probably upon the supposition that it was the species used by the ancients in the early construction of the lyre.

**Fossil Testudinata.**

Cuvier commences his admirable treatise upon Fossil Tortoises by observing that the number of living species is so considerable, that it is very difficult to decide whether a fossil tortoise is or is not of an unknown species, insomuch as it is not only necessary before arriving at this conclusion to compare the carapaces and plastrons covered with their horny plates or scales, as they are ordinarily seen in cabinets and represented in books, but also the skeletons, so that the observer may accurately study the joining of the ribs and other bones which concave to compose their euriasses. He names twenty-nine species that he himself had stripped of their covering, and says that he had performed that operation on others besides. Thus he distinguishes a species which has been noticed in the fossils as far as his examined species went; but he adds, with his usual philosophical candour, that it is only by induction that he could be guided in the case of those species which he had not at his disposition.

Cuvier begins with the fossil *Triocyno*, and distinguishes, 1, Those from the gyspum-beds of the environs of Paris; 2, Those from the gyspum-beds of Aix; 3, Those from the molasses of the department of the Gironde; Those from the gravel and clay-beds of Hautevigne in the department of the Lot and Garonne; 5, Those from the gravel-beds in the neighbourhood of Castelmaudry; and 6, Those from the sandy beds in the environs of Avary.

He next considers the *Emydes, or Freshwater Tortoises,* noticing, 1, Those from the Paris gyspum-beds; 2, Those discovered together with crocodiles in the Jurassic limestone of the neighbourhood of Solure; 3, Those of the terrigenous sand of Sussex; 4, Those of the molasses of la Grave and those of the molasses of Switzerland; 5, Those from our isle of Sheppley; 6, Those from the environs of Brussels; and 7, Those from the marly sand (sable marneaux) of the province of Aix.

The Marine Tortoises, or *Cheloniens,* he divides into, 1, Those of the environs of Maestricht; and 2, Those of the slate of Gravis.

The Land Tortoises noticed are, 1, Those of the environs of Aix; and 2, Those in the Isle of France under the volcanic beds.

The conclusions drawn by Cuvier are, that the tortoises are as antient inhabitants of the world as the crocodiles; that they accompany the remains of the latter generally; and that as the greater number of their remains belong to fresh-water or terrestrial species, they confirm the conjectures drawn from the bones of crocodiles as to the existence of isles or continents which were frequented by reptiles before the progress of civilization and quadrupeds; or at least before there was a sufficient number of these last to afford a quantity of remains at all comparable to those of reptiles.

Cuvier concludes by stating that he further knows of the remains of tortoises found in many different places, but whose characters are but little or badly determined; thus he remarks that some are found in the basin of Puy en Velay with fresh-water shells and the bones of quadrupeds, and that some are others which appear to be marine in the blue marls of the Plaisantin, so abundant in marine shells, bones of whales, &c.

Hermann von Meyer refers to all the fossil *Testudinata* known up to the time when he wrote his *Bd. 32,* but the following are the only species named:—

*Triocyno, Parisiensis, and Mouinir.*

*Emydes: no specific names are given, except such as Emys de Sussex, E. de Sheppery, &c., according to the localities; and Ervirvermaurum, Wulg., is noticed from the Solenhofen slate.*
It is the same with Chelone, with the exception of Chelone Harencensis, and with—

Testudo, with the exception of T. radiata, T. antiqua, and Testudinata Sellovii.

Professor Owen, in his paper read before the Geological Society of London, December 24, 1841, containing a Description of Six Species of Marine Turtles (Chelones) from the London clay of Sheppey and Harwich, after quoting the generalizations given in the latest works which treat of fossil Cheloniens, and examining the evidence on which those species of the London clay of Sheppey and Harwich had been referred exclusively to the fresh-water genus Emyx by Cuvier and others, points out the circumstances which invalidate the conclusions that had been deduced from it. He then proceeds to describe the fossils, and to show the characters by which he has established the existence of five species of marine Turtles from the London clay of Sheppey, and a sixth species from the same formation near Harwich. The following are the species named by him:—


The same author, in his elaborate and highly satisfactory Report on British Fossil Reptiles, gives the following account of the order Chelonia:—

I. Family Testudinidae, Tortoises, or Land-Tortoises.

1. New Red-Sandstone Tortoise. The most evident of the evidences of Cheloniens in British formations appear to indicate that Owen will be referrable to the Land-Tortoises; and he quotes the foot-prints from the quarries at Corncleek Muir, and those subsequently discovered at the quarries of Crigs, two miles east of Dumfries, as examples. (Geol. Proc., vol. iii., p. 155.)

2. Oldie Tortoises. Examples, impressions of horned scutes about the size of those covering the carapace of a tortoise ten inches in length, in the oolite stone of Stonesfield.

II. Family Emydidae, Fresh-water Tortoises.

1. An undetermined species in the museum of Professor Bell, from the Eocene clay near Harwich.

2. Emyx testudiniformis, Owen (Emyx de Sheppey, Cuv. de Longeau).


5. Tretosterna punctatum, Owen. Purbeck limestone.

N. B. Closely allied to Trionyx.

6. With regard to Platemyx Mantelli, Emyx de Suisse, Cuv., Emyx Mantelli, Gray. Professor Owen remarks that the fossils discovered by Dr. Mantell in the Wealden strata of Titegate Forest, and the resemblance of which to the Trionyx Mantelli, the Egyptian discovery, and the Jurassic limestone of Soleure have been pointed out by Cuvier, are referrible to the pleuroderal section of the Eymidian family, as arranged by M. Duménil and Bibron, and in that section the genus Platemyx is the same as Platemyx, Bell!; but that the supposed of the skeleton of any individual has yet been obtained to afford a foundation for specific character.

7. Large Emyx from the Kimmeridge Clay. A bone in the museum of Sir P. S. Egerion, Bart., from Medington Pits, probably belonging to a species of Platemyx.


Genus Trionyx: Professor Owen remarks that certain British species from the secondary formation referred to Trionyx have been proved to belong to another family of Chelonians: the supposed Trionyx from the new red-sandstone (Caithness) has been pronounced to be a ganoid fish (genus Corvostra) by Agassiz. Nor had Professor Owen (1841) seen any Cheloniens from the Wealden formation that could be confidently affirmed to belong to Trionyx.

1. Penmar from cliffs at Linkfield, in the possession of Mr. R. G. Bath, of one inch in diameter, and found remains of Pleosaurus and Hybodus. Though not identical in form with any Trionyx with which Professor Owen could compare it, he found it to resemble the modifications of the bone in that genus more closely than in Triorhynchos. Emyx de Sheppey, Cuv. de Longeau. He remarks that although some of the Turtles of the Eocene period, as the Chelone longicapa, present such modifications of the jaws as seem to have adapted them to habits and food analogous to those of the Trionyx, yet evidences of this genus, to which the destruction of the eggs and young of crocodiles is more particularly assigned in the Nile and Ganges, are not wanting in certain localities where the London clay appears to have been deposited under circumstances analogous to those at the termination of equally gigantic rivers; and he adds that unequivocal portions of a true Trionyx have been found among the bones of the vast deposit laid at Bracklesham, and that they are also associated, as in the Purbeck basin, with remains of Anoplotherium and Palaeotherium in the Eocene limestone deposits in the Isle of Wight.

III. Family Chelonidae, Testaceous, or Turtles.

1. Testudo, Owen. Purbeck limestone.


3. Wealden Chelonie, an undetermined species. Portion of the carapace, plastron, and bones of the extremities e. of the Wealden strata, and of large dimensions, have been referred to individuals nearly three feet in length—discovered by Dr. Mantell in the Wealden strata at Tigata Forest (figured in the Doctor's Illustrations of the Geology of Sussex). The species in Professor Owen's opinion comes nearest to Chelon planentimentum of the Harwich Eocene clay.


5. Chelone Benestadi, Owen. (Emys Benestadi, Mant. Chalk; Burnham, Kent.

Professor Owen then proceeds to notice the Eocene Testaceous Chelones (see above, his paper read before the Geological Society of London), and concludes by observing that the indications of Cheloniens are found in the Wealden strata of Titegate Forest, in the works of Parkinson, Woodward, and König, being unaccompanied by the anatomical deductions essential to the establishment of their true affinities, have been either mistaken or improperly cited. Professor Owen points to the citation of Woodward's Chelone Harviciensis, in M. H. von Meyer's compilation, the existence in the London clay of fossil Emyx alone has been recognised in the latest summaries of the present branch of palaeontology. 'These therefore,' continues the Professor, 'could indicate the difference between the present fauna and that of the Eocene period in regard to the Chelonian order. But the case assumes a very different aspect when we arrive at the conviction that the majority of the fossil Cheloniens belong to the marine genus Chelone, and reflect that the number of extinct Eocene turtles from that limited locality exceeds that of all the well-determined species of Chelone now known to exist. For notwithstanding the assiduous search of the naturalist-collector, and the acquisition of shells and flesh of turtles offer to the commercial voyager, the tropical seas, though often traversed, have not as yet yielded more than five good species of Chelone; and of these the British Cheloniens belong to the marine genus Chelone, and are known to frequent the same locality. Now, whilst it is obvious that but a small proportion of the organized treasures of the vast deposit of petrified mud and clay which forms the great bed in this basin have been brought to light, the results of the examination of the material now on show that the ancient ocean of the Eocene epoch was more abundantly provided with turtles, and that these presented a greater variety of specific modifications than the same extent of ocean in any of the warmer parts of the earth at the present day.

'The indications which the Sheppey turtles give, in conjunction with the other organic remains from the same deposits, of the higher temperature that prevailed in the latitude in which they lived, cannot be overlooked; yet at the same time the conditions which allow the attainment of the size which the present tropical turtles often exhibit, would seem not to have been present in the time and place of existence of these remains, which have been enumerated; and again, the affinities to the fresh-water forms which the skeletons of some of the Eocene Chelones exhibit, accord with the indications that they inhabited the estuary of a great river, and found food abundant; and that the amount of lime in the district of Genoa, and of the province of Alessandria. The river or torrents Seriati and Curone, both affluents of the Po, rise in the Ligurian Apennines, and cross the province of Genoa from south to north. The province contains about

TOROLA. [VIRGIN ISLANDS.]

TORTONA, the Province of, an administrative division of the Sardinian States, is bounded on the north by the Po, which divides it from the province of Mortara; east of the river the province extends to the Ligurian Apennines, which separate it from the districts of Genoa; and west by the province of Alessandria. The rivers or torrents Seriati and Curone, both affluents of the Po, rise in the Ligurian Apennines, and cross the province of Genoa from south to north. The province contains about
TORTOSA, a town of Catalonia in Spain, and the capital of a considerable district of that name, is situated at the foot of a steep mountain on the left bank of the Ebro, and about 13 English miles from the mouth of that river; in 41° 42' N. lat. and 3° E. long. Tortosa is the ancient Dertos, known from inscriptions, to have been a Roman municipality, and the capital of the Ibergaones. It became a flourishing city under the Moors, owing to its favourable situation for trade, being placed in the route of communication between the ports of Fangos and Alfàques, last which still retains its Moorish name, the word Al fukh meaning a jaw and a harbour in the sea. It was taken from the Moors in 1141 by Raymond of Capua, who exiled the people and the priests, and took possession of the town; being several times taken and retaken under the reign of that prince, until he finally united it to his dominions of Arragon. On one of the above occasions the women of Tortosa distinguished themselves by their courage and piety. The cause of their action is described in the words: 'They were so steadfast in their place at night when the garrison were absent, the women mounted the ramparts, and defended the place so vigorously that the enemy was repulsed and compelled to raise the siege. To extract evidence from their piety, they instituted the military order of “la Hacha” (the taper or light). Tortosa is the see of a bishop, who is suffragan of Tarragona. The city is badly built, and with the exception of the castle, where the military governor resides, and the cathedral, a fine building, with three naves, erected at the expense of the inhabitants in 1825—there is nothing of merit in the city. In 1826, during the latter part of the war, Tortosa, which is defended by a wall and six advanced forts, sustained a siege against the French, commanded by Marshal Suchet, but the garrison after a vigorous defence was obliged to capitulate, on January 2, 1811. The environs of Tortosa are celebrated for their vineyards, and oil in great abundance. The inhabitants are chiefly occupied in the culting trade. The population, according to Melillo, did not exceed 12,000 inhabitants in 1826. Tortosa is the birthplace of Oppen, the French historian.

TORTRIX, Oppen's name for a genus of serpents, synonymous, according to Cuvier, with Anilius of Oken, Torquatrix of Gray, and Hydria of Hemprich and Fitzinger. Cuvier, who places the genus immediately before Uvulatia, which last is followed by Boas, observes that Tortrix is distinguished from the Ovata even externally, inasmuch as the scales of the row which runs along the belly and under the tail are a little rounded and inasmuch as their tail is extremely short. He says they have only one lung. Locality of known species, America. Example, Tortrix Segale. Mr. J. E. Gray (Synopsis of British Rept. 1850) places Blyxin in the family Gekkonidae, between Chelonina and Cylindricalinis.

TORTUGA, island. [Antilles.]

TORTUGAS. [Florida.]

TORTURE, which in a legal sense means the application of force designed to cause pain or arouse confessions from persons accused of crimes, has been recognized by the laws of most civilized nations as an instrument for obtaining judicial truth. A learned civil law term is exorcismus, orum ferre boni institutorum populorum communis: ut non immitteri pro lege in quem quodam gentium habetur.’ (Wesenbechii Paraetalia et Dig. de Questerionibus, num. 3.) Torture was applied to slaves at Athens (Demosthen., Orat. meg. Pantilae); and Cicero also describes a number of the places to which it was applied even to citizens and freemen (Oratoria Polit., 34); but there is some doubt as to the accuracy of this statement with respect to Athenian freemen. It has been questioned whether torture was used by the Romans during the republican period; but Cicero frequently speaks of it as an ancient practice, and attributes it to the customs and institutions of an earlier age (moribus majorum). (Oratio pro ilio Deito, c.1; Pro Milone, c.22; Orat. Polit., 34.) Tacitus also describes a multitude of places to which the ancient Senatus-consultum (Aug., lib. ii., c.30). However this may have been, it is beyond all doubt that the use of torture in judicial inquiries had become fully established in the time of the first Roman emperor. The ancient Romans allowed it to be used only to the case of slaves when examined either as witnesses or offenders; but under the emperors, even under Augustus, but more frequently under Tiberius and Caligula, instances occur in which freemen and citizens were interrogated by torture; most of these instances however are to be considered as irregular acts of power, not sanctioned by law. Rules regulating the mode of applying torture, and limiting the occasions of its application, were early established in the Roman law. One of the most important of these is that which Cicero in the passages above cited refers to anterior usage, namely, that a slave should not be tortured to give evidence against his master, except in the cases of incest and conspiracy. Tacitus also refers to the case of a woman who could not be persuaded to reveal her slander against her former master. This device is however ascribed by other historians to Augustus. (Dion, lib. iv.) In judicial inquiries or public trials for crimes, the question was applied at the instance of the accused in the presence of the judge, the avowor and judge sitting together, and the avowor under torture were reduced into writing (in tabulas relatam), and signed by the praecon (Heineccius, Ant. Rom., lib. iv., c. 18, sect. 35); but private persons also were permitted to force domestics under torture to reveal their slaves' secrets. (Orat. pro Clucatto, cc. 63, 66; Quidnunam, Declarn., 329, 328, 333.) At a later period of the Roman empire many new regulations appeared, and the earlier restrictions upon this practice were wholly removed or greatly modified.
Several exceptions to the rule, which prohibited "questiones in capit dominii," were introduced, and even freemen were subjected to torture, when they were found guilty of the crime of "corpus delicti," and probable or presumptive evidence that the accused was the guilty person. Moreover when the offence was of a grave character, and affected the head of the state immediately, personal exemptions from the law were admitted, and the law was suspended in certain cases. (Digest (lib. xviii, tit. 18; De Questionibus, sect. 10), in majestate criminis, quod ad personas Principum attinet, non exigit, torturunt. (Wasserschleben, Historia Questionum per Tormenta apud Romanos, Berol., 1836.)

It is remarkable, considering the extent to which the practice of torture was eventually carried by the Inquisition, that according to the principles and early practice of the Common law and several of its criminal law in the case of heresy, which was then considered and termed "crimen læse majestatis divinae." Nevertheless the earlier councils relating to the Inquisition, though violent in their proceedings against heretics, made no use of torture; and the first trace of any ecclesiastical sanction of this mode of proceeding, even in the case of heresy or apostasy, is found in a decree of Innocent IV. in 1252, which however does not authorize the inquisitors to use torture, but calls upon the civil magistrates to press the accused to confession against themselves and others by means of torture. At a subsequent period the necessity for secrecy in the proceedings of the Inquisition induced the use of torture by the inquisitors themselves, and the extent to which it was afterwards used is notorious. (Bienien's Geschichte des Inquisitions-Processe, p. 73-4.) An instance of the application of torture under the ecclesiastical law occurred in England, under remarkable circumstances, about 60 years after the first sanction of the practice by the Church of Rome. In the great contest between Clement V. and the Templars in 1310, inquisitors were appointed by the pope to examine the prisoners who were charged (among other offences) with apostasy and heresy. The Archbishop of York, who was one of the inquisitors, propounded to certain monasteries and divisions several difficulties which had arisen, in order to have them respecting the mode of conducting the examinations. Among other questions he asked, whether the things accused of by the accused constituted a crime of torture, vel sicutum visum fuerit vel auditum? Et si torturandi sunt, utrum per clericos vel laicos? Et dato, quod nullus omnino tortor invenit valeat in Angia, utrum pro tortoribus mittemi, vel invenit evitarem, res monasteriorum. In answer, the bishops of London, in whose custody the accused were, to suffer the inquisitors to examine them and put them to the torture. (Rymer's Fœdera, tom. iii., pp. 228, 232.)

Judicial torture was admitted in part of the civil and legal systems of Europe, which adopted the Roman law. In Germany it was gradually introduced as the use of the Roman law increased, and displaced the ancient Teutonic and feudal proceedings by ordeal and battle. Indeed while these judicial

decision continued in use, there is no notice of the existence of torture. In most German cities judicial torture was unknown, and all dealings with criminals were regulated by the laws in the statutes of the Italian municipalities at a much earlier period. (Mittermayer's Deutsche Strafsverfahren, their i., pp. 73, 394.) A species of torture was indeed employed in Germany to a very great extent during the middle ages, and is still admitted to have been used by the torture-chambers and instruments still exhibited at Nürnberg, Salzburg, Ratisbon, and other ancient cities and castles; but these were in general not used for legal purposes, but for the proceedings of those secret religious tribunals, or "Fehmgereichte," which abounded in that period. The regular torture however, as derived from the Roman law, continued in many European states until the middle of the last century, when more enlightened views on the subject of jurisprudence were disseminated, and the conviction of the inefficacy and injustice of this mode of ascertaining truth. In France the "question préparatoire" was discontinued in 1789 by a remarkable decree, which forbade in Merlin's Repertoire, vol. i., p. 502; an act of torture in general was abolished throughout the French dominions at the revolution in 1789. In Russia its abolition was recommended by the empress Catharine in 1785, which was not effected until 1801. In Austria, Prussia, and Saxony, the law regarding TORT was not altered before the middle of the 19th century; but although so seldom used as to be practically extinct, torture continued to form part of the laws of Bavaria, Hanover, and some of the smaller states of Germany. In Belgium, the practice continued, even in the time of the Revolution. The last instance of its use is that of the case of the suspect in the Séance des Inquisiteurs (Wasserschleben, loc. cit., pp. 90-93, note.) In Scotland, where the law is almost wholly founded upon the civil law, the use of torture prevailed until the reign of Queen Anne, when it was declared by the act for improving the union of the two kingdoms (7 Geo. ii. c. 5), that in future no person accused of any crime in Scotland shall be subject or liable to any torture.

The history of the use of torture in England is curious. From the reign of Edward II. to the reign of Edward III. (1310), as above mentioned, as well as from the express statement of Walter de Hemingford, it appears to have been at that time unknown in England, either as an act of prerogative, or as an instrument of criminal inquiry in the ordinary course of laws. Nevertheless, Holinshed relates that, in 1468, Sir Thomas Coke, the lord mayor of London, was convicted of imprisonment of treason upon the evidence of one Hawkins given under torture; and that Hawkins himself was convicted of treason by his own confession on the rack, and executed. From this period until the Commonwealth the practice of torture was frequent and uninterrupted, the particular instances being recorded in the council-books of the two kingdoms (7 c. 5, 21). The last instance recorded occurred in 1640, when one Archer, a glover, who was supposed to have been concerned in the riotous attack upon Archbishop Laud, was convicted of treason, and, as a contemporary letter states, 'to make him confess his companions.' A copy of the warrant under the privy seal authorizing the torture in this case, is extant at the State Paper Office. With this instance the practice of torture in England ceased, no trace of its continuance being discernible during the Commonwealth or after the Restoration. But although the practice continued during the two centuries immediately before the Commonwealth without coming to the knowledge of the public, it is not improbable that it continued in use, and even declared to be unknown in this country by judges and legal writers of the highest character who flourished within that period. Thus Fortescue, who was chief justice of the court of King's Bench, and wrote his book De Laudibus et Defectibus Legum Angliae, and of Henry VI., and who notices a case of false accusation under torture (which was probably the case of Sir Thomas Coke above mentioned), condemns the practice in the strongest terms (chapter 3), and states that it was not the custom in England. (Fortescue, cap. 22.) Again, Sir Thomas Smith, a very eminent lawyer, statesman, and scholar, who wrote in the early part of Elizabeth's reign, says that "torture or question, which is used by the order of the civil power, is not used by the order of the civil power of other countries. It is taken for service." (Smith's Commonwealth of England, book ii., cap. 27.) And Sir Edward Coke, who wrote in the reign of James I., says 'there is no law
to warrant tortures in this land; and there is no one opinion in our books, or judicial record, for the maintenance of them.' (3 Inst., 33.) Notwithstanding this explicit denunciation of the practice as against law, both Smith and Coke repeatedly set as commissioners for in the Tower in the reign of Henry VIII. (2 C. R. & E. 147, p. 105.) But his lies were not heard as the tower. (Rushworth's Life of the villainous Sir Edward Coke.)

The TORY party was formed by a group of Whigs, essentially an aristocratic party, which opposed the Hanoverian succession and supported the rights of the Catholic monarchs. TORYISM was a movement aimed at maintaining the ancient liberties of the people and defeating attempts at the Crown to assume despotic power. It was characterized by a belief in the efficacy of the struggle of individuals against the government, a rejection of the idea of legislative omnipotence, and the assertion of the rights of conscience and the individual against the will of the majority. However, the word 'Tory' has often been used as a term of abuse since the 18th century and has been applied to political parties and individuals throughout British history.
servation of monarchy was henceforth an object with all, when at the same time the power of the House of Commons had been checked, and it was absolutely necessary for the king's advisers to gain, some way or another, the assent of a body which they could no longer endeavour to coerce, that political differences in the nation led to systematic struggles in Parliament, and to the formation of parties. It was in the year 1675, says Mr. Hallam, that the words Whig and Tory were first heard in their application to English factions; and though as senseless as any cant terms that could be devised, they instantly assumed a color in use as they have since continued. There were then indeed questions in agitation which rendered the distinction more broad and intelligible than it has generally been in later times. One of these, and perhaps the most important was the Biblical Exclusion, in which, as it was usually debated, the republican principle, that all positive institutions of society are in order to the general good, came into collision with that of monarchy, which rests on the maintenance of a royal line as either the end or at least the necessary means of lawful government. But as the exclusion was confessedly among those extraordinary measures to which men of Tory principles are sometimes compelled to resort in great emergencies, in fact, as a political Whig, possessed at any other time, we shall better perhaps discern the formation of these grand political sects in the petition for the sitting of parliament, and in the counter addresses of the opposite party. (Constitutional History of England, etc.)

The first Tories opposed the Exclusion Bill and supported Charles II. in his endeavour to prevent a renewal of the attack upon his brother, by successive prorogations of the parliament. The original name referred to the House and the body to the house. This led to no much opposed, naturally led to a common use of slighting and opprobrious words, such as Yorkist. That served for mere distinction, but did not scandalize or reflect enough. Then they came to Tantivy, which implied riding post to Rome. Observe, all the while the loyal church party were passive, the outrage lay wholly on the other side. These observing that the Duke favoured Irishmen, all his friends, or those accounted such by appearing against the king, straight became tories, and in the copies of the factional words the Tory was entertained, which signified the most despicable savages among the wild Irish; and being a vocal crowning word, readily pronounced, it kept its hold, and took hold of the soul on citizens everywhere as these men passed we could observe them breathe little else but Tory, together with oaths and damnations. (Examen, p. 321.) Thus Dr. Johnson's first inference, I suppose, from an Irish word signifying a savage; and Mr. Moore, in his 'Memoirs of Captain Rock,' sarcastically refers the history of the Tory party to a general 'History of the Irish Rogues and Rapparees.' The origin of this word, which is a little younger than Tory, will be explained under Whig.

Dr. Johnson proceeds to give an explanation of the word Tory, which is perhaps as good a short general description of Toryism as can be given—'a cant term, derived, I suppose, from an Irish word signifying a savage;' and Mr. Moore, in his 'Memoirs of Captain Rock,' sarcastically refers the history of the Tory party to a general 'History of the Irish Rogues and Rapparees.' The origin of this word, which is a little younger than Tory, will be explained under Whig.

TOTTANIS. [Scolopacidae: Tringinae]

TOTTANUS, Cuvier's name for a genus of Wading-Birds [Grallatones], containing those snipe-like species known by the names of Cheswicles, etc. Example, Tottanus stagnatilis. [Scolopacidae, vol. xxii., p. 86.]

TOTILA. [Romer.]

TOTIPALMES, Cuvier's name for a group of birds whose hind-toe is united with the others in a straight line between two oars; instead of becoming a foot, which makes their feet more perfect oars, the Totipalmae are nearly the only Palmipedes that perch on trees. All fly well, and have short legs. The Pelicans, the Cormorants, the Frigate Birds, the Boobies, the Anhingas, and the Tropic Birds are the chief of the rest. The name is derived from the resemblance of the tail feathers to that of a palm; and for the strengthening of the popular element of the constitution.

The history of the Tory party, rising and falling in the state, may be traced in a series of articles in Knight's Companion to the Newspaper for 1824, 1835, and 1840, entitled 'Changes of Administration and History of Parties;' or in Mr. G. W. Cooke's 'History of Party,' 3 vols. 8vo., which is on the whole a useful publication, though its accuracy is not to be implicitly depended on. This trade, totanis, totnes, totnas.

TOTTANES, or TOTNES, a parliamentary borough in the hundred of Coleridge in Devonshire, 23 miles south by west of Exeter, the county town; 190 or 191 miles west-south-west of the General Post-Office, London, by Staines, Basingstoke, Andover, Amesbury, Wincanton, Ilminster, Honiton, Exeter, and Newton Bushel; or 200 miles, namely, 166 miles by the Great Western and Bristol and Exeter Railways to Taunton (including the distance from the Post-Office Office). The county town stands on the main line of the railway, farther by road through Wellington, Collumpton, and Exeter.

Totten is a place of great antiquity, and is mentioned by Rickwood in his 'Survey of Devonshire.' Being shown by Brodus and Uther Pendragon landed on their arrival from the Continent to oppose Vertigern. Risdon gives Bede as his authority, but we have not been able to trace the passage in the 'Historia Ecclesiastica' or other works of that father, or to find what is meant by the adventurer of Nennius, c. iii. Totten is described in the Exon Domesday as a borough containing ninety-five burgesses within and fifteen without the borough: it was held by Jumel de Totenys, or Totynys, who was created earl of Totenys in the year 1066, as his name is written. Jullel founded here a Churicn priory, cell to the abbey of St. Sergius and St. Bachus at Angers: this priory was suppressed at the time of the general suppression of monasteries under Henry VIII., when its yearly revenues
TOUCANS.

The area of the parish of Totness is 1170 acres: the number of houses, in 1831, was 491, viz. 375 inhabited by 791 families, 18 uninhabited, and 11 building: the population was 712, but M. de Vergennes, the French ambassador to Constantinople, who was assassinated in 1793, and the town, which was built on the marshy ground, in the parish of Berry Pomeroy, the manor of Bridgeorton, which comprises 241 acres, and had, in 1831, 78 houses and a population of 714, has, for parliamentary purposes, been added to the borough, giving it an area of 1411 acres, 402 houses, and a population of 1042, and is watched by a private subscription: the houses are commonly white, with slated roofs: the principal street runs down the hill to the bridge, and is paved: several of the houses are antient, with upper stories projecting over the footpath, and supported by pillars: in the middle of the main street is an antient gateway, originally belonging to the town wall; and on an artificial mound of great elevation, commanding a fine view of the town and the surrounding country is the circular keep called the antient castle. The church, which is on the north side of the town, behind the houses of the main street, is a handsome structure, with a well-proportioned tower, with pinnacles, at the west end, which, with the large windows, was formerly painted and gilded, and a plain stone pulpit: the altar-piece is of classical design, not in keeping with the Gothic architecture of the church. The church is built of a red stone, having the appearance of brick. There are meeting-houses for Independents, Unitarians, and Wesleyan Methodists. There are a guildhall and a small gaol, a small theatre, and an assembly-room.

There is no manufacture carried on at Totness, the sergeant manufacturer, formerly carried on, having been given up, but it is a place of some trade, especially in corn, coal, and culm, which are imported, and in cider, which is exported. The river Dart is navigable for vessels of 100 tons up to the town; there is a salmon fishery in the river near Totness, and off the coast of the town are abounding men and fishermen. There is a weekly market on Saturday, a great cattle-market monthly, and two yearly fairs. Races are held yearly.

Totness received its first municipal charter from King John, but we have seen that it existed as a borough long before that time. The municipal borough comprehends the town, but not the whole parish. It has sent two members to parliament for the county of Devonshire since 1832. The number of parliamentary electors, in 1830-36, was 312.

There were in the parish, in the year 1833, three dame-schools, with 52 children of both sexes, and thirteen other day-schools; of which the grammar-school had two schools on the same foundation, of active and passive scholars, partly by endowment, partly by yearly subscription, 70 children; the national school, 136 children; and eleven other schools, 359 children. There were also two Sunday schools, with 392 scholars. Kaunitz, the eminent barrister, and Lye, the Anglo-Saxon scholar, were natives of Totness.

(Tidson's Survey of Devonshire; Polwhele's History of Devonshire; Tanner's Notitia Monastica; Clergy List; Old and New Totness.)

TOUJOURS,
TOUCH. The sense of touch belongs to the outward integument of the body—the skin, and is shared, in a minor and modified degree, by parts of the mucous membranes, which are also provided with nerves of the same nature as the sensory nerves of the skin, and with the same kind of prolongations of the same structure. By it we have the faculty of determining our immediate relations to material objects, in regard of contact, temperature, and electrical excitement.

Two nervous influences, or endowments, on which this sense depends, appears in no essential particular to be distinguished from that which gives common sensibility to the various deeper organs of the body. The nerves which constitute the sense of touch, are distributed in the flesh, in the same way as are those which constitute sensibility without nervous prolongations, and in the same way as those nerves are associated with their origin, or in their course, with others not reaching to the surface of the body, under the common name of sensitive; so that if we trace such a one from the centre outwards, we find it (previously to its termination in the skin, where it ministers to the special sense of touch) pursuing and overspreading every minute part of the body. To the same class of nerves we likewise owe our immediate knowledge of weight and resistance; for, as they partly pass, together with the nerves of motion, to the voluntary muscles, so they inform us of the weight, or the tactile sensations of the action of these bodies. To the same class of nerves, we owe the perception of the minute proportions of our saliva, or the sensitiveness of our lachrymal glands.

Accordingly, each trunk of the sensitive nerve transmits to the centre not only the special impressions of contact, temperature, or electrical shock, which may affect its cutaneous extremities; but likewise, by the excitement of pain, makes us aware of deviations from healthy function, and, by the so-called muscular sense, measures for us our own particular exertions of force.

Thus, the tactile sensations of the motions being communicated to the brain, there is no surer as well as more certain way of knowing the condition of any part but by resting our hand on it, and thus by examining our own sensations. These sensations may be ascribed to two different nerves: the one which is excited by contact, and the other by pain.

The tactile sense is divided into two classes, one which is excited by the pressure of bodies, and the other by the action of the skilful hand. The former is excited by contact and pressure, of which the latter is excited by motion. The former is excited by contact and pressure, of which the latter is excited by motion.

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TOU 85 TOU

piousness of the Baptist; upon which, in 1765, he trans-
ferred himself to Taunton, where, besides having the
charge of a Baptist congregation, he taught a school,
and, it is said, kept a bookseller's shop. It was while re-
duced here likewise that he wrote and published most of
the sermons which have made his name known. He
had not been long at Taunton before he commenced
a further change; but, although he had previously
received invitations from the Unitarians both of
Hovecaster and Yarmouth, he remained where he was till
1770, being then standing with the whole of those of
the Unitarian congregation at Birmingham, formerly
preached over by Dr. Priestley, and then assembling in
what was called the New Meeting-House. This appoint-
ment he soon declined, and, in summer having lost his
expectation, till his death at Birmingham, after a short ill-
ness, in the 23rd of July, 1815, leaving five children, out
of a family of twelve, by his wife Jane, youngest daughter
of Mr. J. Smith, of Taunton, whom he married in 1764.
His case was for some time minister of a Baptist con-
gregation at Chewdbury, in Lanashire, but afterwards went
over America.

Dr. Toulmin received his diploma of D.D. from Harvard
University, in the United States, in 1794. His first pub-
lication appears to have been an octavo volume, entitled
Sermons addressed to Youth, with a Translation of Is-
ocrates's Oration to Demonicus, which appeared in 1770,
and was reprinted in 1799; this was followed by 'Two Let-
ters on the True Sinn of the Disentining Ministry,' 8vo.,
1774; 'Memoirs of Socinus,' 8vo., 1777; 'Letters to Dr.
John Sturges on the Church Establishment,' 8vo., 1778;
'Discourses on the Internal Evidence of Religion,' 8vo.,
1786; a new edition (the third) of 'Mr. William
Foot's Account of the Orination of Baptist,' 8vo., 1787;
'Review of the Life, Character, and Writings of John
Biddle, M.A.,' 8vo., 1793; 'History of the Town of Taun-
ton, A.D. 1801,' a new edition of N. T. Bright's 'His-
tory of the Puritans,' with notes and additions, 5 vols. 8vo.,
1794-1797, reprinted in 3 vols. 8vo., 1837; 'Biographical
Memoirs of the Memory of Dr. Priestley,' 8vo., 1801; 'Addresses
to the Dissenters of the North of England,' 8vo., repub-
lished in 1814; 'Pamphlets on the Politics of...,
'Sermons on Devotional Subjects,' 8vo., 1810; 'Historical
View of the State of the Protestant Dissenters in England,
Svo., 1814; besides a number of single sermons and other
pamphlets: and he was also an occasional contributor to
the 'Theological Repository,' the 'Nonconformists' Mer-
norial,' 'The Monthly Magazine,' and other periodical
publications. Dr. Toulmin's writings, without much either
of originality or power, are the dockyard absolute, in an
agreeable perspicuity and neatness of style, rising some-
times to considerable energy and animation; and although
steady, and even eager, in the defence of his own opinions,
his style is marked by a fine literary taste, and is quite
courteous to his opponents. He appears to have been a
somewhat narrow-minded but conscientious and kind-
hearted man.

TOULON, a town in France, on the coast of the Medi-
terranean, capital of an arrondissement in the depart-
ment of Var, 428 miles in a direct line south-south-east of
Paris, or 530 miles by Milan, Sens, Auxerre, Autun, Châlons-
sur-Saône, Mâcon, Lyon, Vienne, Valence, Orange, Avign-
on, Aix, and 5,500 miles by sea from Cadiz; 'History of
Toulon' (clerg. at 8,700),

Toulon existed in the time of the Romans, and is
noticed as a harbour in the 'Itinerarium Maritimum' of
Antoninus, under the name of 'Telo Martius.' It is noticed
also by the anonymous geographer of Ravenna, who calls it
'sequi Telo Martius,' and is known down to the time of
Galilæus, which enumerates among other officers the 'Pro-
curator Baphi Telenois Gallariun' ('Overseer of the
dye-house for the provinces of Gaul at Toulon'), it appears
that Toulon, from the time of the Romans, was the most
important naval station of the Mediterranean, and thus
gained the name of the 'Venerable Port, 'or 'Old Harbour,'
which, in the time of N. A., had been captured from the
Romans by the Arabs, and was consequently occupied by
the Saracens, and often recovered from the disease.

Louis XII. to protect it from the pirates of Barbary, com-
missioned the erection of a large tower, which was completed
by François I. In the year 1530 it was taken by the Constabular
iron, and the Constable of Bourbon, then commanding the Imperial
army, Henri

IV. strengthened the fortifications of the town, and formed
a harbour for merchant vessels. Louis XIV. designed
to make it one of the barriers of France on the south side of
the Mediterranean, and the establlishment of the royal dockyard,
caused the whole town to be fortified by Vauban. It was
then garrisoned by the French, and subsequently by
land, at the head of a formidable land, and by
combined English and Dutch fleets by sea. In 1793 it was
occupied by a detachment of marines from the English and
Spanish fleets then coining off the port, through an under-
standing with the latter. In the town was afterwards
garrisoned by a strong force of the French
and their allies and of the French Royalists. It was soon
besieged by the French, and conquered by
in 1797. The town was then
occupied by the French troops, and the French fleet
being directed by Napoleon Bonaparte, whose celebrity
had its commencement here. The capture of General
O'Hara, the commander of the garrison, and the taking
of Fort Eguillette, on a point of land between the inner
and the outer road, obliged the allies to evacuate the
town, after burning the arsenal and carrying away or burning
nearly all the vessels in the harbour. Many of the
Royalists escaped on board the allied fleets; but some
remained, several of whom were put to death by the vic-
torious Republicans. The town, in consequence of its
having been given up to the allies by the townsman, lost its
rank of capital of the department, which has never been
restored.

Toulon is open on the south side to the harbours and
road, but is sheltered on the north by the lofty Mount
Pharon, and on the east and west by hills of less elevation;
from its position, the heat in summer is intolerable. The
inlet leading to the Mediterranean, is an inlet of over
a mile in length, with a width of two furlongs; the
river running into it is at its mouth over twelve furlongs
broad, and divided by the rise of two mole or piers: they have each a narrow entrance, passable only
by one vessel at a time; and there is a passage commu-
nicating between the two with a swing-bridge. 'Le
Vieux Port,' or 'Old Harbour,' is surrounded by a large
and tolerably handsome quay, along which, on the south or
town side, are a number of goods houses. 'Le
Port Neuf,' or 'New Harbour,' is surrounded by the
various buildings connected with it as a naval port. On the
north of it stands a large arsenal, containing many storehouses for the navy; covered slips for building vessels;
the sailmakers' and other workshops; the armories, in
which is a fine collection of ancient arms; the naval-school,
and a collection of ordnance of every kind; the school of
naval artillery; the navigation-school; and, on the north side of the dockyard, the rope-
making, near 1700, or, according to some accounts,
above 2000 feet long, built of freestone, from the designs
of Vauban, with a vaulted roof. On the east side of the
naval port, and at the eastern extremity of the south side,
are the barrack or convict-house, and the hospital for con-
viacs; they are built on the moles which enclose the
harbour, and usual height from 300 to 400 feet.

In the same quarter are three basins for the
construction or repair of vessels. The depot or park of artillery is on the west side of the harbour, and is enclosed in one of
the basins of the town. Both town and barracks are sur-
rounded by a strong wall, except to the north, where it is
being surrounded by bastions and by a ditch. Without the ditch, on the west side, adjacent to the dockyard, is the government
bakehouse. The town is entered by two gates, the gate of
Paris, Aix, and Marseille, near which is the arsenal of
Toulon, and the gate of Italy on the north-east, through which the road from Genoa, Nice, and Fréjus enters. Adjacent to the town, on the
south side, is a well called the entrenched camp of St. Anne: a great number of detached works occupy various positions round the town, and are consi-
tered to form so well arranged a system of defence, that
the place is regarded as impregnable. The depot or park
of artillery for the land service occupies one of the bastions
on the north side of the town; and there are handsome

Digitized by Google
The Champ de Mars is the exercise ground, is on the north-east side, without the walls.

The older part of the town is in the centre, and is surrounded on the north and east by a wide street (Le Cours and Rue Lafayette), or boulevard, apparently occupying the site of the old town-wall; beyond this, but within the present town, are streets which, though regularly laid out, are streets whose modern origin; and on the west side of the old town, and north of the dockyard, are other new streets regularly laid out. The streets are tolerably well paved, and the houses are built; and a number of foundries tend to keep the town clean: there are some 'places,' or squares, but all small, except the Place d'Armes or Parade.

Toulon has the ex-cathedral of Notre Dame, and three other parish churches, St. Jean, St. Pierre, and St. Louis; the latter is a small church, but is decorated by several works of the sculptor Puget. The front of the church of St. Louis has a tolerably good colonnade. Adjacent to the church of Notre Dame is the college or high school, which is a good building. There are a marine hospital, a military hospital, a foundling and another hospital; the ex-episcopal palace; the office of the maritime prefect, forming one side of the Place d'Armes; a small and inconvenient palais de justice or court-house; an exchange; a town-hall, on the quay of the old or mercantile port; a theatre; and several bathing establishments.

Some of these are outside of the walls of the town. There is a public library of 9000 volumes, a medical and natural history and botanical garden, an observatory established in the national hospital; a society of belles lettres, sciences, and arts; courses of instruction in geometry and practical mechanics; a savings' bank, a mont-de-piety, and a maternity society. There is a town-wall, on the outer road, at some distance from the town.

The population of the commune, in 1831, was 28,419 (of whom 24,121 were in the town itself); and in 1836, 35,322. The business of the place, independent of the government establishments, is not very great. There are some soap-houses; some coarse woollens, morocco leather, chocolate, vermicelli, and caudles are manufactured; and some merchant vessels are built. Trade is carried on in wine, brandy, oil, olives, dried fruits, corn, flour, and other productions of the neighbourhood. There are two yearly fairs of eight days each. The townspeople were formerly reputed to be the roughest in Provence; hence arose the proverb, characterizing the manners of this and the other chief towns, 'Aix in Provence, Marseille in Turkey, Toulon in Barbary.' The low grounds in the neighbourhood are fruitful; they produce excellent vegetables, bees, eggs, olives. The oil is a medium quality. To be reckoned with as a naval port in France, and is the residence of a number of officers connected with the administration of the naval department. There are also several fiscal government offices. It has three courts of justice; tribunal de Commerce, tribunal d'Instruction, a tribunal de commerce, and a tribunal de marine.

The arroundissement of Toulon has an area of 500 square miles and comprehends twenty-eight communes: it is divided into eight cantons or districts, each under a justice of the peace: the population, in 1831, was 94,242; in 1836 it was 99,012.

[Text continues with various historical and geographical details about Toulon, including its history, the people, and various administrative and economic aspects of the town.]

TOULOUSE, a city in France, formerly capital of the province of Languedoc, and now the chief town of the department of Haute Garonne, 363 miles in a direct line north of Paris, or 438 miles by the road through Orleans, Chateaurenard, Limoges, Cahors, and Montauban in 35° 35' N. lat. and 1° 36' E. long.

The notices of this town in antient writers are more numerous than of most towns in Gaul, and relate to an ancient town which was perpetually called Lutetia, or Strabo and Ptolemy Tola, Tols, and Thos. By the Latin authors and in inscriptions Tolosa and Thos. By a similar variation to this last name has been written in later times Toulouse and Thoula, but the A in Toulouse was generally omitted. To this city, which belonged to the Volcace Tectosages, a Celtic nation, contained an enormous treasure in gold and silver which was seized by the Romans under Cæsarc. M. C. 106. As the treasure had been deposited in consecrated
places, the seizure of it was regarded as sacrilege; and the misfortunes which afterwards overtook the perpetrators occasioned the 'gold of Toulouse' ("aurum Tholusannum") to become a proverbial expression, which still remains. (Aulus Gellius, Noctes Atticae, III. ix.) Toulouse was afterwards subject to the Romans, the Visigoths, and the Franks, and in the middle ages had counts of its own, who were potenates of great power. In 1568 it was the scene of one of the most beautiful historical events of importance connected with it was the battle fought, 10th April, 1581, between the allied army under the duke of Wellington, and the French under Marshal Villars. The latter were victorious, and Soutoul was obliged to evacuate the town.

Toulouse is situated on the right or east bank of the Garonne, which, flowing from the south, bends westward, forming a crescent, on the concave side of which the town stands. On its southwestern boundary, which unites the Garonne with the Mediterranean, opens into the town a short distance below the town, and has its course for some distance parallel to the river, the site of the town and its suburbs is a peninsula, enclosed between the Garonne, close to the town, and the west, and the canal at a little distance on the north and east. On the south side, but at some distance, are the heights of Pech-Charbon, and on the east, beyond the canal, and between it and the town, a range of old cliffs may be noticed (and falls into the Garonne below it), are the heights of Mont Rave, on which the first part of the battle of Toulouse, in 1581, took place.

Beside St. Cyprien, is on the opposite bank of the river, are enclosed by walls, erected in the middle ages, and are united by a bridge of seven arches, the Pont Neuf, about 800 feet long, erected under Louis XIV., from the designs of Souffron, which crosses the river in the middle of the bend. The river is lined with handsome quays. The walls (which have nine gates) appear to have been, in 1581, tolerably entire, and so thick as to admit sixteen and twenty-four pound guns respectively (with buildings), but later authorities describe them as gradually disappearing in the progress of improvement. Beside St. Cyprien, there are several faubourgs or suburbs: Bazacle, on the north-west, close to the river; Arnaud-Bernard, on the north; Mathiau, on the northeast; St. Etienne and Guillemin, on the east; and St. Michel, on the south: the faubourgs Arnaud-Bernard, Mathiau, and St. Etienne, extend to the Canal du Midi; and Guillemin lies beyond the canal, adjacent to St. Etienne. On the south-east side of the town, between St. Etienne and St. Michel, is the Espallade, a circular space surrounded by trees, planted so as to form four concentric circles, and having six avenues radiating from it. These avenues are all shaded by plane-trees. The streets of the town itself were, till of late years, narrow and crooked; the squares irregular in form, the houses built of brick, and few of the edifices of a handsome appearance (Millin, Voyage dans les Départemens du Midi, p. 181); but later authorities say that the town has been very rapidly improved. The town is still however as it were in a state of transition; its streets, commonly narrow and crooked, become still more irregular, as in taking care to give them a better appearance, the old houses are replaced by others arranged upon a new line; so that, with some exceptions, the streets present only houses, some protruding and some receding. (Malte-Brun.) They are paved with round stones, very fattening for foot passengers. The old houses generally have flat roofs, and the roofs are still unfinished, but they show what they will be when completed (ibid.): the Place Royale, Place St. George, and Place Angoulême are the handsomest. Ten or more frontages are built upon them, and issued from walls, serve to cleanse and refresh the streets. Many of these fountains owe their erection to M. Montbel, formerly mayor of the city, and afterwards one of the ministers who signed the unlucky ordinance of 13 October, 1792, in which it was ordered that a pillar of white marble in the Place Royale, adorned with bas-reliefs of events in the Spanish campaign of 1823.

The principal public buildings are the cathedral, the town-hall, the ex-capitular palace, and the church of the Grands Augustins, now occupied as a museum. The nave and portal of the cathedral are more antient than the choir, and are described by Malte-Brun as belonging to 'an old heavy Gothic church,' the choir, erected in the sixteenth century as a part of a new edifice designed to replace the older one, but which has never been finished, is described by the same author as one of the most beautiful products of the school of Toulouse. (ibid.) The decoration of Malte-Brun regard must be had to the difference of architectural taste in England and France. The choir is not in a line with the nave; so that the whole structure has a singular form, which is well described in figures.

In the tower of the Cathedral is the bell of Caradoc, weighing 50,000 lbs. French. The town-hall or capitoul is almost entirely a modern edifice, and was erected in 1544. There is an old remnant of the former building. A gallery termed 'Galerie des Illustres,' is set apart for busts of those persons, natives of the city or connected with it, whom the town has thought worthy of the honour of a place. The ex-palace of the archbishop, now occupied by the government, is the handsomest modern building after the capitoul. The museum in the cloister and church of the Grands Augustins contains a number of antiques, which have been collected in the department. Besides these, a statue of Toulouse the poet is in the theatre; a museum is kept for the Cour Royale and the tribunal de première instance; the veterinary school; the church of La Dorday, built on the site of an antient heathen temple, and that of St. Sernin, which is not without the taste of the old building, is one of the most celebrated hospitals of the Hôtel Dieu and St. Joseph-de-la-Grave; the mill of Bazacle; the abattoirs; and the bridge and bas-relief at the junction of the Canal du Midi and the Canal de Brienne. This latter canal, which is very short, connects the Garonne at the mill of Bazacle, descends to the town wall, with the Canal du Midi. In the Ile de Tonnis, a small island in the Garonne opposite the town, and indeed forming part of it (for the island is covered with houses and buildings), are the remains of the Castle of Narbonnis, the former residence of the counts of Toulouse. Toulouse has scarcely any remains of Roman buildings. There are a large public garden; a botanical garden, rich especially in plants from the Pyrenees, and in exotics, where courses of instruction in botany are given; and a public walk, 'Cour Dillon,' in the Faubourg St. Cyprien, on the bank of the Garonne.

The population of the compound of Toulouse in 1820 was 65,319; in 1831, 69,630; and in 1836, 77,379. There are bell-foundries and copper-mills, a very large manufactory of sickles, files, and other hardwoods, and a number of establishments for different branches of manufacture, as silk-manufactures, glass-manufactures, tanneries, breweries, dye-houses, tan-yards, rope-walks, flour-mills; manufactories of wax, wax-candles, paper-hangings, oil-cloth, musical strings, morocco leather, cotton and woollen yarn, blankets, cotton counterpanes, printed cottons, hats, stove-baths, earthenware, porcelain; and a government snuff-manufactory. Trade is carried on with Spain, with the ports of Bordeaux and Marseille, and with the interior; the Spanish trade is the most important. The chief export is of tobacco, and the produce of the surrounding country, which was eminent for its productiveness in corn as early as in the time of Caesar (Bell. Gall., 1, 10). Toulouse is celebrated also for its ducks' liver pies, of which a great number are sent to other parts of France. There are celebrated courses of ducks' liver pies every year, with flowers and salt pork; and eight fairs, including four of eight days each, and two of three days; one of the eight-day fairs is an important fair for wool and woollen cloth. The coronation of the duke of Toulouse is the feast of the Court Royal, whose jurisdiction comprehends the departments of Ariège, Haute Garonne, Tarn, and Tarn et Garonne, and of an Académie Universitaire, which has authority over the same departments: it is the head-quarter of the provinces of the departments of Haute Garonne, Hautes Pyrénées, Gers, and Tarn et Garonne. It has an assize court, a chamber of commerce, a tribunal of the procureur, a royal and an ex-archiepiscopal palace, a court of justice, a mint, and several fiscal government offices. There are a royal cannon foundry, an arsenal, and an artillery school.
TOUP, JONATHAN, was born at St. Ives in Cornwall, in December, 1723, and was partly educated at a grammar school in that town. He was afterwards entered at Exeter College, Oxford, where he took his bachelor's degree, but his master of arts degree he took at Cambridge. Toupet entered the church, and obtained successively the rectory of St. Giles, Cambridge, and a prebend of Ely Cathedral. He died on the 19th of January, 1783, in his 72nd year, and was buried in St. Martin's church.

Toupet was an accurate scholar, and one of the best English grammarians; in the middle of last century, in which he is best known is his 'Emendations of Suidas,' the first volume of which was published in 1739, under the title of 'Emendationes in Suidam, in quibus plurimis locis veternam Graecorum, Sophoclis et Aristophanis Imprimis, cum explicationes et notis.' The second volume followed in 1740, and the third in 1742.

In 1745 Toupet published his 'Epistola Critica ad virum celeberrimum Gulielmum episcopum Glocestri-
The least Trojan have mentioned Spelman, all celebrated in vv. torneare, H., but the resemblance lost in a man, it is only intended to give a culminated party an opportunity of showing that he possesses enough of that essential quality to entitle him to exemption from reproach on any other account.

The origin of the tournament as we have seen, has been carried back at least to the Roman times. Virgil's description is, in some passages, not unlike what the name would lead us to suppose the tournament may now be. But the resemblance in which of Troy is certainly better preserved in the evolutions of a modern review, in which the charge, and mêlée, and retreat of cavalry are exhibited, than it was in what the tournament is known to have actually become. The tournament, like the other customs of chivalry, must be properly considered to have taken its rise after the establishment of the feudal system. Some writers attribute the invention of the tournament to the emperor Henry, surmised the Fowler, who in 1036, and another common account, given on the authority of the Chronicle of Tours, and the Chronicle of St. Martin of Tours, is that its inventor was Geoffrey of Preuilly, ancestor of the counts of Anjou, who died 906. Du Cange, in his Dissertations De l'Origine et de l'Usage des Tournois, at the end of his edition of Joinville, quotes various notices of tournaments held before the age of either of these personages—a among others one which appears at the earliest interview between Charlemagne and Charles the Bald of France, at Strassburg in 841, as mentioned by the contemporary chronicler Nitard. Geoffrey of Preuilly perhaps introduced the tournament into France. From the time of Henry II. it appears to have passed to the English and the Germans, and, in a later age, to the Italians and the Greeks. Tournaments are said to have been first practised by the English in the time of Stephen; but they were forbidden by Henry II. they had been been formerly against it. It was not till the reign of Richard Coeur-de-Lion that they were properly established in this country. The flourishing age of the tournament, here as well as in France and elsewhere, in the middle of the fourteenth century, and it continued in frequent use down to the middle of the sixteenth, and was not altogether abandoned till a considerably later date, although the few tournaments that were held in the latter part of that century were rather such mere shows or spectacles as have been sometimes exhibited under the same name even in our own day, than the real combats which were so called in an earlier age. The accident of Henry II. of France meeting his death at the battle of Truigny at once occasioned the abolition of the practice everywhere as well as in France; but the spirit by which it was formerly kept up had long before this been decaying under the influence of the Middle Ages, at least from the middle of the preceding century, had been operating a general change in the social condition of Europe. Among the physical causes in question the chief may be considered to have been the introduction of fire-arms into war; among the moral, the extension of the commercial spirit; and the rise everywhere of a new literature, together bringing with them other habits, other tastes, another civilization. The church, however, it may be observed, which had set its face strongly against the passion from about the middle of the twelfth to the middle of the thirteenth century, prohibiting persons from engaging in them by some of its decrees on pain of excommunication, and denying Christian burial to such as lost their lives in these contests, had long been reconciled to them, and for some ages had rather cherished and encouraged the practices than otherwise.

Tournaments were usually held on the invitation of some prince, which was not always proclaimed by his heralds that they were to issue out his own dominions, and at all the foreign courts or other places whence it was expected or desired that parties might come to take part in the martial competition. A few points essential to the form of the tournament, consisting in the fixing the list (or boundaries within which the fighting was to take place), in offering and accepting the challenges, in declaring the issue of each encounter, and in assigning and bestowing the prizes (which last office was often performed by female hands), cannot be attempted here.

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All these particulars, together with the usual laws or regulations of the combat, and the mode of fighting (which was commonly with lances and swords, and in the first instance always on horseback, although parties who were dismounted frequently continued the contest on foot), may be most conveniently learned from the many accounts of tournaments in Froissard and other old chroniclers, or even from such fictitious narratives as the 'Knight's Tale of Palamon and Arshte,' in Chaucer (or Dryden's paraphrase of it), or that of Sir Percival in Spenser, and Ivanhoe, in Scott. There is a passage in his 'Essay' on Chivalry ('Miscellaneous Prose Works, vi. 60, &c.), remarks that it is a mistake to assume, as has been done by Cervantes among others, that the combatants at the turn of the 14th century were always knights; the more distinguished among the esquires, he shows, were frequently admitted to that honor. In another part of this 'Essay' (pp. 44, 45), Scott represents the dangers of the original tournament as having been subsequently modified by the introduction of arms of ceremony, as they were termed - lances, namely, without heads, and with round branches of wood at the extremity, called roosters, and swords without points and with blunted edges. According to Ducange, in the 'Dissertation des Armes à Outrance, des Jousters, de la Table Ronde, des Beurhouds, et de la QuinQuaine,' in his edition of Joinville, the arms of ceremony, {	extit{armes courtoises}}, which he compares with the {	extit{lausoria arma}} and {	extit{lausoria cela}} mentioned by Seneca, were formerly used, but were afterwards exchanging for those with sharpened edges and points, which were denominated {	extit{armes d'outrance}}. {	extit{Outre}} means properly to pierce an enemy with sword or lance; and at tournaments one of the principal objects was vanquishing him, either by being killed, or by surrendering and asking quarter, or by being thrown out of the lists, the contest was said to be outre- le gage de bataille était outre.

The distinction between tournament and a joust, or just, is not very clear. Ducange makes the joust to be properly a simple combat or duel, whereas in a tournament a considerable number of combatants were commonly engaged on each side. But this distinction is certainly not considered in the use of the words by our English archaeologists, Spielman, who defines {	extit{tornaire}}, "gladiis conceutere, justus facere, hastitudinem exercere," does not appear to have been aware of it. The term joust or just has been derived, improbably enough, from the Latin 'justa,' near to, because, say the etymologists, the combatants here fought hand to hand. It is no doubt, connected with the verb to justle, or jostle (in French, {	extit{jouster}}), though possibly the original word may be best preserved in the Italian form {	extit{giustare}}, which the Byzantine writers have imitated in their {	extit{czerpera}} and {	extit{czerpera}}. There was also the species of single combat termed a {	extit{pas d'armes}}, or passage of arms: it was actually and literally that Henry VIII was killed. On the subject, besides the works quoted above, the reader may consult the 'Traité des Tournois, Jousters, Caroussel, et autres spectacles publics' (par Claude François Menestre, 4to., Lyon, 1659); and 'Mémoires sur l'ancienne Chèvre-Hufleterie, considérée comme un Établissement politique et militaire,' par J. B. de la Curne de St. Palaye, 8 tomo, 12mo., Paris, 1769-1781.

TOURNAY, or DORNIK, or DOORNIK, an important town in the province of Hainault, in the kingdom of Belgium, 48 miles south-west of Brussels by Hal, Enghien, Ath, and Leuze. This town was mentioned by Jerome in the beginning of the fifth century, under the name of Tornet, as being among the places which had been set on fire by the Saracens. It was amongst the towns early acquisitions of the Franks; and was the capital of the as yet infant empire of Clovis. It underwent various changes in the middle ages, and was besieged and taken (A.D. 1552) by the Duke of Mantua, and afterwards overthrown by the French; and was ceded to a castle here. Having reverted to the French, it was again taken (A.D. 1521) by the count of Nassau, one of the generals of the emperor Charles V, and ceded by the treaty of Passendale (A.D. 1555) to the emperor. During the religious troubles of the Netherlands, the Protestants committed great disorders here (A.D. 1566); and the town, having joined in the revolt against Spain, was taken (A.D. 1581) by the duke of Parma, and remained under the dominion of the Duke of Parma (A.D. 1582) until 1600, when it was taken by the French by the peace of Aix-la-Chapelle (A.D. 1668); but having been again taken (A.D. 1709) by the allies under Marlborough and Eugene, it was at the peace of Utrecht (A.D. 1713) ceded with the rest of the Spanish Netherlands to Austria. It was taken (A.D. 1745) by the French under Louis XV, but restored at the peace of Aix-la-Chapelle, A.D. 1748. It was repeatedly ceded to France by the treaty of the French revolution; and has changed masters with the rest of Belgium several times.

This town is situated on the Schelde, which here forms the boundary between two parts of the country on the left bank and the new town on the right. The old town occupies the site of the Tornac or of the antients: the new town is of later origin and is distinguished from its predecessor by its gridiron plan of its streets, by its well-built houses, and by its handsome quay planted with trees, which forms the most frequented promenade of the city. The cathedral of the old town is a large and fine Gothic building with several towers (one of our authorities says four, another five) surmounted with spires. The interior of the church is adorned with the richest carving and other ornament.

The tomb of the Frankish king Childeric I. was discovered nearly two centuries ago, near the cathedral, seven feet below the surface of the ground; a number of coins and other antiquities were found. The church of St. Martin, the Episcopalian palace, the town-hall, the bell-tower, and the hospital for endowed students are reputed to be among the most ancient in France. The old town is fortified, and is entered by seven gates: it has several suburbs.

The population of Tournay is not adequate to the size and extent of the town; it numbers about 13,500. The manufactures of the town are important, and comprise cotton-yarn, printed cottons, dimities and other cotton goods, carpets, hosiery, linen, awaskin, paper, leather, earthenware, porcelain, oil, liqueurs, especially Cévennes, Buzençon, &c. There are a number of glassworks, and glass kilns, and (at least) four large flour-mills, built by Vauban, a considerable trade is carried on. There are a subordinated court of justice, and a commercial court, a chamber of commerce, and an academy of drawing, sculpture, and architecture, in which instruction in outline drawing is given; an orphan-house and some schools of mutual instruction, five hospitals, and several churches. Limestone and sandstone are quarried in the neighbourhood. Tournay is the seat of a bishopric which dates from the latter part of the fifth century; the bishop is a suffragan of the archbishop of Mâcon and Grenoble.

TOURNÊFORT, JOSEPH PITTON DE, a celebrated botanist, was born June 5, 1656, of a noble family at Aix in Provence, in the present department of Bouches du Rhone, near Marseilles. He was gifted with a great taste for observation, the study of nature soon disgusted him with all other calling, and theology, in which he was employed, in order to please his relations, who wished him to enter holy orders. The death of his father, in 1677, enabled him to follow his own inclination; and having exhausted the hedges and hawthorns of his own country and the garden of an apothecary, he went to the Alps, in order more fully to satisfy his curiosity. At Montpellier, whither he had gone to study medicine, and where he was received by Magon, and became the friend of Chiraz, he found fresh stores of information, which he collected still richer from the Cévennes, the Pyrenees, and from Catalonia, to which places his zeal carried him. In these excursions he was twice robbed by the Spanish and French; once by a band of robbers from the coast of Algeria, with his books; he was buried also for two hours under the ruins of a hut where he was passing the night; and thus he seemed to be incurring himself to the fatigues he was one of the first botanists, who at the beginning of the 17th century, who possessed the two necessary qualifications for the rank, placed him above jealousy; and Tournefort found in him a disinterested protector. In 1683 he was appointed assistant professor with Fagon at the Jardin du Roi, whose botanical garden he enlarged. He is celebrated for his knowledge and merit: his character, as well as his works, were of the highest estimation. In 1687 he was President of the Academy of Sciences. In 1691 he was appointed professor of botany, and in 1694 of pharmacy, at the University of Paris. In 1697 he succeeded his brother, who had died, as President of the Academy, and in 1700 as President of the Royal College of Physicians. He died in Paris, July 25, 1734, and was buried in the chapel of St. Louis in the church of St. Louis, in Rue St. Louis, just off the Rue St. Honore. He left an edition of the 'Flora de Villari'; he wrote some Botanical works; and his name is connected with the first part of the French dictionary of the Academy of Sciences. He was a member of the Royal Society, and a corresponding member of the Royal Society of London. He died in Paris, July 25, 1734, and was buried in the chapel of St. Louis in the church of St. Louis, in Rue St. Louis, just off the Rue St. Honore. He left an edition of the 'Flora de Villari'; he wrote some Botanical works; and his name is connected with the first part of the French dictionary of the Academy of Sciences. He was a member of the Royal Society, and a corresponding member of the Royal Society of London.
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a crowd of students to his lectures and herbarizing excursions. In 1688 he was commissioned to travel through Spain and Portugal, and shortly after through Holland and England, which he visited with the express purpose of observing the plants of these countries. These travels made him acquainted with the most distinguished scientific men of the countries he visited, and gained him their friendship and esteem. Being made, in 1692, a member of the Académie des Sciences, he was sent to the island of Georgia, in the Black Sea, Georgia and the environs of Mount Caucasus, Asia Minor, and Armenia. He was preparing to go to Egypt, when, hearing that the plague was ravaging that country, and that his patron Fagon was dangerously ill, he hastened back to his own country, to which he was called both by gratitude and friendship. Having resumed his duties at the Jardin du Roi, and being also appointed professor to the Faculty, he spent the little spare time he had by investigating the most critical part of his system of grouping up different works, especially the account of his travels in the Levant. The fatigues of work and his travels had much weakened his originally robust constitution, and a violent blow which he received on the breast from the accident of a fall, a few days after the 1st of July, 1698, which, after lingering some months, left him in his hospital the 28th day of November, 1708. By his will he bequeathed to the king the valuable zoological museum which he had formed, and his library to the Abbé Bigot.

A judicious and lively mind, and a natural gaiety of disposition, rendered Tournefort equally fitted to succeed in scientific investigations and to form the charm of his friends in society. His attachment to his own country made him refuse the solicitations of the German, who wished to have him for his successor, and offered him, in the name of the states of Holland, the situation of professor of botany at Leyden, with a salary of 4000 francs (300£). The system of Tournefort was an advance on those of Celsalpino, Morison, Hermann, Ray, and Rivinus, but has since been displaced by those of Jussieu, De Candolle, and others. Authors who had previously only employed themselves in grouping plants into classes; the more important divisions of the genera, was still almost entirely wanting. It is this subdivision of the subject which Tournefort executed with such admirable acuteness, and which distinguishes his labours from all that had gone before. He has introduced into his system a notation simple, easy, and almost always natural, which caused his method to be afterwards adopted by the botanists of all countries.

Tournefort adopted the principle that genera should be constituted on characters derived from both the fructification and organs of vegetation. In seeking for order he had the good sense not to pretend to an absolute regularity, which nature nowhere presents; and felt (which has been too often forgotten in our day, and which has introduced into the natural history so many useless genera, and so many parasitical denominations) that the generic characters must admit of exceptions which are commanded by nature itself. Linnaeus, when again referring to the same line of reasoning, first rejected the whole genus of Tournefort; but having constructed his genera on characters derived from the fructification alone, he was obliged to reject many of Tournefort's genera. The principle of Linnaeus is now generally acted on. In other, less natural plates where the Linnaean has given characteristic of the genera are, even to the present day, for the most part, the best means of understanding them: they are well executed, and upon a plan at least as good as that of Tournefort; but in order to satisfy his taste, as well as of his spirit of order and observation.

Although he did not think that the consideration of the natural relations of plants (of which the first glimpses were to be met with in the works of Label and Magno) was the only part of the herbarist's business, he generally observes the most marked of these relations, and the greater part of his classes form one or more large families. The separation of the woody from the herbaceous plants, which nature frequently offers together in the same genus, and which was admitted by the botanists of Tournefort's time, is in his system a defect which all subsequent naturalists have endeavoured to correct. The precipitation of plants has long since caused botanists entirely to abandon their systems of classification, however much advantage may be derived from it for practical purposes.

Tournefort did not do for the species what he had so well accomplished for the genera; as he left confounded with them simple varieties, even those which are evidently only the result of cultivation. Neither did he think of giving them names more convenient than those which were in use, and which were commonly vague, and very often long and complicated. These inconveniences Linnaeus got rid of; and at the same time he arranged the vegetable kingdom according to his celebrated sexual system, in which plants were ranged in classes and orders according to the number of stamens and pistils. But the system of Tournefort was never abandoned in France, and the study of its principles resulted in the labours of Adanson, Jussieu, and De Candolle, whom we are so greatly indebted for the present position of systematic botany.

The *Institutiones Rei Herbariae* is distinguished for its clearness and precision, and for a number of very just observations. The author frequently points out the most considerable, displays much solid learning, which has been of great use to those who have since his time written on the history of botanical science. The different travels of Tournefort enriched botany with a great number of genera and species, which he brought from his travels in the East more than thirteen hundred plants, the greater part of which were in the herbarium of Gundelshheimer, his companion, and have been since examined by Wieldenow, who has mentioned them in his *Species Phantasm.* If the history of the plants in the environs of Paris, by Tournefort, divided into six herbarizations, is of little importance as to the number of species described (which is only four hundred and twenty-seven), still it is a very valuable work, written by the exactness of the synonyms, and by the skill with which the plants are referred to the nomenclature and to the plates of the present botanists, whose errors Tournefort corrects, this work furnishes an excellent model of criticism. There is also to be found in it a faithful description of some rare plants, which are omitted in his other works. Hoffer however rather over-estimates its value, when he is inclined to regard it as the chief of Tournefort's writings (*p. principium fortis Tourneforti opus*). One may judge of Tournefort's reputation, and of the value that was put upon whatever he wrote, from the fact of his lectures on Materia Medica having being translated and translated into English before they appeared in French. This was not till some years after his death. The account of Tournefort's travels was for a long time the source of our most important knowledge of the country.

Among the manuscripts left by Tournefort was a botanical topography of all the places which he had visited, and a large collection of critical and other observations, which has never been published, though it was entrusted to Régnier for the purpose. Some of this material, which the French botanists, to which Pluvinet, out of honour to his master's memory, gave the name of 'Tournefortia,' derives its chief interest from this celebrated name. [TOURNEFORTIA.]

There are few of the scientific men of France whose reputation has extended more widely than Tournefort's, and who have done more honour to their country. A judicious and methodical mind, an ingenious acuteness of perception, and a strong taste for the noble pursuits of science, are his peculiarities. If he had not the profound and original genius of Linnaeus, nor such an extensive knowledge of nature, in botany at least Tournefort's name still continues, in spite of the revolutions of science, to be one of the highest which can be found in the kingdom. The country is in the addition the glory of having opened to him, by the creation of the genus, the extensive field which he afterwards traversed.
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The following is a list of Tournemont's principal works: —

Plantes, a Memoire pour compte de la Commission de la Plantes, 1694, 3 vols. 8vo., with 451 plates. Contains, which, with several

imperfections in this work were pointed out by Ray, to whom Tournemont replied in a Latin work, entitled 'De Optima Methodo Instructanda in Re Herbarum ad Sapientem Veniamque Ingenuam,' in which the author

included his reflections on the Caesars, and in the Preface of one of the editions, Tournemont said: "For the use of the sciences, this has entitled 'Institutiones Rei Herbariae,' ed. altera, Gallice longe acceptissima,' Paris, 3 vols. 4to., with 476 plates. After his expedition to the East he published 'Corollarium Institutionum Rei Herbariae, in quibus Plantae 1596... in Regionibus Orientalibus observatae,' and added a new and revised edition of this work, Paris, 1703, 4to., with 13 plates. This was afterwards added to Ant. de Jussieu's edition of the 'Elements,' in 1719, Lyons, 3 vols. 12mo. 'Histoire des Plantes qui nais-

sent aux Environ de Paris, avec leurs Usages dans la Medicine,' Paris, 1698, 12mo. An improved edition of this work was given by Bernard de Jussieu, in 2 vols. 12mo., 1725; and an English translation was published by Martyn, London, 2 vols. 8vo. in 1732. 'Relation des voyages de Lévan, fait par M. Pinot, contenant l'Histoire Ancienne et Moderne de plusieurs Iles de l'Achipel, des Plantes des lieux les plus considérables, et enrichie de Descriptions de Figures de Plantes, d'Animaux, et d'Observations touchant l'Histoire Naturelle.' The first volume of this work was printed at the Louvre before his death; the second was completed from his manuscripts; and both were published in 1717, 2 vols. 4to. There have been several French editions, and it has been translated into English of Langois, 1-3 vols. 8vo. 'Traité de la Médecine Medicale, ou l'Histoire et l'Usage des Médicaments et leur Analyse Chimique. Ouvrage posthume de M. Tournemont, mis au jour par M. Berrier, Paris, 1717, 2 vols. 12mo. This work, which was not published in French until after the death of the author, had been already translated and published in English, London, 1708 and 1716, 8vo. (Biographe Medicale.)

TOURNEFORT, a genus of plants of the natural family of Cactaceae, so named by Linnaeus in honour of Joseph Pinton de Tournemont, celebrated as the author of the 'Institutiones Rei Herbariae,' which is the chief foundation of the method of arranging plants afterwards extended and formed into a system by Jussieu. He was also author of 'Travels in the Levant,' and of other works. The genus Tournefortia is characterized by having a salver-shaped or rotate corol, of which the throat is naked; the stamens are within the tube of the corol. The stigma is peltate, and the fruit consists of a berry which contains from three to four 1-seeded nuts. The species are about fifty in number, containing small shrubs or herbs, diffused through the hot parts of the world, as the West Indies, South America, India, and the isles of the south sea. The flowers are conspicuous, and the plants, though easy of culture, are seldom worth it; but T. loxenatis, a native of Quito, at an elevation of 6000 feet, is a shrub which, like the Heliopa-

ture, is of a most elegant stature.

TOURNEMINE, LE PEIRE RENÉ JOSEPH, Jesuit, occupies a subordinate but useful and honourable position in the literary history of France. He belonged to an ancient family in Brest, and was born at Rennes on the 26th December, 1696.

In 1690, at the age of nineteen, he entered the Society of the Jesuits. His superiors thought that his peculiar talents qualified him for a teacher, and his subsequent career showed the correctness of this opinion. For more than twenty years he taught in different colleges of the Order, with eminent suc-

cess, humanity, rhetoric, philosophy, and theology; and while thus instructing others he was accumulating information in the belles-lettres,—physical, moral, and meta-

physical, chemical, historical, theological, metaphysical, and mathematical—that was to fit him for the employment of nearly twenty years of his matured intellect.

During the period of his life which was spent in dis-

seminating the duties of a teacher, he was regarded by his brethren as possessed of an active and penetrating mind, a lively imagination, which sometimes overcame his judgment, and a fervid but not ascetic spirit of devotion. In the colleges he undertook voluntarily the superintendence of the religious studies and exercises of the pupils; and he extended his watchfulness not only to the students in the colleges, but to those who attended his seminaries. The nobility received the rudiments of the education under the direction of the Jesuits.

In 1701 Tournemine was called to Paris to take the Manage-ment of the 'Journal de Trevoux,' a periodical publication of the Academy of Sciences. It was a journal of narrow views and unamiable temper of sectarianism, and rendered services to literature that entitle it to a better reputation than the equivocal one in which it is held by his contemporaries. It was in the society of Voltaire. Tournemine was the principal editor of this work for nineteen years, from 1701 to 1720. He contributed to the journal during this time a number of curious dissertations and analyses which procured for it a high reputation for erudition. He was a fervent admirer of the spirit of many of his brethren, he was sufficiently impartial to combat the systems of Houdouin and Panel; and from bigotry, although sincerely religious, he raised the 'Morceau' of Voltaire, and even when engaged in controversy with its great author, always treated him with respect.

In 1720 he was freed from the laborious task of editorship, but still continued to contribute largely to the 'Journal de Trevoux.' He had written a great number of essays on studies to which, as teacher and editor of a critical journal, he had found it necessary to turn his attention, and he had produced in him a salutary habit of thought and discourse peculiar to a scholar who did not sacrifice opportunities, and who never tired of investigating details, and the episodic inquiries into which he was continually seduced, diverted him from the completion of the work he had undertaken, and he failed to perform his engagements.

Tourneville died at Paris on the 16th of May, 1739, in the seventy-ninth year of his age, regretted by all who knew him. He has left no work worthy of his talents and opportunities, yet he has not been without influence upon posterity. He was a teacher of rhetoric, and in the conversation of private society, he prompted and encouraged many young writers. His knowledge was at the service of everyone who asked it, and the information which he did not possess, he procured for others. He was ever ready to material service to others. He belonged to a class of mind which, although they leave little or no permanent trace of their individuality, are indispensable to the creation of a national literature—those who go to form a literary public animating and instructing writers by their sympathy and subordinate co-operation.

A list of Tournemine's writings is given in the forty-

second volume of the 'Memoires de l'Academie,' and in the Dictionary of Chaumet. They consist chiefly of his con-

tributions to the 'Journal de Trevoux.' He contributed the chronological tables to the edition of the Bible published by Duhamel in 1706. He published in 1719 an edition of Menochius's 'Scriptural Commentaries,' to which he appended a system of chronology and twelve disserta-

tions on different points of the chronology of the Bible. In 1720 he published an edition of Pridaux's 'History of the Jews,' and added to it a dissertation on the pages of 'The History of England.' He inserted some remarks upon the ruins of Nineveh and the destruction of the Assyrian empire. Tournemine's 'Réflexions sur l'Atlantide' were printed as an introduction to two editions of Dometius's 'Tractat sur l'Existence de Dieu,' and in 1726, his 'Réflexions sur le Deel,' which had already appeared, was published in the 'Journal de Trevoux' (October, 1725) a letter on the immateriality of the soul, which does not appear to have convinced the philosopher. Sketches of the life of Tournemine are contained in the 'Journal de
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TROUVES for September, 1739; and in Belting's Observations sur les Erivaines Modernes, vol. xvii. There is also an inscription, prefixed to his biography of him by M. Weiss in the Biographie Universelle.

TOURNEUR, PIERRE LE, was born at Valognes in 1736; he studied in the college Des Grassins at Contances, and in his youth attempted to remove to Paris about 1767 or 1768, with a view to earn his subsistence by literary labour. His history from that time till his death, in 1788, is little more than an account of his publications and the reception they met with.

He published in 1768 a thin octavo containing a few prize essays which had been crowned by the academies of Montauban and Besançon in the years 1766 and 1767; but after his death Perron, who was unsuccessful in the competition of the French Academy in the latter year, this seems to have been his only attempt at original publication, with the exception of a number of prefaces and some verses in two little volumes, entitled 'Jardins Anglais, ou Vanités tant originales que traduites,' which appeared in 1788. His original composition betrays an entirely common-place mind.

In 1769 Le Tourneur published a collection of tales translated into the English, of no other medium with some sense of his which attested little or no attention. Towards the close of the same year, or in the beginning of 1770, he brought out a translation of 'Young's Night Thoughts' and miscellaneous poems, which was more successful. He has taken upon his shoulders the task of rendering the works of German passages, and altering the whole arrangement of the poem, with a view to render it less startling to French taste. Grimm sneered at the work, but Diderot and Laharpe deemed themselves warmly in its favour. 'The first edition,' says the former, 'has been exhausted in a few months, and they are preparing a second. It has been read by our petits-maîtres and petits-maîtresses, and is no slight manner to personalize a gay and frivolous people. It can remind us. He says in a later letter, 'This translation, full of harmony and varied expression, one of the most difficult to execute in any language, is one of the best that has been executed in ours. The success of the translation has done much to establish the reputation of Le Tourneur, to confine himself in future to that kind of employment.

His first undertaking was a complete and accurate translation of the dramatic works of Shakspere. In this enterprise he was associated at first with the Comte de Cuetan and Fontaine Malherbe, both of whose names are subscribed with his in the dedication to the king, prefixed to the first volume. But his associates deserted him ere the second volume containing eighteen was the unaided work of Le Tourneur. The first volume appeared in 1776; the last in 1782. It is difficult for an Englishman to judge of the merits of this translation to this source of material. He feels the unavoidable defects too strongly. Thus much however may be said of Le Tourneur's, that it honestly aims at giving Shakspere as he is. The translator has evidently benefited by his knowledge of the German translation by Eheeburn (Zürich, 1774-87), and has prefixed the remarks of that critic to several of the plays.

The version is in prose, and by a prosaic mind, yet enough of Shakspere remains to impress minds which have not been accustomed to him with the greatness of his genius. It is still the best French translation of Shakspere, and as such has been revised and republished by M. Guizot in 1824. Some expressions in the prefatory discourse excited the anger of Voltaire, who thought he saw in it an attempt to deify the merits of the great French dramatists. The controversy to which Voltaire's denunciations gave rise was of advantage to the work by creating a public interest in it. Le Tourneur seems to have taken advantage of it; for, it not only proceeded through the ninth volume he quietly observes, 'This work has triumphed over the absurd hostility declared against it at its first appearance, and the extraordinary warmth of a great writer. The improvement of the work has been therefore great, as he was unknown, his unaccountable enemy since he had been translated.' Of the original subscribers to the quart edition a large proportion were English: the sale however increased as the work advanced; a quarto and an octavo edition were published simultaneously: and Le Tourneur, who seems to have become publisher as well as author, ventured on the speculation of publishing in numbers, by subscription, 'Philoxérius' of the same author.

The translation of Shakspere was far from being the only employment of his author during the time he was engaged upon it. In 1770 he published a translation of 'The Steward's Tale,' in La Tombe, in 1771, a translation of Johnson's 'Life of Science;' in 1773, an abridgment of the same author's 'Life of Thomson;' in 1777 he published a translation of Macpherson's 'Ossian;' in the same year a translation of Sacchi's 'The Evidences of Christianity;' in 1778 a translation of 'Clarissa Harlowe;' in 1778, a translation of 'Interesting Memoirs of a Lady;' and his translation of Pennant's 'Description of the Arctic Regions' appeared the year following the 'Universal History' begun by Psalmanazar, which some young authors had undertaken at his suggestion.

These are his most important publications. They deserve a place in the history of letters, inasmuch as they contributed to nourish that taste for English literature which was then growing in France, and which has contributed so much to modify not only the taste, but the character of the nation. Diderot, the first to recognise the merits of Le Tourneur, was the first eminent author of France who really felt the merits of English imaginative writing; his sanction encouraged others to feel, or affect to feel, its beauties. Le Tourneur had the principal share in enabling merely French readers to judge in some measure for themselves, what the literary taste of the nation had become assimilated to England since the time of Diderot and Le Tourneur, but it has been since their publications entirely revolutionised. Gollé, in his 'Dictionnaire Universel,' and his 'Hameau du Neuf,' has explained the influence which Diderot exercised over the modern literature of Germany, both by his own writings and by directing attention to English authors. It was in part through the medium of French literature that the English literature was enabled to exercise an influence on the literature of Germany. The part which Le Tourneur played in this intellectual revolution was an humble but still an important one.

It has been intimated above that Le Tourneur in translating Shakspere was indebted to Eheeburn, and this of itself would imply that he was acquainted with the German as well as with the English language. He published some translations from the former in 1787, one of Sparrmann's 'Journey to the Cape of Good Hope;' in 1788, one of the 'Memoirs of Baron Trench.' In 1783 he translated and published a selection from the Éléges of Ariosto.

The persevering industry displayed in this brief recapitulation of what was accomplished by Le Tourneur in the space of eighteen years, would lead to the inference that he must have secured an independence by his labours. In 1796, however, he became a member of the Academy, which, under the appointment of private secretary to Monsieur, afterwards Louis XVIII.; and for a short time before his death that of censor-royal. He died on the 24th of January, 1788. An anonymous biography is prefixed to his 'Jardins Anglais;' and M. Weiss has contributed a correct outline of its leading incidents to the Biographie Universelle. Le Tourneur had not the slightest pretension to the character of a man of genius, but he was a respectable and useful labourer in the field of letters.

TOURNIQUET is a peculiar kind of bandage applied to the limb for the purpose of arresting the current of blood through its main artery. It is employed for this purpose in several cases, but especially in amputations of parts of the limbs, where large arteries have to be suddenly cut across. Before the invention of the tourniquet surgeons used to constrict the limb with a simple tight bandage; but, although this plan may well be resorted to in an emergency, it does not cut off the current through the veins more than that through the arteries, produces an extreme engorgement of the limb, and in amputation permits severe hemorrhage. A tourniquet to prevent such accidents was invented by Weiss, and the first instrument for the purpose of the tourniquet was invented by Jean Louis Petit in 1718. Since that time various changes have been introduced, but at present the construction of all tourniquets is simply
similar. They consist of a very tough band, about an inch and a half wide, upon which there is a movable leather pad, to be placed immediately over the artery on which it is desirable that the chief pressure should be applied. For this purpose the surface of the pad must be directed towards the bone of the limb, that the artery may be pressed firmly against it. The rest of the band is passed round the limb and is fastened by a buckle.

It is tightened and loosened by means of a bridge of buttons, by the middle of which is a hole falseable in being placed a screw passing through it, and at the ends of which there are two small rollers, around each of which the band is made to take a half turn. In use, the bridge and screw are applied to the opposite side of the limb to the pads above mentioned.

The tourniquet is now not so generally used as formerly. Many surgeons prefer to have the artery compressed during an amputation by an assistant; because the tourniquet is not free from the objection of compressing the veins as well as the artery, and is liable to accidents which cannot be instantly repaired. An instrument has also been recently invented by Signor Signorni, a surgeon at Milan, which, seems, likely to supersede the tourniquet altogether. It is composed of two arches of steel, connected by a hinge at one end, and each bearing at the other end a pad. By an Archimedean screw ingeniously placed at the hinge, the pads can be approximated and separated like the ends of the bow of a pair of calipers, and thus can be irremovably fixed in any position. In use one pad is put over the artery, and the other on the opposite part of the limb, and the screw is worked till, in their tendency to approximate, the pads have sufficiently compressed the artery, upon which alone the pressure is thus made to fall.

As already said, in an emergency, such as that of a wound of any of the large arteries of a limb, when medical aid is not near, the old-fashioned tourniquet should be instantly applied. A piece of strong tape or cord should be tied in a double knot round the limb above the wound; or a piece of wood, or anything firm, should be then passed under it, and twisted, just as packers tighten the cords round the forearms, till the blood has served to compress the limb. For hemorrhage from large veins or small arteries this tourniquet should not be employed, but simple pressure with the finger or the hand.

TOURNON, a town in the department of Ardèche in France, on the right bank of the Rhône, 33 miles south-east of Paris by Lyon, Vienne, and Tain, which last town is on the left bank of the Rhône, immediately opposite Tournoy, with which it communicates by a suspension-bridge of iron spans, the first erected in France on a large scale. The town consists of ordinary houses; the college is the only public building of any pretensions; but there is a handsome quay along the Rhône. On the north side of the town is the site of the town of Soubise; and at a little distance north of the town is a handsome bridge of one arch over the Doux, which joins the Rhône just above Tournon. The population in 1831 was 5,150 for the town, or 3,971 for the whole commune. The townsmen manufacture leather and silk, and trade in the woollen cloths manufactured in the neighbourhood, in wine, timber, and chemicals. There are one or two government offices, a college or high school, which in the time of Napoleon was in high repute for its excellent management, and an agricultural society. There are eight fairs in the year. The arrangement of Tournon comprises 124 communes, and had, in 1831, a population of 12,500.

TOURNUS. (Saône et Loire.)

MARIE-CLARICE, MARIE-ANTOINE-LOUIS CLARET DE LA, naturalist, was born at Lyon in August, 1729, where his father was commandant of the city. Prévôt des Marchands, and President à la Cour des Monnaies. He commenced his elementary studies at a college of Jesuits in Lyons, and afterwards sent to the Collège de France, and the court at Paris. He was early admitted a member of the Academy of Sciences at Lyon, and during the last twenty-five years of his life acted as secretary to that body. On the death of the last citizen he was elected a Correspondent à la Cour des Monnaies, but he pursued the study of the belles-lettres with great assiduity. Dissatisfied however with the tendency of these studies, he engaged in the natural history. He commenced with zoology and botany, and soon formed a large collection of insects and minerals. The establishment of a school of veterinary science in Lyon, by the solicitation of the nobility, at which he was teaching, he resigned, and devoted himself to botany. In conjunction with the Abbé Rozier, he was appointed to superintend the formation of a botanical garden, and the giving instruction to the pupils in botany.

The result of these exertions was the publication of a work on 'Démonstrations Elémentaires de Botanique,' 1805. This work, in two volumes, contained a general introduction to knowledge of the structure of plants and their arrangement, with descriptive of the most useful and curious plants. The first edition the introductory matter was entirely by Rozier, the description of the plants by Rozier. A second edition nearly the whole was rewritten by Rozier. This work has since gone through many editions.

The fourth consists of four volumes of letters press in 4to, and two volumes of engravings in 4to, containing color of the lives of both Tourrette and Rozier.

In 1770 Tourrette published a voyage to Mount Blanc, giving a geographical account of the district, and a list of the plants which he discovered there. In 1783 he published the 'Chloris Lugdunensis' (4to), in which he described the plants of the neighbourhood of Lyon, and special attention to the best plants of that town. He published numerous papers on various departments of natural history, in the Transactions of Society and Journals. Those most worthy of mention were on the origin of Belemmites, on vegetable monstrosities, and the singular discovery of a meteor, or Conway rock.

He made numerous excursions for the purpose of collecting plants in various parts of France and Italy. In some of these herbarisms he was accompanied by Jacques Rousseau, with whom he was intimate; and he published correspondence of that philosopher are seven letters written to Tourrette. He took great pains in introducing foreign trees and shrubs, which he cultivated; his father's park near Lyon, and at his own residence the garden of Saint-Etienne-du-Mont. He was a correspondent of most of the greatest botanists of his day, as Linnéus, Adamson, Jussieud, and others. During the siege of Lyon he was exposed to fatigue, anxiety, hardship, which brought on an attack of inflammation in the lungs that terminated his existence in 1783.

Tourrette, like most of the botanists who adopted the system of Linnéus, mistook its object, and made it assume a position and importance of which it was untenable. The consequence was that in his 'Démonstrations' and other works he sought more anxiously to add our knowledge of existing species than to elucidate the structure and functions of the vegetable kingdom. He published several volumes of the 'Démonstrations Elémentaires de Botanique.'

TOURS, an important city in France, capital of the department of Indre et Loire, situated on the south bank of the Loire, 124 miles in a direct line S.W. of Paris by the road through Verdun, Châlons-sur-Marne, Beauvais, and Vendôme; or 142 miles by the road through Orleans and Blois; in 47° 24′ N. lat. and 0° 48′ west long.

It was known to the Romans by the name of Cesarodunum; and towards the close of the Roman dominion assumed, like many other towns, the name of the peop. (Turons or Tourons, a Celtic nation) whose capital it was.

It was included in the kingdom of the Visigoths, from whom it passed to the Franks (A.D. 507) by Clovis, king of the Franks. In the feudal period it came, about the middle of the tenth century, into the hands of Thibaud le Tricheur, count of Blois, one of whose successors in the following century held it by a charter of the pope, which was passed by inheritance to the Anglo-Norman kings of England.

It was restored from his son John by Philippe Augustus, and finally ceded to France (A.D. 1289) by Henry III., son of John. Louis XI. had a favourite residence at Plessis-

Tourret, the choir of the chapel of the king, called the Chapel of St. John, where he died A.D. 1483. The remains of his palace are occupied as a farm-house: the chamber in which he died, and in which Cardinal La Balue was confined by his order, are still in use.

The town stands on a flat tongue of land between the Loire on the north, along the bank of which the town ex
and the Cher on the south, which flows a short distance from the town; an arm of the Cher passes into the Loire, and a branch of the Cher does not in the Loire till several miles lower down. Each of these towns is a canal from the Cher to the Loire, and a port for the river trade. Opposite Tours, on the north bank of the Loire, is the suburb of St. Symphorien, which is united to it by a formidable bridge of 608 feet span; the whole length of the bridge, which is horizontal, and, before the erection of Waterloo Bridge, on the Thames, was considered the finest in Europe, is about a quarter of a mile and 40 feet. The avenue by which the road from Paris approaches the bridge, the bridge itself, a new street pierced through the heart of the city, and lined with handsome houses uniformly built of white freestone and roofed with tiles, by which the town is beautiful; the arcades of the town, are in one line, forming the principal thoroughfare, and give to the traveller a higher idea of the beauty of the city. The handsome piazzas or squares at each end of the bridge, and the quays which skirt the water on the town side, above and below the bridge, confirm this impression; but the back streets are narrow, crooked, old lined with poor houses, and present a striking contrast to the beauty of the principal thoroughfare, which divides the town into two parts. The eastern part of the city, and a fine Gothic building, remarkable for the two towers, more than 200 feet high, crowned with ‘domes,’ which adorn the front, and which have produced so much enthusiasm in modern writers. It contains the tomb of Charles VIII. and of his father Louis XII. The archbishop’s palace, near the cathedral, the office of the prefett, the town-hall, the college; and the museum have handsome buildings; and there are several public buildings of less striking appearance, including six other churches. Two towers yet remain of the ancient church of the abbey of St. Martin in the western part of the city; Aleuin was abbot of St. Martin’s in the last part of the eighth century. In the eastern part, on the quay, is an allée of trees, formerly used as a prison, and now merely as a barric. The foundations of this castle are Roman. The town is walled on all sides except towards the river, and has several suburbs. There are some agreeable promenades and several fountains in the town; and near it are two bridges over the Cher, one of seventeen arches and one of eight arches.

The population of the commune of Tours was, in 1820, 81,920; in 1831, 233,255; and in 1866, 266,690. The silk manufacture established here by the care of Louis XI., and which long flourished, is still maintained, though Tours is now outstripped as a manufacturing town by others in the south of France; there are some considerable manufactories, especially guided by the commerce of the Loire; ribbons to a considerable amount are made; silk tramplings and silk stockings are made; and to which articles of manufacture may be added woollen stuffs, carpets, cottons, and silks. The city is governed by a mayor, obliged, according to the law, to conduct the affairs of the city with a council of 21 members chosen by votes. The city taxes are considerable.

TOUSSAINT LOUVERTEUR, one of the noblest revolutionaries known to have been born in the negro race. It is impossible, amid the highly coloured pictures of him which both the love and hatred of partisans have produced, to form a fair estimate of his character. We must therefore content ourselves with recapitulating the leading events of his life as they can be collected from the white-lies of the friends of the negroes, and the somewhat darker-tinted falsehoods of some French republicans.

Toussaint Louverture was born at Breda, a property which then belonged to the Count de Noé, near Cape Town in St. Domingo, in 1743. His father and mother were both African slaves. During the prosperity of Toussaint, a genealogy was compiled, it is inscribed with his privity, which made his father the younger son of an African king. This may be true or not; it is of little consequence.

The first employment of Toussaint-Breda (so called from the place of his birth) was to take care of the cattle on the estate. He received the elements of education from a negro of the name of Pierre-Baptiste. As soon as he could read and write his name, he was promoted by M. Bayon de Lébeaut to the care of the estate.

He gained the confidence of his master, and was appointed to exercise a kind of superintendence over the other negroes. In this position the Revolution found him. He took no part in the first insurrections, and is said to have expressed himself violently against the perpetrators of the massacres of 1791.

The negroes not unnaturally made attachment to the royal cause the pretext for rising in arms against masters who, with equality and the rights of men, are cucurates, still sought to keep them slave. Toussaint, from 1791 and till the appearance of the proclamation of 4th February, 1794, which declared all slaves free, was alike conspicuous for his zeal in the cause of the Catholic religion and of royalty. He held at first the title of Médicin des Armées du Roi, in the bands of Jean François, but soon exchanged it for a military appointment. Though placed under arrest by the chief just named, and delivered by the other negro leader, Basso, the ferocity of the latter determined Toussaint to ally himself most closely with Jean François. He became his aide-de-camp. At this time Toussaint was high in the confidence of the Spanish minister, Don Joseph Garcia, and apparently the Spanish minister, the French minister, and the Spaniards.

When the negroes rejected the first overtures of the French commissioners, Toussaint assigned as his reason, that they had always been governed by a king; could only obey any other authority; but having lost the king of France, had betaken themselves to the protection of Spain.

The proclamation of the 4th of February, 1794, emancipating the slaves, worked a change in his sentiments. He opened a communication with General Laveaux; and receiving the assurance that he would be recognised as a general of brigade, occupied the Spanish posts in his neighbourhood, and repaired to the camp of the French at the Marmalade, and other strong places, and threw confusion into the Spanish ranks. An explanation of Laveaux on learning the consequences of Toussaint’s joining his standard (‘Comment, mais cet homme fait ouverture partout!’) said to have been the origin of the mounting of the soul of a fellow negro, and subsequently adopted. Laveaux, left by the departure of the commissioners governor of the colony, treated him at first with coldness and distrust; and Toussaint, now past his fifty year, refused to join the general, saying that he had reached to all appearance the close of his political career.

In 1795, in consequence of a conspiracy of three of the Maltace generals, Laveaux was arrested at Cape Town. Toussaint Louverture was himself, by the support of the partisans of France, at the head of ten thousand men; marched upon the capital, and released the governor. Laveaux, in the enthusiasm of his
gratitude, proclaimed his deliverer the protector of the whites and the avenger of the constituted authorities. 'He is,' runs the governor's proclamation, 'the black Spartacus, who, Raynal predicted, would arise to avenge his race.' Toussaint Louverture was created a general of division, and was the supreme head of the French army in the colony. When the peace between France and Spain was concluded, Jean François repaired to Madrid, leaving Toussaint the only powerful negro leader in St. Domingo. He reduced the whole of the northern part of the island to the obedience of France, with the aid of a few thousand negroes of St. Nicholas, of which the English retained possession. He was the first who succeeded in establishing discipline among the armed negroes.

The commissioners sent by the Directory to proclaim the constitution of the year 3, confirmed and confirmed and named Toussaint. In April, 1796, Sonthonax appointed him commander-in-chief of the armies of St. Domingo. In the month of August Toussaint proceeded to the Cape at the head of a large body of cavalry on a visit to Sonthonax. The day after his arrival he proposed, at a meeting of the civil and military chiefs, that the commissioners should be sent back to France. Raymond, a Malfeito, was the only commissioner allowed to remain. The civil administration of the colony was confided to him in the first instance, but he soon resigned the charge into the hands of Toussaint. Fully aware of the boldness of the step he was about to take, Toussaint had to remove all suspicions that might arise in the minds of the Directory. He sent two of his children to receive their education at Paris; and along with them Vincent, a chefe de brigade, charged with the task of explaining everything to the Directory. The Directory was perfectly satisfied, and appointed a new commission, at the head of which was placed General Hédouville.

Hédouville on his arrival at St. Domingo showed his suspicions to the negro general by land ing within the Spanish territory. Toussaint was at this time engaged in negotiations with General Maitland for the surrender of the strong places held by the English. It was generally known that Hédouville's staff spoke openly in the most hostile and insinuating terms of Toussaint; nor did any of his officers profess any attachment to the commission, with scarcely any attendants, and professed the utmost devotion to the French government. Hédouville asserted his right as agent of the republic to refuse the power of rallying or refusing to ratify any convention between Toussaint and the British commanders. The negro chief nevertheless received the capitulation of Port-au-Prince, St. Marc, Jérémie, and the Môle of St. Nicholas, without consulting Hédouville. On the day when the Hé drouville had left the island, a negociation took place between Toussaint Louverture and General Maitland. All this increased the distrust of the commission, who showed it by seeking to thwart the St. Domingo chief. Toussaint Louverture persuaded his countrymen to resume their agricultural occupations. Hédouville soon after issued a proclamation denouncing the émigrés and professing to regulate the political relations of whites and negroes. Toussaint immediately issued another proclamation declaring that there were no émigrés among the natives of the island; and that the negroes were de facto free, but that it was desirable they should continue during five years to labour for their old masters, receiving one-fourth of the produce. His partisans were in the mean time industriously spreading the opinion that Hédouville was an enemy to the negroes and to the tranquillity of the colony. An insurrection broke out at the Cape, which was suppressed by Toussaint; but the commission was adhered to, to the number of twelve or fifteen hundred men, took refuge on board three French frigates which were lying off the island, and sailed for France.

The departure was the signal for the breaking out of the animosity between the mulattoes and negroes into acts of open violence. Rigaud, the mulatto chief, sanctioned the massacres committed by his partisans; Toussaint did all in his power to repress the ferocity of his. One strong party, adhered to the mulatto chief, the number of the negroes of another, until Rigaud was shut up in Cayes, the only hold that remained to him. This was towards the close of 1799, and Bonaparte had already assumed the reins of government in France. One of the consequences of the first steps of the French was to send a deputation to Toussaint, composed of his personal friends Raymond and Vincent, and General Maitland. They brought the intelligence that Toussaint was confirmed in his authority; and Rigaud, seeing himself abandoned by his own partisans, embarked with a few of his retainers to seek an asylum in France.

Toussaint kept the summit of prosperity. He assumed much state; and affected to cast a shade of mystery round the circumstances of his early career; and took pride in proclaiming himself the undeliverer foretold by Raynal. He preserved great caution; held council of war, but surrounded himself with a brilliant staff. In January, 1801, he conquered the Spanish part of St. Domingo. He presented to a central meeting of his partisans a scheme of a constitutional government, of which he was appointed governor for life, and by which he named his successor, and to nominate to all offices of government. He exercised this authority to the fullest. He quelled an insurrection of the negroes, and hesitated to punish with death his only son, who was at the head of it. Under his strict but just sway, agriculture and commerce of St. Domingo flourished.

Bonaparte in the meantime preserved an omen silent towards all Toussaint's overtures of friendship. The terms of the latter, disquieted by the coldness of the First Consul, was not tranquilized by the proclamation issued immediately after the peace with England, declaring that slavery was to be continued in Martinique and Cayenne, and St. Domingo; and by the new conscription, issued on the 18th of December, 1801, in which he was compelled to offer the obedience to the republic, but at the same time pealed to the soldiers in language which left no doubt to his resolution to repel force by force. Bonaparte and his squadrons, which was preceded by that of General Le Clere, his brother-in-law, to reduce St. Domingo.

The first view of this force discouraged Toussaint himself. He sailed, but his follower the intimidated and divided. The flattery of the First Consul, and the solicitations of his own children, were brought to bear on the negro chief in vain. He retired to the Morné of Chal and entombed his treasures where the enemy might find them. After a long pause, he called out and claimed an outlaw. The negroes who remained in arms were defeated in all parts of the island; Toussaint continued nevertheless to defend himself, making a despair of those among the enemy; but the defection of Christophe and Desilles obliged him to listen to terms. The sentence of outlawry pronounced against him was reversed. He was received with mitra honours on paying a visit to Le Clere, and General Bonaparte took the whole of his honors, the imposition of taxes, and the selection of cantonments.

Brunet invited Toussaint to a conference midway between Sanney and Gonaives, on the 10th of June; and after a long discussion a consultation, to which a negro guard was disarmed, and their chief arrested and sent on board the Creole, which immediately set sail for Cap Town, where he was transferred to the Heres, a vessel on the line. After a voyage of twenty-five days he landed at Brest, and without delay sent to Paris, where he was for a short time lodged in the Temple, but soon after conveyed to the castle of Joux, near Besancon, where he was subjected to a close and severe confinement. His faithful attendant Marc Plaisir was removed from him. After months of rigorous imprisonment, he died on the 27th of April, 1803.

Toussaint, like all eminent and successful politicians, was marked by a strong inclination and power of concealing his sentiments and intentions. There was a good deal of imagination or romance in his composition. He possessed strong devotional feelings, and a nice sense of domestic morality. His reserved and energetic nature commanded respect. The negroes, enabled him to restrain them from excesses and keep them to order, under the condition of restored confidence to the whites. He loved splendour in his attendants, but was plain in his personal habits. St. Domingo was peaceful and prosperous under his government, and his influence as an instrument of peace among friends and enemies; and they entitle him to be classed among great men. More it would be improper to say positively, considering how conflicting are the witnesses respecting him, and how biased by passion their evidence. Of his selfish meaness, of Bonaparte's conduct towards...
In there can be scarcely two opinions, and the vexatious
discussion at St. Helena wars all the appearance of
peace of those who have been called 'roundabout by
tonguelessness, which sometimes occur in real life.

After the death of Toussaint Louverture, his family
were confined at Brieven-en-Agen, where one of his
sons died, and lord of the Louverture line of
the Bourbon.

The Tower is situated in 1816, in the
fixation of her sons Placie and Isaac. M. du Bois has
published a sketch of the life of Toussaint Louverture.

TOWER OF LONDON.

That large assemblage
of buildings, presenting so many varieties of aspect, age, and
purposes, which we call generally by the name of Tower, oc-
cupies an elevated area of twelve or thirteen acres, just
opposite the three bridges over the northern bank of the Thames. The outline of the
buildings, as of the area on which they stand, is an irreg-
ular square, gradually narrowing towards the city side.

As from without, the Tower plan presents first
a broad and deep moat encircling a lofty battlemented wall,
with strong towers at intervals through its entire course;
then a similar line of wall and towers at some little
distance within; among which are interspersed a consider-
able number of the garrison and other inhabitants of the Tower; and,
finally, a great central space, where stands the
White Tower, the lofty keep of the old fortress, with the
buildings from 1st of June, to 1564, of the armories, against the inner walls, are, in different parts, the
ancient chapel, the remains of the grand storehouse or armoury, the Jewell-office, and the buildings of the Board of

The chief entrance is by the spur, a small
measuror, at the south-west corner, originally forming a
kind of barbacian; between this spot and the central space
of the interior the road passes over the moat by a draw-
bridge, and is defended by three strong towers, the first
intended to secure the passage of the moat, the second the
entrance into the ballium or outer ward, and the third, the
Boody Tower, to secure the entrance into the inner ward,
the central space before mentioned. Opposite the ex-
ception of the Boody Tower, a large building, it is supposed,
from the suicide or murder within it, originally forming a
designed to be the residence of the Duke of Northumberland, sent here by Elizabeth for his
reasonable correspondence with the unfortunate Mary—is
the Tower’s Gateway, which, during the long period of
history of the Tower as a state-prison, formed the
sole entrance for the prisoners. When Elizabeth was
brought here, it will be remembered she at first refused to
but seeing force would be used if she did not, she
was required to enter the spur, or barbacian, which was,
according to the belief of the time, a true subject, being a prisoner, as ever landed at those
stairs; and before thee, O God, I speak it, having
none other friend than Thee.

The most interesting of the separate buildings of
the Tower may be as follows:—1. the White Tower;
2. the towers and other buildings or places which
have been used for the confinement, execution, or burial
of prisoners, and which are still full of interesting personal
memorials; 3. the buildings forming or connected with the
Armoury, as the Grand Storehouse, Horse Armoury, &c.; 4.
the miscellaneous portions of the Tower not previously
mentioned. The White Tower, as a building devoted to all the
uses mentioned, and as the most ancient and interesting part
of the fortress, we may with propriety notice first and
necessarily:

This is a large quadrangular structure, measuring
in its north and south sides 96 feet, and on its east and
west 118, and rising to the height of 92 feet. Turf
covers the roof. Baillie was very particular about
the preparation of this building for such purposes at Greenwich. In the interior, the
chief apartments on the ground floor are: the Valuation
Office, where immense quantities of small-arms are
kept in convenient and beautiful order, and the room
where Raleigh was so long a prisoner; on the floor above,
the armouries, chiefly for the cavalry and naval
service; and on the top, the Council-Chamber, whilst
the chapel in its height occupies both these upper stories.

The Council-Chamber is a very long, broad, and high
apartinent, with a dark-looking timber roof, formed in a
number of the larger of the lower stories, and
supported by a double range of wooden pillars or supports.

P. C., No. 1564.

The walls are pierced on the one side with windows, on the
other with arches, both adorned.

This rude premed-
\r\n
• The original is in old Italian.

The air of Elizabeth

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The Bell tower.

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was confined. In the Bowyer tower (where the fire broke out in 1844), Clarence, Edward IV's brother, was, according to tradition, drowned in a butt of maltsey. Most of the other towers have interesting recollections attached to them, but we can only refer to one, the Flint tower, for the most part empty (the place of the present building is a remnant building), for the purpose of observing that the ruins of the last are long known as 'the little hell,' possibly from its containing the Little-ease, where the prisoners could not breathe. It lies, however, in the basement of the Rats' dungeon, into which innumerable vermin were driven with every flow of the tide, appears to be unknown.

The chapel of St. Peter's, at the north-west angle, is the only one now used for Divine service. This was built in the thirteenth century as one of the first, and like the others, the buildings of the fortress, is rich in its associations. Here lie Anne Boleyn, with her brother Lord Rochford, Bishop Fisher, the great chancellor More, the venerable countess of Salisbury before mentioned, the minister Cromwell, the two Seymours (the protector and the admiral), Lady Jane Grey, with her uncle and husband, the duke of Norfolk beheaded by Elizabeth for his pretensions to the hand of Mary, Elizabeth's favourite Leicester, the duke of Monmouth, and the Scotch lords beheaded for the rebellion of 1745. The spot on which the scaffold was erected for many of these executions is immediately in front of the chapel; no one can for a moment mistake the spot. The darker appears that portion of a pavement of the area presents. Another and the chief place of execution was outside the walls on the neighbouring Tower Hill.

The largest of the buildings connected with the Arsenal estate is the Long Tower, that as a ruined shell; scattered about the floor of which are the few pieces of ordnance that alone escaped destruction of all its extensive and valuable stores. The building was modern, and, in that point of view its loss becomes a mere matter of expense; the same may be said of the greater part of its contents. These consisted of a collection of pieces of ordnance on the ground-floor, of all shapes, sizes, and periods; memorials chiefly of our naval and military successes, some of the most valuable of which have disappeared; and sections of the Smallest Armory on the floor above, fitted up in the most convenient and picturesque manner for the reception of a stand of 150,000 arms. The fire by which the building was so completely destroyed broke out on the night of the 9th of October, 1841; in its course great apprehensions were felt for the safety of the entire fortress, but ultimately it was extinguished without further injury. A novel kind of street fire (and indeed it continues), of the dregs of the conflagration, generally weapons, flew like ashes to the want of a proper mode of extinguishing. Under the care of the Board of Ordnance, forming as it were the appropriate historical museum of their department, are the places of exhibition known as the Horse Armoury and Queen Elizabeth's Armoury. The former is a low building resting against the base of the White tower, exactly opposite the Ordnance-office, and from it a staircase leads upwards into the Tower, where we find the prison of Raleigh changed into the small armoury that now bears the name of his royal mistress. The Horse Armoury is principally occupied by a row of mounted figures, intended for the display of complete suits of armour, which are here found, from ancient to modern times, of all nations of the Cross, through all the growth and decline of the more splendid plate-armour, down to the merely helmeted and cuirassed warriors of the reign of James the Second. Among the suits which demand special notice is that worn by Henry VII in the Ethiopian portrait given by the Emperor Maximilian I., which is one of the most picturesque and elegant in its outlines, and sumptuously decorated in its details. The entire mass of armour for both man and horse is washed with silver, and engraved with figures, devices, mottos, arms, &c. of the finest workmanship. Among the other suits dispensed about the armoury are two that attract much attention for their divinities; one of them, a complete suit of steel plate, was worn by Charles II. when only in his fifth year. Queen Elizabeth was formerly said to have a main collection of the spoils of the Armada, and the various instruments of torture here shown were looked on as so many monstrous inventions of the Spaniards. These, now known in most cases to be as genuine English as the limbs they were intended to torture. Whatever it may be in the opinion as to the formation of certain supposed ancient instruments of torture, there is no doubt, in this great variety of weapons of which it consists are mostly the fifteenth and sixteenth centuries. They comprise bucklers, gaives, catch-poles, blackjacks, stillettos, glasse, a great many curious instruments of torture (bilboes, collar of tortue, thumb-screw, &c.), and numerous curiosities, among which is the axe that severed the fair neck of Anne Boleyn.

Since the fire the Regalia [Royal] have been re-arranged in the map-office, and the great building was erected for the purpose in the corner by the old Jewel-house. The mode of exhibition has been strikingly improved. The Regalia are enclosed within a glass screen in the roof of the building, over which is a strong with the that, without in the slightest degree interfering with view, renders any possibility of the repetition of such an attempt as that of Colonel Blood almost impossible, the same time the spectators can walk round and examine the objects thoroughly. We hardly need add that they have been removed from the Tower for some years. Mint also is no longer here, but on the neighbouring premises.

Of the history of the Tower it can be only possible to make a general sketch. The fortress of London might very well be introduced into a complete history of the building which has for so many centuries been palace, prison, and arsenal of our kings. Tradition attributes the building to Julius Caesar; but to speak in less dilatory terms, the register-book of the acts of the bishop of Rochester, down by Edmund of Hadenham, that William I. named the Conqueror, built the Tower of London with the great white and square tower, about the year of Christ 1078, appointing Gundolph, then bishop of Rochester, to be principal surveyor and overseer of the work, who was for that time lodged in the house of Edmure, a burgess of London. This then was the original building, which continued the Tower till the year 1189; in addition to which we have commenced with the coronation of Richard II., to have terminated with that of Charles II. The old memories of the palace are of a very different nature; Richard II.'s deposition, Henry VI.'s supposed murder, the similar fate of the young princes, Anne Boleyn's execution, these are but a few of the incidents which are recorded in connection with this regal home. Even these recollections sink into insignificance before the long and bloody history which records the trial and imprisonment of our prisoners. Among those who shared this captivity, or were relieved by the scaffold, to the prison doors so often led, we find Hubert de Burgh, the Scotch king Baliol, Wallace, dragged hence as a hurdle to Smithfield; another Scotch king, David Bruce, the fairly-famed citizens of Calais; Sir Simon Burley, executed on Tower-hill; the poet Chaucer (through his connexions with John of Gaunt and support of Wickliffe); the king's men, from Boniface to Bishop Hacket; the lessees; the barons, &c., &c.; whilst in many cases hundreds of their less distinguished friends and associates, followed shared their captivity or death.

The government of the Tower is vested in the Constable of the Tower, an officer of the highest rank. Langton, archbishop of Canterbury, is appointed to be lord president (present at one time, constable at another). Harvey, lord president (Sir Hugh Denzapper - Sir Hugh Despenser?);
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About 1772 he brought such acquisitions as he then possessed to London, and placed them in a house in Park Street, Westminster, where his extensive collection was advanced to its highest celebrity.

It was not to marbles alone that Mr. Townley directed his attention. He had also a collection of terracottas; and he laid out large sums in the purchase of ancient bronze figures and those of antiquity in antique paste and drawings, the greater part of which served essentially to illustrate his sculptures. During two or three of the latter years of Mr. Townley's life, feeling himself capable of devoting himself to preparing designs for a Statue Gallery and Library to be added to the mansion at Townley; and enjoined his executors in his last will, dated November 9th, 1802, to complete his plans within five years, otherwise he directed his executors to purchase real estate to be given to the British public, and to be preserved in their Museum.

Mr. Townley died January 3rd, 1805. After his decease, his executors, upon a mature consideration of all the circumstances of his fortune and collection, came to the decision of offering the marbles and terracottas only to the nation, and of immediately fulfilling Mr. Townley's conditional view with respect to the British Museum. An Act was accordingly passed for purchasing the collection, and on the 12th of April, 1807, the sum of 30,000l. was voted. An additional edifice was built at the Museum for their accommodation, and the collection was opened to public view in 1808.

Mr. Townley's remaining collection of antiquities, illustrated by the collection of terracottas which he purchased and deposited in the same institution under another Act, in 1814, for the sum of 8300l.

The Marbles and Terracottas of the Townley collection are at present (1842) in Rooms I., II., III., IV., V., VI., XI., XII. of the Museum Gallery. The collection of sepulchral urns, which formerly filled the Columbarium in Room VII., are at present removed to the south recess of the ante-room to the Philaeian saloon.

The Terracottas form a collection of eight statues, sixty-seven bas-reliefs, and nine amphorae. Some of these were collected in Italy by Mr. Townley himself, others he purchased after his return of Nollekens the sculptor, who had acquired them in Rome at an earlier period. The statues, with one exception, were found about 1765, in a dry well near the Porta Latina. The collection of terracotta bas-reliefs is believed to be the most valuable in Europe. As far as terracotta statues are concerned, the Townley collection is excelled by the museums at Naples. The numbers 7, 8, 16, 24, 26, 47, 56, 59, and 60, among the bas-reliefs, are the most deserving of attention.

Of the Marbles of the Townley collection, about two hundred and fifty are represented. Two objects, however, are not the most important, as they stand in the several rooms.

Room II., No. 4. A Caryatid larger than life, found in the ruins of the Villa Strozzi, deserves the first notice. It was formerly in the Fontaltno collection, and is supposed to have formed one of the supports of a small temple, and to have been the work of two Athenian artists of the names of Criton and Nicolaus.

No. 6, in the same room, a statue of Venus or Dione, is of the highest order. When Canova visited England in 1814, he spoke of it as the finest female statue he had seen in England. It consists of two pieces of marble imperceptibly joined at the lower part of the body, within the drapery; and was found in the ruins of one of the imperial baths of the emperor Claudius, at Ostia, in 1776.

Two vases of exquisite workmanship stand one on each side of the statue of Venus. One, No. 7, more than three feet high, represents the celebration of the orgies of Bacchus. It was found in detached pieces at Monte Cennano, the site of the villa of Antoninus Pius, at the antient Latium. The other vase, No. 9, of smaller size, presents a Bacchanalian group of four figures only, on the same subject; but there is no record of the place where this was discovered.

Two busts of Hercules—one of hard character and of an early period of art, found at the Panthala in Hadrian's baths near Tivoli; the other, which bears his name, was dug up at the foot of Mount Vesuvius—also decorate this room, with two colossal heads of Minerva, Nos. 1 and 16; one with hollow sockets to the eyes, supposed to be of a date from 550 to 600 years before the Christian era; the bust of the
Farnese Hercules however does not belong to the Townley collection.

Room III. of the Townley Gallery contains an assemblage of statues of a smaller size, busts, terminal heads, and base-reliefs; these last for the most part are let into the walls.

The Statues consist of a figure of the goddess Fortune, No. 18, her right hand resting on the rudder of a vessel; found, according to chance from Rome, beside the Via Labranda, a Venus, No. 22; found in a bath at Ostia in 1775; a Faun, from the Macaroni palace, No. 24; one of Diana's nymphs resting after the chase; found, in 1766, in the Villa Veropoli, Nos. 28; a statue of a youth, No. 31, forming the right part of two Hercules in the same room. The huckle-bones: two statues of Fauns, found, in 1773, near Civita Lavina, Nos. 33 and 43; and Acteon attacked by his dogs, No. 45; found, in 1774, in the ruins of the villa of Periander, No. 42, are the most remarkable.

Of the Base-reliefs, No. 5, representing warriors consulting the oracle of Apollo: No. 6, Castor managing a horse, in the National Museum of Naples, 1796. 7, Hercules securing the Minalian stag, in a very early style: and No. 12, a Bacchanalian group, are most important.

The Townley Marbles in Room IV. consist of a bust of Townshend, found in an excavation near the Campagna di Roma in 1776: a head of Apollo, of early Greek work, found at Hadrian's villa: a head of Homer, found in some ruins at Baiae in 1790: a head of Pericles, No. 32: and a terminal head of Periander, No. 42, are the most remarkable.

In Room VI. the more exquisite Statues are, a small torso of a Venus, No. 20: another small one of Cupid bending his bow, No. 22; found, in 1775, at Castello di Guido, on the road from Rome to Civita Vecchia, within a large amphora filled with earth: two figures of Victory sacrificing bulls, Nos. 29 and 31; both found in the ruins of the villa of Antoninus Pius: a statue of Libera, No. 49: another of Ceres, No. 43: a small statue of Jupiter sitting, No. 48: another of a Muse, the plinth inscribed EYMELIA, No. 60: and a small statue of Hercules sitting on a rock, the apples of the Hesperides in his right hand.

Busts which have been the most interesting are, No. 15, a head of Jupiter; No. 18, Apollo Musagetus; No. 27, a bust of Hadrian with the imperial palæmatum; a bust of Sevus, No. 29, found in 1770 on the Palatine hill; No. 32 and 35, heads of the two Faustins; No. 39, a head of Phaeton, found at Pyae, No. 41, of Atyes, found in the Villa Palombara; No. 44, a head of Nero, brought from Athens, in 1740, by Dr. Askew; No. 47, a head of one of the Homeric heroes, from the Pantanella at Hadrian's villa; No. 51, a bust of Sallust; No. 53, a bust of the young Marcellus; and No. 65, a head of Donititia, formerly called Messalina, found in the Villa Cassi.

The more curious of the Base-reliefs are, No. 2, part of the front of a sarcophagus, representing Achilles among the daughters of Lycomedes: No. 4, part of the front of a large sarcophagus, representing a marriage; No. 5, the front of another, representing the nine Muses from the Villa Montalto; No. 7, part of a sarcophagus, representing a battle; No. 11, the fragments of a sarcophagus, representing a poet and his muse; No. 23, a funeral monument inscribed XANHINSOS; No. 28, a beautiful base-relief of a Bacchante; and No. 54, a base-relief representing a girl playing the lyre.

This room likewise contains a swan in red marble, No. 21: an eagle in marble, No. 34: several altars, cippi, &c.

The Townley Marbles of Room XI. deserving most notice are, No. 16, a statue of an intoxicated Faun; No. 17, a statue of a young Bacchante, of large proportions, from the celebrated bronze statue executed by Myro; found, in 1791, in the ruins of Hadrian's villa: No. 21, a statue of Mercury sleeping on a rock: a statue of Bacchus, from the ruins of the villa of Antoninus Pius, No. 22: a small Mithraic group, No. 43. Beside these, this room contains two statues in bronze: one of Hercules, No. 21, carrying away the apples from the garden of the Hesperides, by the direction of Apollo, purchased by Mr. Townley in Paris in 1774.

The base-reliefs and fragments of sepulchral monuments in this room are numerous, but of less important characteristic. There are numerous articles also in this room, which originally formed part of the Townley collection.

Room XII. contains the following Townley Marbles: a superior character: No. 1, a Head of June; No. 2, a head of a young Faun, sitting upon the back of a lion; this sculpture was found in a vineyard near the Flaminian gate of Rome, and once belonged to Cardinal Alessandro Albani: No. 9, a Head of Adonis covered with veils, No. 12, a Head of Antinous Pius: No. 12, a singularly beautiful bust of an unknown female, commonly called Isis. It is gracefully terminated by the flower of the Nymphæa lotus, on which it appears to rest. It was purchased at Naples from the Lorenzono family in 1772, and was conveyed by Mr. Townley to be the gem of his collection. No. 13, a Head of one of the Dioscures: No. 11, a colossal head of Antinous in the character of Bacchus: and No. 20, a bust of M. Coriolanus: No. 1 of M. Pomp. Africanus: the helmet and bust of bronze are modern additions to it.

The sepulchral urns in the south recess of the ante-room approaching the Phigalaean Saloon, belonging to the Farnese family, are Nos. 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33, 35, 37, 38, 40, 41, and 42.

Since the opening of the Townley Gallery in the spring of 1808, the trustees of the British Museum have added numerous marbles of high character to the collection, and a few have been added by benefaction. The more prominent additions have been, a terminal Head of Mercury, purchased in 1812, at the sale of antiquities belonging to Dr. William Chinnery; a very fine Base-relief of the Apotheosis of Homer, found at Fratoci, about nine miles from Rome, No. 23, purchased in 1819 at the expense of 1000l.: In Room IV. a statue of Apollo, of very early Greek work, purchased in 1818 for 900l., at the sale of the Count of Chiosl's collection of antiquities; Room XI., No. 14, a Mithraic group of large size purchased from Rome in 1815, purchased for 3000l.: No. 15, a statue of a Faun, formerly in the Rondinini palace at Rome, purchased for 300l.: Room XI. of Cyprian winged, purchased at the sale of the Right Honourable Edmund Burke's marbles in 1812: and No. 46, a Head of Demosthenes, purchased in 1818.

TOWNSHEND, CHARLES, VISCOUNT TOWNSHEND, an eminent statesman in the reigns of George I. and George II., was the second viscount of that name, and was born in the year 1706. The family of the Townshend.s is of Scotch origin; a Mr. Townshend, keeps himself at Rainham from the middle of the fifteenth century. Sir Horatio Townshend, the father of the subject of this article, had been one of the leading members of the Presbyterian party, and having zealously co-operated to bring about that event, was rewarded by George II. with the title of Baron Townshend in 1661, and was, in 1692, raised to the rank of viscount. He died in 1686, when his son was only ten years old. On the latter's taking the title of Lord Viscount Townshend in 1710, he married the Honourable Emma, daughter of Lord Somers. When William III., just before his death, in the beginning of 1702, had omitted the present title of Lord Viscount Townshend, the viscount's eldest son, Robert, assumed the title in 1707. Lord Townshend had attained sufficient political influence to be named for the Lord Privy Seal. (Coxe's Memoirs of Sir Robert Walpole, vol. i. p. 113, 5vo. ed.)
During the reign of Anne, Lord Townshend was appointed, in 1705, one of the commissioners to treat for the union with Scotland; in 1707, captain of the yeomen of the queen's guard; in 1709, joint plenipotentiary with the duke of Marlborough and Lord Methuen for the port of Seicland, and in the same year ambassador extraordinary to the States-General of the United Provinces. In this last capacity he concluded the treaty known by the name of the Hanoverian演变, of the restitution of the succession to the throne for carrying out the Hanoverian succession, and engaged the endeavours of England to procure in a treaty of peace the Spanish Low Countries as a barrier for the States-General against France. On the disposal of the treaty, if the ultimate result was no more than that Lord Townshend lost his appointment of captain of the queen's guard.

In the session of 1712 the Commons, violently on the barrier treaty, voted that the Lord Viscount Townshend, and all who negotiated and signed, and all who advised the ratifying of the said treaty, are enemies to the queen and kingdom.' This vote was followed up by the Representation to the Queen, in which the treaty was dis\r

umented very severely and at length. The Representation may be read in the 'Parliamentary History,' vol. vi., p. 1005; or in Swift's 'History of the Four last Years of the Queen' (Works, Scott's edition, vol. v., p. 260,)

Hague, and, his ministerial practice came a complete change of foreign policy; and the persecuted negotiator of the barrier treaty was now selected to be chief minister of the new king. Lord Townshend had been one of the intimate and personal friends of Mr. Pelham, his brother-in-law, Lord Townshend named as his colleague General (afterwards Earl) Stanhope. [Stanhope, James, Earl.] Lord Townshend had been recommended to George's minister, Sir John, now Lord Hague, and with whom was recommended the praises of all the principal statesmen at the Hague had concurred.

Lord Townshend had now been twice married. His first wife was Elizabeth, the second daughter of Thomas, Lord Pelham, and half-sister of the subsequent duke of Newcastle. After her death he married, in 1713, Dorothy, sister to Sir Robert Walpole.

The administration formed under Lord Townshend was entirely different from that of Mr. Pelham. He was both a man of courage and a man of principle, and on their respective ascensions to the throne, had pursued the plan of combining the leading members of opposite parties in the ministry; but during Anne's reign party warfare assailed the ministry, and it was charged with the want of that spirit of party unity, that of Lord Oxford, had consisted exclusively of Tories. This monopolizing precedent was now turned to the advantage of the Whigs. Lord Townshend was prime minister, though this name had not yet come to be established; and Walpole, who in a short time approached him in influence in the ministry, held at first only the subordinate post of paymaster of the forces, but after the death of Lord Halifax, in the next year, became chancellor of the exchequer and first lord of the treasury, (Walpole, Sir Robert.)

The principal acts of Lord Townshend's ministry were the impeachments of the principal members of that which had preceded, and the Septennial Bill. The latter measure was aimed to give the long-desired opportunity of breaking the fall. This offer, conveyed by Stanhope, together with the announcement of his dismissal from the secret service, was indignantly refused. 'I am highly sensible,' Lord Townshend wrote to the king, 'that you know which your majesty confers on me by conferring that my life, my goods, and my interest in the senate, and in the houses of the kingdom of enjoying the large appointments annexed to that honourable office without doing the duty.' (Coxe's Memoirs of Sir R. Walpole, vol. i., p. 191.) This was truly the case; and had the war been a successful one, George I's accession, and had never visited Ireland. Sir Robert Walpole wrote to Stanhope, who had urgently solicited his mediation with Townshend, to prevail on him to
accept the lord-lieutenancy:—When you desired me to prevail with my lord Townshend to acquiesce in what is carved out for him, I cannot but say you desired an impossible; and 'tis fit you should know that there is not one of the cabinet council with whom you and Lord Sunderland are not at variance in all things. I think that, considering all the circumstances and manner of doing this, nobody could advise him to accept of the lord-lieutenancy of Ireland. . . . And be assured that whoever you can secure the consent of your private interests or private correspondence betwixt us and the two brothers, or any management in the least tending to any view or purpose but the service, honour, and interest of the king—I must repeat it, be assured, they will be found, pardon the expression, as good as made of iron. . . .

And in another letter to Stanhope, whose conduct on this occasion was misapprehended, not perhaps unnaturally, by Townshend and Walpole, the latter made this pointed appeal:—What could prevail you to enter into such a scheme as this, and appear to be the chief actor in it, and undertake to carry it through in all events, without which it would not have been undertaken, is unaccountable. I do swear to you that Lord Townshend has no way deserved it of you. . . . Believe me, Stanhope, he never thought you could enter into a combination with his enemies.” (Id., p. 310.) Stanhope had concurred in the king’s recommendation against Townshend; but Walpole was supposed to be the main motive of the French treaty, and had shown his feeling by immediately tendering his resignation, which the king refused. But having been satisfied that his suspicions against Townshend on this occasion had been unjust, he now had borne no fruit, and there was no appearance of the king’s design to endeavour to conciliate him towards Townshend, and soften his determination. The king had conceived a disgust. Stanhope wrote in his first letter on the subject to Sir Robert Walpole, at Townshend’s instance. The falsehoods told him of Townshend’s intrigues with the prince, of which Stanhope naturally said nothing, but with which there was no evidence to connect him, drove the king into a fury. And the determination which the king had come to under the influence of these vio- lences was impossible to alter. Stanhope wrote to Methuen, who sided with Townshend and Walpole, though he had been destined to succeed Townshend:—If you have any interest or credit with them, for God’s sake make use of it upon this occasion. They may possibly unmask their master, or (which I do before God think very possible) make him abdicate England, but they will certainly not force his resignation. I told Lord Townshend of the king’s desire to consult the interests of the Whig party had led him, though with some reluctance, to adopt Stanhope’s suggestion of offering Townshend the lord-lieutenancy; and now, when he found the degrees of resentment felt by Lord Townshend, and the many of the House of Commons, he also to keep the appointment open till his return to England, in the hope that Townshend might yield. Stanhope saw a gleam of Townshend’s return to his former post, if he would first accept the lord-lieutenancy; and he wrote to Walpole, January 16, 1717:—Believe me, dear Walpole, when I swear it to you, that I do not think it possible for all the men in England to prevail upon the king to admit my lord Townshend into his service, upon any other terms than of compliance with the offer made of Ireland. The king will exact from him this mark of duty and obedience.” (Id., p. 319.) It was not unnatural that Townshend and Walpole, at a distance from the scene of the negotiations, and without being made acquainted with the false charges made of them, indignantly denounced the false charges of which they heard, and ascribed to Stanhope and his friends the false reports and idle tales. The effect of Lord Townshend’s dismissal, when it was made known, on the public mind and on the Whig party, was such, that the king took fright, and on his arrival in England sought out Bernstorff to Lowestoft to tell him, that having taken away the scales, though perhaps on false reports and too hastily, he yet could not with due regard to his own character at once restore them to himself, and to beg Townshend and Walpole and the lord-lieutenancy of Ireland to be exchanged hereafter for another more influential one. Townshend now yielded, and those who had sided with him in the ministry were satisfied. But the union thus effected did not last long. Stanhope and Sunderland had acquired an ascendency with the king from which they were now not to be deposed by Townshend and Walpole. These showed their mortification; could not conceal their distress; and on the 9th April, 1717, almost all Townshend’s personal friends voted against the ministry, which narrowly escaped a desertion from townshend and Walpole at a dismissal of his office from lord-lieutenant of Ireland. Walpole immediately tendered his resignation, which, it was said, the king received with so much surprise and sorrow, that he returned the seals to him ten times before he would receive them. An instance of Walpole’s conduct was followed by Methuen, Pulleyn, the secretary at war, Lord Orford, and the Duke of Devonshire.

Lord Townshend now went into opposition, and, like Walpole, is open to the charge of having out of office opposed principles and measures which he had previously supported. In the differences between the king and the prince of Wales, he and Walpole were now the friends of the latter. A reconciliation having been brought about between the king and prince of Wales, in April, 1720, Lord Townshend was admitted a few days after, with the Duke of Devonshire, Lord Cowper, Walpole, Methuen, and Greville, to the council on the occasion of the Lord Mornington’s terms, which was supposed to be some delay in the payment of the salaries of lords Stanhope and Sunderland, led in 1721 to a recon- struction of the ministry, in which Lord Townshend became again secretary of state, and Walpole also resumed his post of first lord of the treasury; which office he had vacated when he was made lord-lieutenant of Ireland, and which office he had held from June 1721. The influence of Walpole in the country was considered of great importance, and was considered prior minister.

Townshend and Walpole had now again complete influence with the king. Lord Carteret, who was the other secretary of state, beginning, together with Count Bern- storf, to intrigue against Townshend, did not find success as Lord Sunderland had done in former days. When the king went again to Hanover, Townshend now took care to accompany him, and Lord Carteret accompanied him also. ‘The superior influence of Townshend and Walpole,’ say Archdeacon Cox, was not solely gained by court intrigues, but also by his personal feeling, which was prostituted by a preference of Hanoverian interests to those of England. In the midst of these cabals, the con- duct of the brother ministers was firm and manly, moving in direct opposition to the king’s prejudices and the views of his chief counsellor. As the king adopted violent measures against Russia, proposed by Bernstorff and seconded by Carteret, which, if pursued, must have involved England in hostilities with the Carr and he exultingly informed Walpole that the king con- tinued true to his resolution of signing no paper relating to British affairs but in his presence.” (Memoirs of Sir R. Walpole, vol. ii., p. 180.) Lord Carteret was removed from the secretariat of state in 1721, and made lord-lieutenant of Ireland. The death of Newcast, the brother of Townshend’s first wife, succeeded him; and eventually became, what Carteret had been, Townshend’s rival. Their soon arose also a coolness between Townshend and his other brother-in-law and old friend and colleague, Walpole, owing, it is supposed, to their altered positions and Townshend’s jealousy of Walpole’s growing superiority. It was not until 1730 that the breach between the two brother ministers, and Lord Townshend’s resignation, took place. The cause of these were symptoms already standing as early as 1725, two years before the death of George I. Walpole does not appear to have been to blame in the beginning.”

On George’s accession, in June, 1727, Lord Townshend’s pre-eminence was fully established; and it was owing entirely to his influence that Townshend was retained in the secretariat. During this year Townshend’s health was dangerous, which was expected to be fatal; and although he was supposed to be, he wrote, that he considered him ‘the bulwark of the com-
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stitution,' and that he trusted 'Providence would interfere to save the man without whom all must fail to the ground.' (Coxe's Memoirs of Sir R. Walpole, vol. ii., p. 288.)

In the year 1729 Walpole and Townshend had become determined opponents in the ministry, and Walpole, with his usual vigour and talent, was selected to move the address to the throne with the king, had no difficulty in always gaining the majority over Townshend. Almost every question that arose became a subject of dispute. The duke of Newcastle and Walpole endeavoured to bring Lord Harrington into the ministry, when Townshend compelled him to retire into Lord Stanhope, afterwards the celebrated earl of Chesterfield. Lord Townshend's object was defeated. Dr. Hatty has related the following anecdote in his 'Memoirs of Lord Chesterfield,' who related it to him: 'The first time he (Lord Chesterfield) appeared at court on his return to London, sir Robert Walpole took him aside and told him, 'I find you are come to be secretary of state.' 'Not I,' said his lordship, 'I have as yet no pretensions, and wish for a place of more ease. But I claim the garret ... I am a man of pleasure, and the blue riband would add two inches to my size.' Then I see how it is,' replied Sir Robert, 'it is Townshend's intrigue, in which you have no interest, but he is always on the right side, nor shall you be beholden for the gratification of our wishes to anybody but myself.'

Disputes arose also between Townshend and Newcastle on an important question of foreign policy. Townshend had advised stronger measures against France, and had pressed the subject of the king to a despatch directing an invasion of the Austrian Netherlands. He went out of town to Norfolk for a short time, and in his absence Newcastle, with the advice of Walpole and the queen, brought the king to approve of a contrary policy. Townshend now determined to resign. Angry words, and even blows, passed between him and Walpole before he did so. A particular account of their quarrel is given by Archdeacon Coxe, in his 'Memoirs of the Present Administration,' vol. ii. p. 112: 'The first time he (Lord Townshend) appeared at court on his return to London, sir Robert Walpole took him aside and told him, "I find you are come to be secretary of state." 'Not I,' said his lordship, 'I have as yet no pretensions, and wish for a place of more ease. But I claim the garret ... I am a man of pleasure, and the blue riband would add two inches to my size.' Then I see how it is,' replied Sir Robert, 'it is Townshend's intrigue, in which you have no interest, but he is always on the right side, nor shall you be beholden for the gratification of our wishes to anybody but myself.'

Lord Townshend's resignation took place on the 15th of May, 1730. He retired immediately to his seat at Reinin, and, never again returning to London, devoted himself to agricultural pursuits for the remainder of his life. He introduced the cultivation of the turnip from Germany into this country. Lord Chesterfield visited him in his retirement, to press his coming to London to be present at an important debate, and Lord Townshend refused, saying, 'I am not of this world.'

Lord Townshend died on the 21st of June, 1730, in his sixty-third year. He went in as able and honest minister, but his ability and honesty were unfortunately uncontrolled by temper or prudent tact. He was not conspicuous as an orator. Lord Chesterfield has left a description of his speaking style, which he knew well: 'Lord Townshend has no雄穪, and always vulgar, his cadences false, his voice unharmonious, his mien pensive, and always in a manner that makes all who talk with him patience, and the young fellows used to joke upon him, and repeat his inaccuracies.' (Letters, vol. ii., p. 318.)
pointed to the lucrative post of treasurer of the chamber. There are some letters in the lately-published 'Correspondence of Lord Chatham,' which show the importance that was attached at this time to Charles Townshend's support, and the trouble taken to secure him (vol. i., pp. 182-184). Lord Bute demanded the resignation of one connected with the lucrative post in the household. This was already engaged. The treasurership of the chamber was then offered, and represented as 'in every respect exactly equal' to that of Lord Bute. Defeated, Townshend went not finding him, to Townshend's brother, afterwards marquis of Townshend, to press his acceptance of this office, and, with the aid of the Prince of Wales's name, succeeded in satisfying him.

Pitt resigned in the spring of next year, in consequence of the dismissal of Lord Temple, and Townshend resigned also. Townshend refused offers to join the new ministry, which Lord Waldegrave had been commissioned to form. After some months of fruitless negotiations, the king was obliged to return to Pitt, and in the ministry formed by him as premier, in June, 1767, Townshend resumed his post of treasurer of the chamber.

In March, 1767, Townshend was appointed secretary-at-war. The next year, Lord Bute's ascendency having led to the resignations of Pitt and Lord Temple in the first instance, and shortly after of the dukes of Newcastle and Devonshire, a plan was made to establish the lord chancellor in the office of the secretary of state for the plants, which he refused. Mr. Nutall writes to Lady Chatham, October 14, 1762:—'My countryman the right honourable Charles Townshend was offered by the Duke of Bute, who opposed this system, for the position of secretary of state for the plants, and he refused, answered, 'Don't believe that, Sir, till you hear it from me.' Mr. Fox was struck, and said he was greatly astonished, for he had understood that this had been settled.' (Correspondence of the Earl of Chatham, vol. iii., p. 183.)

Townshend, however, supported in parliament the preliminaries for the peace, but soon after was among the opposition to Lord Bute's ministry. On Lord Bute's resignation, in 1763, it was rumoured that Townshend was to be offered the place of lord of the Admiralty. He was afterwards appointed first lord of the Admiralty and Secretary of State. He was afterwards appointed first lord of trade and the plantations. In the fruitless negotiations which took place with Mr. Pitt towards the close of the year, Townshend was one of the cabinet to Pitt the king. (Chatham Correspondence, vol. iv., 186.)

Mr. Grenville's Stamp Act, introduced early in 1765, was zealously supported by Charles Townshend in a speech which elicited from Colonel Barré, in reply, one of his most successful parliamentary efforts. Townshend had concluded with the words, 'And these Americans, children planted by our care, nourished by our indulgence, protected by our arms until they are grown to a good degree of strength and opulence, will they grudge to contribute their share in the support of the cause of freedom?'

The talents and character of Charles Townshend have been celebrated in a speech which was delivered in the House of Commons in this administration, that the post held by him had been offered to Townshend, and refused by him. Afterwards, with a valediction characteristic of him, and by which he acquired the name of 'the statesman,' he repented his refusal, and was willing to sacrifice the superior profits of paymaster for the greater honour of secretary and leader. "C. T., with all his cordiality, fixes conditions to his good will: "confidence and zeal." And with words of the same age; nor does he wish to be useful, and the way in which he can be so much as leader of the House. I closed at once, with the addition that he should then be secretary of state too."

To-day I have privately heard that he has said in a letter that things were changed since he refused The Companion to the Newspaper, 1835, p. 365, where there are several extracts from Conway's unpublished letters. The latter demands the recall of the Stamp Act, and the introduction of a new act on the revenue. Shortly after the formation of the Rockingham administration, he had been detained in the country by illness, which many supposed to be a cloak for dissatisfaction with the new arrangements, and with the position in which he had found himself. A pleasant edification of this circumstance has been preserved by Lord Chesterfield (Letters, vol. iv., p. 263):—'-We hear that the Right Honourable Charles Townshend is indisposed, at his house in Oxfordshire, of a pain in his side; but it is not said which side.'

The Rockingham administration died in July, 1769, 'having lasted,' as Burke has chronicled it, in his Short Account of a late Short Administration, 'just one year and twenty days.' In the new administration formed by Pitt, now created Lord Chatham, Townshend was chancellor of the exchequer and leader of the House of Commons. There had been difficulty, as before, in prevailing upon him to assume the post, for which Pitt now first said he would do so, and then said he would not; but the firmness of Lord Chatham kept him to his first statement. The letters which passed on the subject between Lord Chatham and the Duke of Grafton, the king, and Townshend, may be seen in the Chatham Correspondence, vol. iii., pp. 456-63.

The course of this Chatham administration is well known. Lord Chatham was soon too ill to transact any business or exercise any control over his colleagues, quarrelled with one another, and among whom Townshend was looked upon as premising and contemptuous. Townshend, as chancellor of the exchequer, on a tax on the colonies, April 23, 1770, declared he would not resign chancellor of the exchequer. 'His behaviour on the whole,' adds the duke, 'was such as no cabinet will, I am confident, submit to.' (Chatham Correspondence, vol. iv., p. 252.) And on the same day Lord Shelburne writes to Lord Chatham,—'I was surprised at Mr. Townshend's conduct, which really continues excessive on every occasion, till I afterward considered that he knew it was the act of Lord North's refusal, and from himself. ... It appears to me quite impossible that Mr. T. can mean to go on in the king's service.' (Id., p. 235.) The policy of Townshend prevailed, and on the 2nd of June he was introduced into the House of Commons; to announce those unifying measures upon glass, paper, tea, and certain other articles imported into America, which rendered rebellion in the colonies, and eventually led to their separation from the mother-country. This was done under the nominal premiership of Lord Chatham, the determined opponents of American taxation, but who was now kept by illness afool from business, and had not been consulted. Soon the necessity of constructing a new administration with an efficient head was perceived, and a negotiation between the marquis of Rockingham, the duke of Bedford, and the Duke of Newcastle having failed, it was understood that Charles Townshend was to be entrusted with the formation of a ministry. When the higher powers in the state were then just within his grasp, he was suddenly carried away by a putrid fever, on the 4th of September, 1777.
ever. You understand, to be sure, that I speak of Charles Townshend, officially the heir of the late Charles, of whom I cannot even now remember without some degree of sensibility. In truth, Sir, he was the delightful and ornament of this House, and the charm of every private society to which he was honoured with his presence. Perhaps there never arose in this very world a more Sprightly, more pointed and finished wit, and (where his passions were not concerned) a more refined, exquisite, and penetrating judgment. If he had not so great a stock as some would have wished, when he had, long treasured up, he knew better by far than any man I ever was acquainted with how to bring together within a short time all that was necessary to establish, illustrate, and complete. His speculative addresses to (Dr. Blackburne) the author of a late learned Work, are illustrative, in 1768, by 'A Defence' of the 'Doubts,' and by another pamphlet, entitled 'A Dialogue between Isaac Walton and Homologists; in which the Character of Bishop Sanderson is defended against the author of the Confessional.'

In 1768 he made a second tour to the Continent with Mr. Townshend's eldest son, Mr. William Drake, of Bensmore College. In 1778 he published his principal work, his 'Discourses on the Four Gospels,' 4to., which immediately attracted great attention; and in testimony of the merit of which the University of Oxford conferred upon the author, in February, 1779, the degree of D.B. by diploma. A work of such importance and workmanship was awarded to him the degree of D.D., vol. 8vo., in 1783. In 1780 Dr. Porteus, then bishop of Chester, bestowed upon Dr. Townshend the archdeaconry of Richmond. In 1783 the divinity chair at Oxford was willed to him by the Rev. Dr. Townshend, the advanced time of life induced him to decline accepting it. He died 15th April, 1792. Dr. Townshend's collected works were published, in 2 vols. 8vo., in 1810, under the care of Mr. (afterwards Archdeacon) Church, together with a Memoir of the author, from which the above facts are extracted. In addition to the productions that have been mentioned above, this collection contains some single sermons, and a portion of a treatise on the Resurrection, entitled 'A Dissertation on the Resurrection and First Appearance of our Lord and Saviour Jesus Christ,' a few copies of which, in 4to., had been printed by the author in 1784, and distributed among his friends. Dr. Townshend was as highly distinguished by the virtues of his private character as for his professional learning and ability.

TOXICODENDRON. (Tox.)

TOXICODENDRON. (Tox.)

The root of this genus is known as the tomnut, or mamonac, a tooth— from the curvature of the teeth, Professor Owen's name for an extinct genus found on Taxodendron Plateanus, a gigantic mammiferous animal, referable to the order Pachydermata, but with affinities to the Rodentia, Edentata, and Herbivorous Cetacea.

Mr. Darwin, during his sojourn in Banda Oriental, having heard of some giants' bones at a farm-house on the Stannis, a small stream entering the Rio Negro, rode there and purchased, for the value of eighteen pence, the ovarianium now in the museum of the Royal College of Surgeons in London, and the subject of Professor Owen's description. The people at the farm-house told Mr. Darwin that the remains were exposed by a flood having washed down part of a bank of earth. When found, the head was quite perfect; but the boys knocked the teeth out with stones, and then set up the head as a mark to throw at. Mr. Darwin found a perfect tooth, which exactly fits one of the sockets in the head, and which he has himself on being presented, by Sir Walter Wagstaffe Bagot, Bart., to the rector of Blithfield in Staffordshire. This year he was senior proctor of the university; soon after his quitting which he has taken to the lance of a spiritual sword. He resigned his fellowship in January, 1751, on being insti-

TOWNSON, THOMAS, D.D., was the eldest son of the Rev. John Townson, rector of Much Leas, in Essex, where he was born in 1715. After the usual preparatory education, conducted partly at home, partly at school, he went to the University of Oxford, where he was entered a commoner of Christ Church, in March, 1733. In July, 1735, he was elected a deacon (or scholar) of Magdalen College; in 1736 he was admitted to the degree of B.A.; in 1737 he was presented to the living of Hatfield Feverell, in Somerset, and became the Fellow of Magdalen; and in June, 1739, he commenced M.A. In December, 1741, he was ordained deacon, and in September, 1742, priest, by Dr. Secker, bishop of Oxford. Immediately after this he set out, accompanied by Mr. Dawkins, Mr. Drake, and Mr. Houldsworth, on a tour through Italy, Germany, and Holland, from which he did not return till 1745. Having resumed his residence at the university, he was, in 1746, presented by his college to the living of Hatfield Feverell, in which he continued a number of years; having been, on being presented, by Sir Walter Wagstaffe Bagot, Bart., to the rector of Blithfield in Staffordshire. This year he was senior proctor of the university; soon after his quitting which he has taken to the lance of a spiritual sword. He resigned his fellowship in January, 1751, on being insti-

The place where the remains were found is

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broad 120 miles north-west of Monte Video, and the cranium was embedded in a whitish argillaceous earth forming the banks of the Sarandis.

The first notice of this most interesting discovery appears in the 'Proceedings of the Geological Society of London,' and the paper by Professor Owen was read on the 19th of April, 1837.

The Professor premised his anatomical description by an abstract from Mr. Darwin's account of the geological structure of the hill on which the cranium was found.

The foundation of the whole surrounding country is granitic, but covered, often to a considerable thickness, by a reddish argillaceous soil containing small calcareous concretions.

The cranium equals that of the Hippopotamus in size, measuring 2 feet 4 inches in length, and 1 foot 4 inches in extreme breadth. The form of the skull is elongated, depressed, and chiefly remarkable for the strength and wide expansion of the zygomatic arches, and the aspect of the occipital foramen and occipital region of the skull, which slopes from below upwards and forwards. The maxillary portion of the skull is compressed laterally, narrow, and with large intermaxillary bones slightly dilated at their extremity.

The teeth consist of molars and incisors. The latter are four in number in the upper jaw, the two middle ones very small, the two external ones very large, curved, and with their outer cusp curving backwards in a vertical direction, through the intermaxillary bones to the maxillary, and terminating, without diminishing in size, immediately anterior to the grinding-teeth, where the large persistent pulps of the teeth were lodged. In form and relative size, these teeth must have resembled the dentes scalprarii of the Rodents.

The molar teeth no less present a close approximation in their form and structure to the molar teeth of the herbivorous rodents: they are seven in number on each side of the upper jaw, and, from the form of the sockets, appear to have corresponded with each other in structure.

After this description of the teeth, the form, proportions, disposition, and connections of the different bones of the cranium are pointed out, and the structure of the osseous cavities subservient to the organs of sense is adverted to, followed by deductions that the habits of the Toxodon were aquatic.

As far as the form and position of the external aperture of the bony nostrils, of the occipital condyles, together with the slope of the occipital region, are concerned, the same arguments, the Professor observes, might be advanced for referring the Toxodon to the mammiferous group containing the Dugong, as had been urged in reference to the Dinosauria; but the existence of air-cells or sinuses in the superior parietes of the Toxodon's cranium show, he says, that the cranial characters are insufficient to be conclusive as to the cetaceous nature of the animal.

The general conclusions respecting the affinities of the Toxodon to existing orders of mammals are then summed up.

In the 'Geology of the Beagle' (1838) the subject is treated by the Professor in greater detail, and more richly illustrated: among the illustrations is a figure of the cranium, of the natural size. Our limits will not permit us to follow out these satisfactory details, which should be attentively perused, and we proceed to give the summary, which is nearly the same in substance as that at the end of the abstract in the 'Proceedings of the Geological Society.'

'After summing up the different affinities, or indications of affinity,' says Mr. Owen, 'which are deducible from this most curious and interesting fossil, we are led to the conclusion, assuming it to have had extremities cast in hoofs, that it is referrible to the order Pachydermata. But the structure, form, and kind of teeth in the ungulate mammals are indubitably such that the gigantic Toxodon was intimately related to the Rodent order. From the characters of this order, as afforded by the existing species, the Toxodon however differs in the relative position of the anterior maxillary incisors, and in the number and direction of the curvature of the molars. If however the lower jaw, next to be described, belongs as I believe, to the Toxodon, the dental character of the genus will be—'

* Mr. Darwin's paper, entitled 'A Sketch of the Deposits constituting the Clay-epochs in the neighbourhood of the Plata,' was read to the Society on May 3, 1837.

'The Toxodon again deviates from the true Rodentia, and resembles the Wombat [Marsupialia, vol. xiv. p. 489] and the Pachydermus in the transverse direction of the articular cavity of the lower jaw. It deviates from the Rodentia, and resembles the Pachydermata in the relative position of the glenoide cavities and zygomatic arches, and in many minor details already alluded to.

'In the aspect of the plane of the occipital foramen, an occipital region of the skull—in the form and position of the occipital condyles—in the aspect of the plane of the superior bony part of the nostrils—and in the thickness and texture of the osseous parietes of the skull, the Toxodon deviates both from the Rodentia and existing Pachydermata, and manifests an affinity to the Dinosauria and Cetaceous order, especially the Herbivorous section.'

At present we possess no evidence to determine whether the extremities of the Toxodon were organized on the ungulate or unguiculate type, nor can we be positive, from the characters which the skull affords, that the genus may not be referrible to the Mysticæ of Linneaus, although the development of the nasal cavity and the presence of large frontal sinuses render it extremely improbable that the habits of this species were so strictly aquatic as the total absence of hinder extremities would occasion.

'Where the dentition of a mammiferous animal is strictly carnivorous, this structure is obviously incompatible with a foot incised in a hoof; but where the teeth are adapted for inflicting vegetable substances the case is different. If animals so characterized are of small size, and seek their food in trees, or if they burrow for roots or for shelter, the vegetable type of dentition must co-exist with unguiculate extremities, as in the Edentata and Rodentia generally, but the largest genus [Hyracotherium] of the Rodent order, whose affinity to the Pachydermata is manifested in its heavy shapeless trunk, thinly scattered bristly hair and many other particulars, has each of its toes inclosed in a miniature hoof.'

* The affinity above alluded to is too obvious to have escaped popular notice, and the Capybara, from its aquatic habits, has obtained the name of Water-hog. It is highly interesting to find that the continent to which this existing aberrant form of Rodent is peculiar should be found
to contain the remains of an extinct genus characterised by a dentition which closely resembles the Rodent type, but manifesting it on a gigantic scale, and tending to complete the chain of affinities which links the Pachydermata with the Rodent and Cetaceous orders. Professor Owen then enters upon the description of the lower jaw, or rather the fragments of the one above alluded to, found also by Mr. Darwin at Bahia Blanca, in lat. 30°, on the east coast of South America. The inquiry is conducted in the most cautious and philosophical manner, and leaves no doubt that the fossils in question are the fragments of a lower jaw and teeth of Toxodon, belonging, if not to *Toxodon Platensis*, at least to an allied species.

**Toxodon**

**Tracery**, a term of uncertain origin, perhaps of modern invention, but exceedingly useful and almost peculiar to our own architectural vocabulary, there being no corresponding term in any other language to denote with equal brevity and clearness that species of pattern-work formed or traced in the head of a Gothic window by the mullions [mullion] being there continued, but diverging into arches, curves, and flowing lines, enriched with foliations. The term is also applied to ornamental design of the same character, whether for doors, panelling, or joiner’s work; the only difference being that in windows the pattern or tracery is perforated, and in other cases closed, its nature is a mere pattern carved on the surface of a solid piece; except in traceried ornaments, where the tracery on doors, etc., is pierced, and then it is described as *open-work*. The latter term necessarily implies tracery of some kind or other, though 'tracery' does not imply 'open-work,' the latter being merely an exception from the usual mode. Much both of the beauty and character of the Gothic pointed style depends upon windows and their tracery; and it is one great and peculiar merit of the style, that such indispensable apertures for the admission of light are made to constitute some of its most striking features, and to exhibit very forcibly the pervading principle of the entire system. This is so strongly marked, that it is incomprehensible how in making any attempt at Gothic the victor or conqueror could fail to perceive how essential mullions and tracery are to the character of the style, and that to omit them in what professes by the general form of the aperture to be a Gothic window, is just like omitting the capital of a Corinthian column. Neither is it sufficient that the mere general outline and pattern of tracery and mullions be followed, for that may be done, and nevertheless the character be lost—at least greatly impoverished, and rendered mean, meagre, and shabby, as is generally the case more or less in modern Gothic windows and tracery.

On referring to Gothic Architecture, p. 323, it will be seen that 'Tracery does not occur in the simple lancet style or earliest form of Gothic, for there the windows were merely of so many single apertures, placed side by side, and united only by their external mouldings, instead of being included within a larger arch. The first principle followed was therefore rather of addition than of combination; but as soon as the latter idea was adopted, it necessarily led to the continuation of the window by perforating the tympanum, or space between the smaller arches and the larger one over them. At first this was usually done by filling up the head of the window with a single circle cut into single circle cut into small circles, and with the open spandrels or smaller triangular spaces so produced. Of such windows an example from Westminster Abbey is shown at the page above referred to, and on the following one are other instances where tracery of the same character becomes more elaborate and complicated, either by the circle being repeated, as in the example from York, or subdivided into smaller ornamental compartments, as in that from Exeter. These species of tracery is distinguished by the name of *Geometrical*, while that which succeeded it is termed *Flooring* from its being composed throughout of curved lines interwoven with each other, after the manner of the example from Kirton, which is shown along with others above mentioned. In *Perpendicular* tracery, on the contrary, the lines of the mullions are continued in the head of the window, and divide it into panels, which are in turn subdivided into smaller ones. The annexed is into smaller ones. The annexed is into smaller ones. The annexed is into smaller ones. The annexed is into smaller ones. The annexed is into smaller ones.
What is called Flamboyant tracery is a species of the Floising peculiar to French Gothic, and is remarkable not only for its richness and intricacy, but for its irregularity, the pattern of the separate compartments not being perfectly symmetrical, although one half of the window corresponds with the other. To the above-mentioned varieties may be added another peculiar to German, but not very common there; this has obtained the name of Stump tracery, in consequence of some of the moldings appearing to be broken off, and leaving only short ends or stumps where they intersect other lines.

Tracery of the same character admits of very great diversity of design, and that not only in different buildings, but in the same building, although such source of variety is rarely turned to account by modern architects. It has however been done by Mr. Pugin in the Catholic church now building in St. George's Fields, London, in which edifice all the windows exhibit different patterns of tracery.

TRACHELIPODA (τραχελός, trachelos, a neck; and φῶς, pous, gen. podos, a foot), Lamarck's name for his third order of the class Molusca.

Lamarck divides the order into two sections:


Div. 1. Air-breathers.

Families:—Colimataeans (Heltz, &c.), Limicenea (Limea, &c.).

Div. 2. Water-breathers.

Families:—Melaniatous, Peristomiates, Neritaceans, Janthianatous, Macrostomians, Plineceans, Scalarions, Turbinaeans.


Families:—Canifalaeans, Alateae, Purpuriferae, Columellaria, Convolutae. (Animals sans Fortebres.)

Fossil Carnivorous Trachelipods.

Professor Buckland, in his Bridgewater Treatise, remarks that most collectors have seen upon the sea-shore numbers of dead shells in which small circular holes have been bored by the predaceous tribes for the purpose of feeding upon the bodies of the animals contained within them; similar holes, he observes, occur in many fossil shells of the Tertiary strata, wherein the shells of carnivorous Trachelipods also abound; but perforations of this kind are extremely rare in the fossil shells of any older formation. In the green-sand and collife, he adds, they have been noticed only in those few cases where they are accompanied by the shells of equally rare carnivorous mollusks; and in the lias and strata below it there are neither perforations nor any shells having the notch mouth of perforating carnivorous species.

It should seem from these facts, continues the Professor, that in the economy of submarine life the great family of carnivorous trachelipods performed the same necessary office during the tertiary period which is allotted to them in the present ocean. We have further evidence to show that in times anterior to and during the depos-
TRACTHYTE, the name of a pyrogenous rock, extremely abundant among the products of modern volcanoes, and consisting of crystals of the same nature. This is so slight a deviation from the general action that it may almost be considered a mere figment of the imagination. TRACTHYTE is essentially a felspathic rock, and amongst other peculiarities often contains cracked crystals of felspar. It is produced in the formation of the common mass of the earth, as well as in the formation of the Siebengebirge, granular or earthy. Mr. Scrope (Journal of Science, vol. xxxi.) has given a convenient synopsis of the principal varieties of TRACTHYTE, distinguishing them by the nature of their composition, in which the force of traction may be exerted.

A. Compound trachyte, with mica, hornblende, or augite, and grains of titaniferous iron.

B. Simple trachyte, containing only felspar.

C. Quarziferous trachyte, with numerous crystals of quartz.

D. Siliceous trachyte, more than usually quartzose.

The equivalent rocks among old Plutonic or trappean masses are those which have principally a felspathic constitution, as the porphyritic rock of Drumadoon in Arran, the 'claystone' of the Pentland hills, the 'Elvans' of Cornwall and Cumberland. The term trachyte is from the Greek trachys, 'rough,' 'expressing the feel' of this volcanic rock. [Volcan.] (Daubeny, On Volcanoes.)

TRACTYLLAE. A genus of plants belonging to the family of Dilleniaceae, so named from τραχύς, roughness, because the leaves are remarkable for their asperity. The genus belongs to the tribe Dilleniaceae, of the above family, by which it is distinguished from the stature, which is much stouter, the plant is more robust, and 1 or 2 baccate many-seeded carpels. The known species are only two in number, natives of China and Cochin-China, climbing in habit, with racemes of flowers. Tracys or trachys, (1637.) Action so rough a surface, that they are employed in Canton for polishing both wood and metal.

TRACTION, in Mechanics, is the act of drawing a body along a plane, usually by the power of men, animals, or steam; when a vessel is towed on the surface of water, or a carriage moved upon a road. The power exerted in order to produce the effect is called the force of traction.

Numerous experiments have been made for the purpose of determining the power of a horse by means of the tractive shafts of the engine;action so rough a surface, that they are employed in Canton for polishing both wood and metal.

Numerous experiments have been made for the purpose of determining the power of a horse by means of the tractive shafts of the engine; but the amount of information is not sufficient to frame a striking conclusion. The force of traction exerted when a horse is employed to draw laden boats on canals, is found that if the work be continued for several days successively, of eight hours each, the force of traction is equivalent to a weight of 33 lbs. moved at the rate of two feet per second, or 15 miles per hour (it being understood that such weight is imagined to be raised vertically by means of a rope passing over a pulley, and drawn in a horizontal direction). The force of traction exerted when, without increase of weight or the ground, a horse is driven along, so that the weight so suspended, is estimated at 70 lbs. The action of a horse in drawing a vessel on a canal is said to be equivalent to a weight of 180 lbs. raised vertically, as above supposed, per minute. Now, from these experiments it is evident that the power of the horse remains the same, this lever becomes less as the plane of traction (that of the tractive shafts) inclines more upwards from the wheel; and therefore, in order that the power of the horse shall be equal to that of a leverage of the earth should be as small as is consistent with other circumstances.

Experiments have shown that when the angle of traction, as it is called, that is, the angle which the plane of the wheel makes with the road on which the carriage is moving, is 15 or 16 degrees, a horse pulls with good effect; and the height of the points at which the tractive shafts are attached to a horse's collar being about 4 feet 6 inches above the ground, it is evident that if the plane of the tractive shafts be 15 or 16 degrees, that part of the plane which is in contact with the wheel, or which is the effective part, is probably no less than 5 feet 6 inches above the ground, which is the height of the effective part of the wheel, or which is the point of contact of the wheel with the ground.
TRA

and such officers of state in Ireland as are privy counsellors
in England; but those functionaries do not ordinarily in-
terfere in its government. The clerks of the council are,
ex-officio, secretaries of the Board of Trade, but that duty is
performed by two joint-assistant secretaries.

The vice-president of the Board of Trade
exercise, in effect, the duties which in other countries are
performed by the minister of commerce. Their office is
not indeed executive, but rather consultative, the orders
rendered necessary by their decisions being given by the
 Lords of the Treasury or by the secretary of state, as
the case may require. A great part of the business connected
with the government of the colonies, which used formerly
to be transacted in this department, has of late years been
transferred to the new colonial department, but all laws passed by colonial legislatures must
receive the formal sanction of the Board of Trade before
they are assented to by the crown.

Besides the matters of government connected with com-
merce which are brought under the consideration of the
Board of Trade by direct application from merchants or
other parties interested, all questions of that character
which come before the executive branches of the govern-
ment, and referred to the Board of Trade, is a part of its
jurisdiction; addition to this the legislature has provided that its
sanction shall be required in order to legalise the exportation
of machinery, and recently it has placed under its control
the construction of the railways in the colonies, so that the
management of the same may involve the safety of the
public. The department for receiving returns of the prices
of corn within the kingdom and for declaring thereupon
the rate of duty chargeable upon foreign grain imported,
is likewise attached to the Board of Trade, and in 1822 a
department was newly created under the control of the
president and vice-president, for collecting and arranging
statistical information, with a view to its presentation to
parliament.

TRADE-WINDS is the term used by seamen to indicate
the perpetual or constant winds, because they promote
more than any other circumstance navigation and trade.
Though trade winds occur on all open sea on both sides of the equator, and to the distance of about
30 degrees north and south of it. They were not known to
the ancients, and seem to have been unknown even to
modern seamen up to the time of Columbus. Though
before his time Portuguese navigators had proceeded as
far as the Cape of Good Hope, they had not ventured to
any great distance from the coast of Africa, and conse-
quently they had not entered the regions where the trade-
wind prevail. Columbus however, having been a few
weeks at the Canaries, to which the trade-winds extend in
summer, seems to have conceived a just idea of their ex-
tent. On his first voyage, after leaving the Canaries, his
crew were greatly alarmed at finding that the wind always
blows from the east and southeast, and feared that the
voyage would be prevented by it from returning to their native
country. Columbus did not participate in their fears,
and on his return from the newly discovered islands
his track was north of the trade-winds, in the region of the
variable winds. After the time of Columbus, European
navigation extended rapidly in the Atlantic and In-
dian oceans, and the trade-winds became generally
known. It does not however appear that any attempt to
explain this phenomenon was made before the time of
Galileo, who, in adopting the system of Copernicus and
the revolution of the earth round its axis, thought he found
some confirmation of this opinion in the trade-winds,
which Galileo supposed to be the result of the delusion
of the earth, by which the sun, on account of the axis
of the earth and to the circumstance that the atmo-
sphere, though it participated in that motion, could not
follow with equal speed the motion of the dense parts of
our planet, the motion of the air was thus produced which
was contrary to that of the earth round its axis, or
from east to west. The strongest proof in favour of this
hypothesis was the circumstance that the trade-winds
occurred in all latitudes, while the earth in its revolution round its axis has to make a large
circle in twenty-four hours, and consequently must move
with a greater degree of rapidity than in the higher lati-
itudes. The opinion of Galileo was generally adopted up
to 1666, when Halley's hypothesis was published in the
"Philosophical Transactions." Halley had collected more
extensive information respecting these winds, and soon
discovered several facts, which were incompronsible to
the opinions of the previous writers. His principal de-
finite were that there are no trade-winds near the equator, where
the diurnal motion of the earth is greatest, and that the
trade-winds change their position according to the seasons, which
would not happen if they were only the effect of the rotation
of the earth.

The facts respecting the trade-winds, which had been,
collected by Halley, have not been materially increased
in number since his time, but they have a more fixed form.
The trade-winds are at rest with on both sides of the equator. The mean boundary-line of the region in
which they blow, and beyond which variable winds prevail, is about 28° lat. in the eastern parts of the
world, 30° in the north, 20° in the south, and 18° or three degrees farther north and south. To the north
of the equator they blow in the eastern parts of the
ocean from the north-east, seldom from the eastward
of east-north-east, or from the northward of north-north-
east. In proceeding farther west they become more
easterly, and often they blow from due east, and sometimes
from the south of east, but generally they are one or two
points north of east. To the south of the equator the trade-
wind blows from the westward of west-south-west, or
west-south-east, and usually between south-east and west, but they also
desire more to due east in reaching the western portion of the ocean. They do not occur in the vicinity of the
poles or in the near confines of the land kingdoms, as
in the northern part of the sea in which either periodical or variable winds prevail. The trade-winds therefore are only experienced when w.
are well out from the land in the open sea. The wind blow-
with less force and steadiness in the eastern than in the
western hemisphere. In the latter however, it is more easterly than in the former. The region in which the trade-winds occur is an almost continual serenity and fair weather. Though
the trade-winds of the northern and southern hemisphere
blow in an oblique direction towards one another, they do not
meet in general, but are divided by a tract of sea in
which they are frequently prevail. It is at the lightest
wind, and mostly from the west, are met with. This region of the
calms is distinguished by a thick foggy air, and frequent
rains of short duration attended by thunder and lightning.
The region of calms which extends over the north-eastern
trade-winds from the south-eastern, and which usually
occurs a width of four or five degrees of latitude, is not always
found at the same part of the ocean, but advances farther
in the northern hemisphere when it is in the southern hemisphere.
The region is observed respecting the winds themselves. Though
the mean boundary-line of the trade-winds is 29° lat. in the
eastern parts of the ocean, it extends two, three, and
four times farther south in the southern hemisphere, as
the northern tropic, and about the same distance farther
southward when the sun is near its greatest southern
decimation. It sometimes happens that a north-eastern wind
occurs as far north as 46° in the Atlantic, along the
southern coasts of Spain and Portugal, but as this is seldom
the case, it is supposed that such a wind cannot be con-
idered as a trade-wind, but only as one of the variable
winds which prevail to the north and south of the trade-

winds. There are also a few instances in which the
north-east and south-east trade-winds have not been
found separated by a region of calms, but in which a
veil, with the intervention of a calm of short duration,
have produced the same effect. The theory of Halley rests on the well-established
principle that wind is only a current of air or a part of our
atmosphere in a state of more or less rapid motion, and
that its principal cause is the partial or local rarefaction produced in the
air by heat. When the air is heated, it becomes spec-
ically lighter, and in this state ascends: the less rarified or colder air rushes into its place to restore the equilibri-
mum, and thus forms a current of air, or what is properly
called a wind. The rarefied air, as it ascends, press on the
atmosphere by the apparent diurnal progress of the sun is the origin
of the trade-winds. It appears that the heat caused by
the sun in the air is strong enough to produce this rarefaction to
cause a constant degree of latitude, as the trade-winds,
including the region of calms, extend over nearly such a
portion of the globe. In this immense space the rarefied air is replaced by the colder and denser air which rests above it. The transposition of air is the trade-wind. As the difference of the density of the two currents of air which come in contact is not great, the wind is of moderate force. If the two currents are not certainly excited and opposed, as in the progress of the sun, it would blow from the north on the north of the places which are under the influence of the perpendicular rays of the sun, and from the south on the southern side of them. If the density of the wind is infinitely less than that of the earth. Hence it follows that the wind has hardly taken direction which is imparted to it by the rarefaction of one place, when the place of the greatest rarefaction has already changed, having been made up of the support of the wind from the place. the wind decline to the place of greater rarefaction, and thus the northern wind is converted into a north-eastern and the southern into a south-eastern wind. If we further consider that this process in the atmosphere is rapidly extending westward when not interrupted by the intervention of high land, we easily conceive that the quick progress of the rarefaction towards the west must insensibly influence still more the direction of the wind, and hence it is found that a change of wind would occur near the equator the trade-winds blow nearly from due east.

The trade-winds, both in their direction and limits, incline towards the sun, or place of greatest rarefaction; that they are exactly in the same part of the earth in which, from it, having heated the northern hemisphere, the trade-wind descends farther on the eastern point than in the opposite season, and blows with strength towards the place of greatest rarefaction; and its northern limits reach from the equator, and in some places beyond, the 40th. The north-east trade-wind at the same time inclines nearer to the east point than in the other season, blowing with less strength, and becoming contracted in its southern limits, which then receive several degrees, sometimes 14 or 15, to the north of the equator. In the opposite season, when the southern hemisphere is greatly heated by the sun, the north-east trade-wind blows stronger, declines farther from the equator, and in some places beyond, the 40th. The strength of the trade-wind at the same time is considerably diminished by the influence of the sun, and approaches some points nearer to the east point.

Thus all the phenomena of the trade-winds are satisfactorily explained by the theory of Halley, with the exception of the region of calms. No satisfactory explanation has been offered for this phenomenon. Kiempt, in his "Manual of Meteorology," contented himself with saying, "that the cold air, gradually advanced from the east, is heated to the highest degree. There the ascending currents of air are the most rapid; and by this quick ascent the velocity of the wind blowing along the surface of the earth is greatly diminished. Besides it would seem that the wind might be experienced on the surface of the earth at one another at a comparatively small elevation above the surface of the globe. These two circumstances appear to be the reason why no regular winds are met with within the region of calms."

This explanation of Kimpt, the value of which we do not venture to determine, refers to a principle of the theory of Halley which has not yet been mentioned. According to this principle the heated and rarefied air rises above the more dense portions of the atmosphere; and when arrived at a certain elevation above the surface of the globe, it is condensed by the cold, but being unable to return to its former place, which has been occupied by a colder air from another direction, it rises particularly if the land be barren and destitute of moisture. In the Sahel, or western part of the Sahara, an easterly wind blows all the year round with great force, but in the eastern district of the Great Desert it is less constant and less violent, so that in all respects it may be compared with a trade-wind. An easterly wind is also always found on the plain drained by the Amazonas; and by its assistance the voyage against the strong current of the river may be accomplished nearly in the same time as the voyage downstream. Halley adds that he has found this easterly wind, which near the mouth of the Amazonas is moderate, has acquired such a force at the mouth of the Amazons that it is almost impossible to keep a vessel against it, and that although its intensity and though of less strength, is found in the great plains which is traversed by the lower course of the Orinoco.
The countries just mentioned, in which these easterly winds blow constantly, are contiguous to those parts of the Atlantic Ocean where the trade-winds generally are regular all the year round. But the trade-winds of the ocean and the land-winds of the plains do not come into contact with one another. They are separated by a tract of the globe in which neither of these winds prevail. This tract lies Hitherto the ocean, and extends along the coasts of the continents; its width varies greatly. Where it lies east of the trade-wind it is usually a hundred miles wide, but it is of inconsiderable breadth where the land lies to the west of the trade-wind. The continuity of the easterly winds is evidently interrupted by the difference of the temperature of the air incumbent on the sea and on the land. This difference changes with the seasons, the air over the land being hotter in the winter when the sun is nearer the equator on account of its being colder when it is far off. Hence it follows that during the first period the wind blows from the sea to the land, and in the second from the land to the sea. Thus a kind of monsoon is produced along the coasts of the continents, even within the region of the trade-winds. A large island in such a situation is therefore surrounded by winds blowing from all quarters. When the land of Australia is heated by the presence of the sun in the southern hemisphere, the winds, which blow from the north-west and north-east, are raised from the north-west coast, and from the north-west upon the western coast; from the south-west, and south-east on the southern coast; and from the south-east and east upon the eastern coast. In the opposite season however, these winds are less regular, because the greatest part of the island is then without the reach of the trade-winds. The trade-winds occur on both sides of the equator in the Southern Hemisphere, and here they vary considerably in extent and force in both oceans. Some account of this difference is given under the heads of Atlantic Ocean (vol. iii., p. 20) and Pacific Ocean (vol. xvii., p. 119). We shall here add, respecting the last-mentioned sea, that the trade-winds in the southern parts appear to be subject to great changes in direction and force, and that they properly occur only along the coasts of South America, where a constant south-easterly wind is met with at a distance of 800 miles from the coast. In the mid-latitude of the Southern Pacific the trade-winds seem by no means constant. Captain Fitzroy, in speaking of the Paamut Islands, or the Dangerous Archipelago of the Low Islands, says that among them a steady south-easterly trade-wind prevails from March to October, but that in the rainy season, from October to March, westerly winds, squalls, and rains are frequent; and in the Abstract of his meteorological journal we find that in running from the Galapagos Islands, which he experienced only south-easterly winds near the equator; and that in the remainder of his voyage the wind blew almost constantly from the north-east, north-north-east, or north-east by east. Kotzebue, on his voyage round the world, observed it as a very probable circumstance, that between Easter Island and 14° 51° S. lat. he met only with winds blowing from north, north-east, and east-north-east. This anomaly in the trade-winds of the Southern Pacific is probably produced by the innumerable islands and coral reefs which cover that ocean between the equator and the southern tropic, and extend from 130° W. long. to the coast of Australia. Horshu says, probably from his own observation, that 'where shoal coral-reefs shoot out of the deep water in many places between the tropics, a decrease of the prevailing wind is frequently experienced; for when a steady wind is blowing over the surface of the deep water, no sooner does a deep groove form the vorge of a shallow coral-bank than a sudden decrease of the wind is often perceived. This is, in his opinion, occasioned by the atmosphere over these banks being less rarefied by the increased evaporation than that over deep water, and consequently not requiring so great a supply of air to restore the equilibrium, as the circumjacent parts, which are more rarefied and heated. When such effects, according to the statement of this ingenious hydrographer, are produced by single coral-reefs, it may be supposed that the ocean, and the islets of the ocean, may be supposed that their number and immense extent in the Southern Pacific not only diminish their force, but change the direction of the trade-winds, and that these reefs and islands extend so far at its extreme extent as a considerable extent. It appears that in the Southern Pacific the trade-winds are replaced by the north-eastern, northern, and western winds only during the period when the sun is in the southern hemisphere.
which is considered as history merely because it presents nothing that might not happen every day and within our own experience. It is better simply to accept a tradition than to treat it in either of these ways; for thus we have at least a faithful memorial of the manner in which our predecessors conceived the view of certain things, whereas in the former case we have little more than dreams or a spectrum of history.

In the history of Christianity the term tradition has been used in the so-called unwritten word of God, that is, to the doctrines said to have been communicated by Christ to his apostles, which were not written down by them, but were handed down by their oral instruction to his successor, and preserved by the bishops, and prevented from becoming corruptions like other traditions, by the influence of the Holy Ghost. This tradition is preserved in the writings of the ecclesiastical fathers, and the Church of Rome regards them, next to the Bible, as a source of knowledge which ought to regulate the life and religious observances of Christians. She claims for them the unconditioned faith in regard to its divine authority as for the doctrines of the New Testament. This theory has been established by the council of Trent; and the New Testament and tradition are made to go hand in hand, and to exercise a mutual influence upon one another by completing and explaining one another.

The substance of the tradition thus revered by the Church of Rome however varies considerably from the doctrine of the Church itself; and some of these forms, such as the baptism of infants, the celebration of certain festivals, and the like, are retained and observed by Protestants, while on the other hand, and do not consider it binding.

**TRAGACANTH.**

**[Astragalus.]**

**TRAGACANTH.** Familiarly termed **Gum-Dragon,** is the produce of several species of the genus Astragalus, belonging to the section Tragacanthae of the genus Astragalus. The A. vermiculatus Olivier, *Voyage des Évêques d'Ottoman,* v. 342, a native of the north of Persia, Armenia, and Asia Minor, yields the greater part of what is used in Europe. Persia supplies the Medina and Bagdad, but rather the marvellous than the medicinal. The quantity is also obtained from A. gummosa (Laibl.), but this is not marketable in Europe.

A. creticus, Lamarck (Tragacantha Cretica inanna, Tournefort), yields it sparingly; while, according to Sibthorp (*Prod. Pl. Gracac.* ii. 90), the tragacanth which is used in Italy is obtained from the A. aristatus (Villars, non L'Héritier, nee Wild., the plant of which last two is a native of the Alps and Pyrenees, and with which Wilder erroneously confused the mountainous A. punea, or A.').

The A. groenlandicus, or the A. angustifolius, and the A. eburneus, are also known. The latter, which, according to Sibthorp, yields the tragacanth of the Diocoreides. The A. tragacanthus (var. a. Linn.), the A. Massalitenis (Lamarck et Dec.), long reputed to be the gum of China, yields no corresponding gum, but is a gummy juice, which is used in confectionery. In the lute months of July and August, particularly after a dewy or a cloudy night, the branches of A. verum are found encreted with tragacanth. It is not procured by artificial incision, but exudes spontaneously from natural efts in the bark, or from punctures made by insects, or more probably by a subepidermal fungus, like the *nemaspore croceae,* the tendrils from which the juice exudes are always in an unhealthy state, or ready to perish. (Oceannol., *Phys. Feg.* i. f. 74.)

In commerce tragacanth occurs in two forms, termed vermiculatum, and fragile or cake tragacanth. The former, called also Morea gum, is not produced in this country. It is mostly in small twisted threadlike pieces, seldom in flat or bandlike portions, of a variable size, of a whitish colour. The larger irregular pieces often run together, and are of a yellow or yellowish-brown colour. White crystalline articles of India, and other names, are not genuine. Flakes or Smyrna tragacanth occurs in tolerably large, broad, thin pieces, with concentric elevations or lines, seldom of a filiform shape: colour whitish. Both sorts are hard, yet flexible. For medicinal purposes it is recommended not to have a dull and splintery. It is with difficulty reduced to powder, except in winter, or in a heated mortar. It is devoid of taste and smell. It swells in the mouth, and is lubricious. Fine tragacanth is rendered less, and is best affected by it, as well as an artificial substance prepared by boiling starch, which last article, which is the
called tragacanth, does not swell in water. Kutera gum, which is sometimes mixed with or substituted for genuine tragacanth, is not affected by tincture of iodine. It always occurs in stalactite-like pieces, and, consisting almost entirely of morin, is scarcely soluble in water. According to the analysis of Guerin-Varry (Journal de Chim. Méd., viii. 742), tragacanth consists of

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<tr>
<th>Soluble part</th>
<th>Insoluble part</th>
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<tr>
<td>Carbon</td>
<td>42.01</td>
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<tr>
<td>Hydrogen</td>
<td>6:42</td>
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<tr>
<td>Oxygen</td>
<td>7:11</td>
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<tr>
<td>Carbon</td>
<td>54.87</td>
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<tr>
<td>Oxygen</td>
<td>57:10</td>
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The soluble part, termed tragacanthin, or adragantin, though considered identical with that of gum-arabic, and therefore termed arabin, differs inasmuch as neither siliPhi| potash nor perchloride of iron affects it, while alcohol produces a peculiar precipitate. This must be borne in mind in considering Guerin's proximate analysis of it, which is—

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<tr>
<td>Arabian</td>
<td>53:30</td>
</tr>
<tr>
<td>Bassorin and starch</td>
<td>3:10</td>
</tr>
<tr>
<td>Water</td>
<td>11:10</td>
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<tr>
<td>Ashes</td>
<td>2:50</td>
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Tragacanth may therefore be considered as a conglomerate of gum, bassorin, starch, and vegetable membrane. It is considered as a substitute for starch in water, and, which it is more nourishing, but less digestible. Tragacanth is to be preferred to gum-arabic to form a mucilage, as one part will insinuate fifty parts of water. It is better to allow pieces of tragacanth slowly to dissolve in cold water than to use the powder with boiling water. Both the mucilage and powder are used to suspend heavy powders in water; also to make lozenges and pills. For electuaries it is improper, as it renders them alimony on keeping. As a demulcent, or means of soothing the surfeives and intestines, it is preferable to gum-arabic, its insolubility rendering it a more efficient protection to the mucous membrane against either acid poisons or unwholesome secretions. Thus, in India, tragacanth boiled in rice-water is advantageously administered in dysentery and bloody fluxes. Externally, a thick mucilage of tragacanth is a good application to burns, to exclude the air.

In the arts tragacanth is of considerable utility. In Persia and France it is used to stiffen cloth, girls, and, in this country it was much employed to stiffen calico. It is now however so greatly superseded by less expensive indigenous mucilages, that in 1830 duty (6a. per cwt.) was paid on 57 cwt. only. The inferior kinds are used by shoemakers to glaze the edges of the soles of boots and shoes.

TRAGEDY. [ENGLISH DRAMA]

TARACE, a genus of plants of the natural family of Euphorbiaceae, so named in compliment to the name of Tragus, born in science by a German botanist of the name of Bock, which signifies a 'goat,' as does its Greek translation. The species are found in India and America, being climbing in hab., and some remarkable for stinging as violently as nettles. T. cannabin, so named from its leaves resembling those of the Cannabis, or hemp, and of which the roots given in infusion are considered diaphoretic. T. involucrata, is a small plant without taste or smell, but the native physicians of India consider it calculated to strengthen the system in cachectic states of the constitution and in chronic cases of syphilis. T. volubilis, which is stinging climer, and has a very acid juice, is employed in conjunction with common salt for the destruction of some kinds of ulcers.

TRAGOPAN. [PHASIANID. VOL. XVIII. P. 65.]

TRAGOPAN (from τραγός, a 'goat,' and φόνος, 'slain') is a genus of plants of the natural family of Cichoraceae, which is usually considered only a tribe of the great order of Composite. The genus Tragopan, or Goat's Beard, is so named from the long silky beard or pappus of the seeds. The genus is distinguished by having the glumes of most of its species naked. Pappus stalked, plumose. Achene longitudinally striated. The species are found in the temperate parts of Europe and of Asia. One, T. gracilis, is found in the Himalayan Mountains, of which the leaves are eaten by the natives as lettuce is in Europe, but without being blanched. The best-known species in this genus is T. pratensis, the roots of which are said to possess their flavour and sweetness, and are boiled or stewed like carrots. The stalks of year-old plants are sometimes cut in the spring, and, when similarly dressed, taste like asparagus.

TRAGUS HIÉRO/NYMUS (whose German name was Bock, and whom the French call Le Bouc), a German botanist of the sixteenth century. He was born at Heidebach in 1498. In early life he received a good education, and became well acquainted with the ancient languages. He was appointed master of a school at Zweibricken; after this, he studied medicine, but having embraced the reformed religion, he became a preacher, and was still his dean minister at Hornbach. His medical studies directed his attention to the subject of botany, which he pursued with great ardour throughout his life. Up to this time no advances had been made in the science, and times of Pliny and Dioscorides. The Arabian writers had satisfied themselves with copying Greek and Roman writers, and making comments upon them without adding anything new. But Tuchmann of Nuremberg, who lived early in the sixteenth century, was beginning to emancipate itself from the thraldom of authority both in science and religion. Instead of taking for granted all that had been written about plants, he commenced observing for himself. The same spirit also manifested itself in Brünels, Fuchs, and Gesner; with these great naturalists, he was on terms of intimacy, and the first result of his labours in botany was published in 1531, in a work entitled 'Herbarium,' a collection of plates and inscriptions of Herbarium Nomenclatur und Brünelfisman.

In 1539 Tuchmann published his great work on which his reputation depends. It was written in German, and entitled 'Neu-Kreuterbuch vom Unterschiede, Wurkume und Namen der Kreuter, so in Deutschland wachsen,' Strassburg, folio. In all previous modern works on botany the plants had been arranged alphabetically, but in this work Tuchmann adopted a natural classification, which, whatever its defects, has the merit of having commenced the modern attempt at the classification of plants. He divided the vegetable kingdom into three classes:—1, wild plants with odoriferous flowers; 2, trefoils, gramineae, potherbs, and creeping plants; 3, trees and shrubs. This classification was of course imperfectly, but however served to open the way to better systems. He commences his work with a description of the nettle, and for this reason the two classes are assigned:—1, That which was to teach medical men in the practice of medicine not to despise the meanest plants; and 2, that the nettle was his family badge. The first edition of this work was published without illustrations, but in 1546 an edition was published containing upwards of 800 wood-cuts. To Tragacanth, Fuchs, and Brünels belongs the merit of having commenced the illustration of works of natural history with wood-engravings. Haller says that he was homo jucularius, and in his representation of plants this is made evident by the additional illustrations, and the number of species illustrated. Thus Pyramus and Thalie are stationed at the foot of the mulberry-tree; Eosop demonstrating his innocence under a fig-tree; and Noah surrounded by his three sons chosen as an illustration of the effects of the vine. Many of the wood-cuts were good, the majority of them were copied into the various herbs that were published in the sixteenth and seventeenth centuries. The descriptions of the plants are short and somewhat obscure; they were never rewritten, and the structure of the name is generally very imperfectly understood in the time of Tuchmann. He has given the Hebrew and Arabic names of the plants, as well as the Greek and Latin, but in these synonyms he exerted himself in the identification of the German plants with those of ancient writers. The bookings of this work with the names of the plants were pub
lahed at Strassburg by Trev, in 1550 and 1553, under the title, 'Viva auque ad Vivum Expressim imagine omnium Herbarum in hoc Herbario depictarum solem, 4to.' A Latin edition of the Kräuterbuch was published by Kyby in 1552. This edition has a learned preface written by Conrad Gesner. It is sometimes spoken of as a separate work of Trajan. It has for its title, Hieronymi Trebizissiani Herbarium descriptus, etc.; libri tres in Latinam linguam convertit, inter alia David Kyber Argentinesi, Argent., 4to. Several editions of the German book have been published; the first of these is that of 1659, which was edited by Melchior Sebitz and Nicolas Agerius. Trajan died at Hornbach in 1554.

(Haller, Bibliotheca Botanica; Adamson, Familles des Plantes; Бог. Univ.)

TRAJAN'S COLUMN, a celebrated work at Rome, which has served as a precedent rather than as a model for other triumphal or honorary pillars. [Trajanus.] The idea of employing a column for such a purpose—probably derived from Egyptian obelisks (Osiris) —seems to have been first adopted by the Romans, but neither manifests much invention nor regard to propriety. An obelisk is evidently complete in itself; it is not intended to bear any support, or to be kept steady by it, but is calculated to stand by itself. A Trajan's column, however, and he has been accurately traced, which is detached from which and from its entablature it has no meaning or any particular grace, being apt to look tottering and 'top-heavy.' It is chiefly as forming a lofty and conspicuous object that the single column recommends itself as a triumphal monument; yet such a colossal outline might be preserved without adhering to the precise shape and details derived from examples from any one of the orders. In this respect Trajan's pillar is not so great an architectural selection as many of the numerous columns professing to be in imitation of, or 'after' it, because, owing to its shaft being entirely embossed with sculptures, which, as Dyer happily expresses it—

"The ordinary column character is done away with, and a degree of variety and magnificence is produced which may be allowed to silence the objections of critics. There certainly was something poetical in the idea of making the shaft which bore the emperor's statue record his conquests and military exploits; and the sculptures themselves, though necessarily calculated for the present, are yet highly interesting and valuable as historical documents of costume. At the same time they serve to make evident how very ill the surface to which they are applied is calculated to display them; for, instead of being extended horizontally, they are arranged vertically, and, though they are necessarily not the same in the upper part of the shaft can hardly be made out; nor can those on the lower one be viewed consecutively, without going round and round the column. This historical poem, as it has been called, addresses itself therefore more to the imagination than to actual inspection. Still the idea is magnificent, and the general effect of this column, as it stood originally in the centre of a regular area (Trajan's Forum), enclosed by colonnades, must have been very grand and picturesque. Trajan's column and the surrounding forum were the work of Apollodorus of Damascus; and the former was completed a.d. 114, six years after its commencement. It is a column of one piece, which is of basalt, but which, being also embossed with sculpture, as is likewise the base; therefore although it is usually described as being of the Tuscan order, its character is altogether different, being that of extreme richness and decoration. It has a staircase within, and is constructed of white Luna, or what is now called Carrara marble. Semper, a German architect, who had lately an opportunity of minutely examining the upper part of the shaft, discovered traces of polychromy on the building of the capital. Though not so lofty, the Trajan Column is very far superior to the Antonine. [Antonine.] There are engravings, by Piranesi, of both, on an exceedingly large scale, the plates showing the elevations of the shafts, or rather colossi, as the name now is applied to these statues. The statue of St. Peter, which now stands on the Trajan Column, was erected by Domenico Fontana, in 1558, by order of Sixtus V. The following are the comparative heights of this and some other monumental columns, measured to the top of the shafts:

Antonine Column, 139 feet.
Trajan Column, 155 feet.
Napoleon, Place Vendôme, Paris, 116.
Pompey's Pillar (monolith), 96.
Alexander, St. Petersburg (monolith), 121.
Napoleon, Boulogne, 141.
York Column, London, 95.

Great Obelisk in front of St. Peter's, 132. [See Ollié, p. 386, for the dimensions of others at Rome.]

TRAJANOPOLIS, or SELINUS (Σέλινος), was the most western town of Sicilia. The emperor Trajan having died at Selinus, this town was for some time called Trajanopolis. It was situated on the mouth of the river Hebrus, a little distance north of the pass which is formed by this river through the range of Mount Rhodope, and about 40 miles from its mouth. According to the 'Itinerarium Antonini,' this town was situated between Brices and Cypsea, 37 miles from Brices, and 39 miles from Cypsea. Ptolemy mentions Trajanopolis (ili. 11). In the fourth century a.d. Trajanopolis was still a considerable town, and so it was in the time of Constantine Porphyrogenitus. Manntert thinks that this town was destroyed by the Turks in the fifteenth century. He has also examined the ruins of it. Paul Lucas however discovered an ancient aqueduct at a short distance from the present town of Trajanopolis. This modern town is situated on the banks of the Maritsa, or Hebrus, on or very near the site of the ancient town. According to the 'Itinerarium Antonini,' this town was called the city of a Greek archbishop; it is a small town of no importance: in 1829 it was taken by the Russians on their march from Adrianople to Enos. (Manntert, Geographie der Griechen und Römer, vii., p. 234.)

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lar with the troops; and though we know very little about his early life, we must suppose that his merits were great. This we may conclude from the circumstance that the emperor, who in old age fancied himself to be a poet, adopted him a.D. 97, and chose him for his successor, although there were several relations of Nerva who had perhaps more claims to the throne than Trajan. But, says Dion Cassius (lvi., c. 9), "the choice was evident by his consent of a person who, having been devoted to the welfare of the empire; and he considered Trajan's Iberian origin as a matter of indifference. Yet Trajan's nomination as Cæsar was a new thing in Roman history, the imperial throne having hitherto been exclusively occupied by members of the old Roman aristocracy, so that Trajan was the first emperor who was born beyond the limits of Italy.

Trajan received the news of his nomination in Cologne, and three months later ( Aurelian Victor, Epitome, c. 122) the death of Nerva, which took place on the 27th of January, 98, made him master of the Roman empire. On his arrival at Rome the people received him with great demonstrations of joy, and Trajan soon proved that he deserved his high station. He appointed distinguished and honest men as public functionaries; he cured the turbulent body of the Praetorians; he issued an edict against false accusers, and he banished those who were accused of violating the honor of the empress. In his speeches to the bar of the Forum and in other public places, he never forgot his dignity. His virtues and eminent qualities became conspicuous in the first years of his reign, as we may see from the panegyric of Trajan, which Pliny the younger read in the senate as early as 100, after he had been made consul. In 100 Pliny, who was a personal friend of the emperor, was appointed procorn of Bithynia and Pontus; and having inquired into the state of the Christians, he recommended them to the emperor, and thus mitigated the persecutions to which they had hitherto been exposed by Pliny himself. The letters that passed between Pliny and Trajan are the best sources with regard to the private character of this emperor.

As early as 100 Trajan was engaged in a war with Decvalus, king of the Dacians. At the head of a numerous army Trajan crossed the Danube, defeated the enemy, and in 101 took their capital, Zemczezethus (Dion Cassius, lvi., c. 9), which was most probably situated on the site of the present village of Varthe, not far from the pass of the 'Ior Porte,' in Transylvania. In 102 Decuvalus was compelled to purchase peace by the cession of a part of his territory; and on his return to Rome Trajan celebrated his third triumph, and was exulted with the name Dacicus. Lucius Quintus and Hadrianus, afterwards emperor, distinguished themselves in this war. Annoyed by his dependence on Rome, Decuvalus violated the peace as early as 104, and Trajan hastened to the Danube. In order to finish the war by the conquest of Dacia, he ordered a bridge to be constructed over the Danube, which was the largest work of this kind mentioned by the ancients. According to Dion Cassius it consisted of twenty piers, 150 feet high, 60 wide, and 120 feet apart; the piers were united by wooden arches. (Dion Cass., lvi., c. 13, ed. Reimar, and the note.) The whole length of it has been calculated at 4770 Roman feet. If the statement of Dion Cassius is true, this bridge seems not only to have served for war, but the immense height of the pillars, of which scarcely more than seventy feet can have been under water, leads to the supposition that it was at the same time a strong fort to be continued to the navigation. At a height of eighty feet above the water, soldiers were protected against the missiles of the Dacian ships, while the fleet of the enemy in passing that bridge ran the risk of being of passage attacked at Szericez in Hungary, or five leagues above the junction of the Ant with the Danube, in Wallachia, not far from Neapolis, where ruins of the Roman colonies of Romula and Czarda Nova, and a Roman road, which is pretty well preserved, still exist. The Danube was divided into Donaulus. Dacicus, where he encountered the Romans, he killed himself in despair (105); and in 106 all Dacia was conquered and made a Roman province by Trajan, who sent there nume-

— [Wallachia.] Trajan returned to Rome in the same year, and celebrated his second Dacian triumph. In memory of his victories over the Dacians a column was erected, in 114, by the architect Apollodorus on the Forum Traiani, which, having been preserved from ruin, is still admired as one of the finest remnants of ancient art. The column was 144 Roman feet high, according to Eutropius (vii., c. 2), and on the base of it is the following inscription:

SERAPIS POPOLUSQUE ROMANUS
IMP. CAESARI DIV. NERV. ET. NERVI
TRAIANO AUG. GERM. DACICO. PONTIF.
MAXIM. TRIB. POT. XVII IMP. VI. COS. VI. P. P.
AD ORIACONIUM QUINTAN. ALTITUDIN.
MONS ET LOCUS TANTI OPERIDUS
SJ. EGRETUS.

Another column, which is likewise extant, was erected in honour of Trajan by the inhabitants of Beneventum after his victories over the Parthians.

After the conquest of Dacia, eight years of peace elapsed, during which Trajan employed in a careful administration, and in admiring Rome with beautiful buildings; he also founded a library, the Bibliotheca Ulpio, and an institution for the education of poor Italian patriarchs. (Fr. A. Wolf, Von einer milden Stiftung Trajans', Berl., 1808, 4to.) In 114 Trajan left Rome to lead his armies against the Parthians.

In the Asiatic part of the empire peace had already several times been disturbed, principally by the Aramites, who however were subdued by Cornelius Palma, the pro-
consul of Syria, who, in 105, conquered Arabia Petraea, and made it a Roman province. Some years later Cossoroc, or Khotraw, king of the Parthians, who were suffering from the consequences of a violent earthquake, and in the following year, 115, opened a new campaign. He crossed the Tigris, in the province of Adiabene, and the Parthians having again been defeated, he took the towns of Nisibis, Edessa, Ctesiphon, and Seleucia; Babylon, Assyria, Armenia, and Mesopotamia became Roman provinces; a rebellion of the Jews in Egypt and Cyrene was quelled; Khotraw was deposed, and his brother Parthamaesaris was put by Trajan on the throne of Parthia.

Reverse of Coin of Trajan.

After the conquest of these extensive provinces Trajan sailed with his fleet on the Tigris to the Persian Gulf, and took up his winter-quarters in the town of Susiana. When he had reached the sea, the example of Alexander suggested to him the idea of conquering India, but remembering his advanced age, he renounced that scheme. (Dion Cassius, lib. 17, chap. 5.) On the return of the Persian war, he sent his fleet into Arabia, and ordered a fleet to be kept on the Red Sea. Suffering from dropsy, he set out for Rome, but he died on his way at Selinus, a town in Sicilia (Trajanus Traile, 2059, 88, and 117, at the age of sixty-five years, three months and four days, according to Eutropius (viii., c. 2).)

Trajan was one of the greatest emperors of Rome. He is said to have been addicted to women and wine; but it is also characterized as a man of great warlike and conquering spirit. However, he undertook no war for frivolous motives. He deserved the title of "Optimus," which the senate conferred on him. The memory of his name lasted for centuries, and two hundred years later the emperors used to receive the emperors with the acclamation, "Be happier than Augustus, and better than Trajan!"

The body of Trajan was transported to Rome, where it was deposited under the Column Trajana. His successor was Hadrian. (Aurelius Victor, De Caesaribus, c. 13; Epitome, c. 13; Suetonius, Divi Caesarum, 8, 14, 29; H. Francke, Zur Geschichte und seiner Zeitgenossen, 1837, is a very valuable book.)

TRAJECTORY, the technical name which was formerly given to a curve, that is, to a curve required to be found by means of given points; most frequently used for the required path of a particle acted on by given forces. The term is now seldom used.

TRALEE, the asire-town of the county of Kerry, in the province of Munster in Ireland, 150 miles in a direct line south-west of Dublin, or 192 miles by the mail-road through Naas, Maryborough, Roscrea, Nenagh, Limerick, Raltih, Luce, Tarbert, and Listowel; 73 miles south-west of Limerick, and 74 miles west-north-west of Cork, through Macroom and Killarney; in 52° 15' N. lat. and 9° 39' W. long.

Tralee derives its name (Tragheile)," the strand or shore of the Lee") from its position near the outfall of the little river Lee into the shallow and unsafe bay of Tralee. There was an early Dominican priory, under the invocation of the Holy Cross, founded (A.D. 1213) by John Fitz-Thomas, one of the great Geraldine family. The knights of St. John of Jerusalem had also a commandery in this township. In the wars of Queen Elizabeth the body of Irish was routed at Tralee (A.D. 1600) with great slaughter by Sir Charles Wilmot. The earl of Desmond had a castle here, which having come, on the forfeiture of the earl, into the hands of Sir Edward Denny, served as a place of refuge for the English families. The story is related about the town when Tralee was entered by the insurgents in the great rebellion of 1641. The castle held out for six months, but was at last obliged to surrender. The town was soon after burned, to prevent its falling into the hands of Lord Inchiquin. It was again burned (A.D. 1694) on the approach of King William's army.

Tralee is in the barony of Trughheackagh: the parish is about four miles in length and one and a half in breadth, and has an area of 4300 acres, statute measure: the population in 1831 was as follows:—

<table>
<thead>
<tr>
<th>Town and borough</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1218</td>
<td>118</td>
</tr>
<tr>
<td>424</td>
<td>242</td>
</tr>
<tr>
<td>1459</td>
<td>110</td>
</tr>
</tbody>
</table>

The borough comprehends not only the town, but a considerable rural district around it: it does not altogether comprehend the whole parish. The population of the borough in 1821, was only 7497; so that the increase in five years (1821-31) was 2021; and the population has considerably increased since.

The town is irregularly laid out on a low site, north of the river Lee, and at some little distance from the bay; it is liable from its situation to be flooded when there are spring-tides in the bay and the stream of the Lee is swollen. The streets are repaired by county presentment, and are partially paved and flagged, but not lighted; neither is there any nightly watch. An attempt to increase the trade of the new port has been made (9 Geo. IV., c. 82) by reserving the inhabitants. The sewers in the town are bad, and the streets are very dirty. There is no regular market-place, and the business of the streets is conducted by the streets. Several of the streets are lined with respectable dwelling-houses (several of them of a superior description) and good shops; and the town has undergone great improvement within the last few years. The church is a large and handsome building, with a tower 200 feet high, and contains nearly 3000 persons, and averages 700 persons, and is increasing. There is a large and handsome Roman Catholic chapel (attended by 3000 persons), a small Methodist meeting-house, and another small one for Independents. Detached from the town, half a mile to the south-east, are the county gaol and a barrack; they are both substantial buildings; the gaol, built on the principal ground, is capable of accommodating more than 200 prisoners; the barrack is capable of accommodating nearly 500 men, and is the residence of about 30 patients. A considerable brewery and distillery are near the gaol. The county court-house, a handsome building of modern erection, is in the town; and in the same street as the church is the county jail and the printing-office. There are an extensive brewery, besides that already mentioned, and a smaller brewery, both in the town.

The trade of Tralee is considerable, and it has been for some years rapidly progressive. In 1831, 991 persons were employed in the town and borough in retail trade and handicraft; and there were 214 capitalists, bankers, professional, and other educated men. There are two weekly markets, well supplied, and five yearly fairs, and about three banking establishments. The town is well supplied with fish, and on reasonable terms. Tralee is a port, but vessels have had to take in and discharge their cargoes at Castlemaine, on the Shannon, a day's journey distant: a ship-canal is in progress, perhaps finished by this time, by which vessels of 300 tons will be enabled to come up to the town, at the west end of which a large basin has been constructed. The port is visited yearly (taking the average of the seven years from 1827 to 1833) by about seven vessels (having a total of 1500 to 1600 tons) from foreign ports; in the same years nearly forty coasters (about 3600 tons) from Great Britain entered inwards, and 890 vessels (about twenty-five thousand tons) cleared out from Ireland and from about fifty-five coasters (about 4000 tons) cleared out for Great Britain, and about fifteen or sixteen coasters (500 to 700 tons) for other ports in Ireland. The trade of Tralee for internal export, was steadily increasing through that interval, but the trade with other ports of Ireland was decreasing. The chief foreign goods imported were timber, deals, and staves; the chief article of import from Great Britain was coal; and the chief exports were wheat and oats, and barley, also increasing; and butter, which was diminishing.

The corporation of Tralee (consisting of a provost, twelve free burgesses, and other officers) was created by charter of James I. It never had any property except the tolls on the Tuesday market and on one of the fairs: it has been abolished by the late act (3 & 4 Vic., c. 109) for regulating the Irish municipal corporations. Before the abolition there was a provost's court, which was a court of record for all personal actions not exceeding the sum of five marks. Petty sessions were held by the provost and some of the county magistrates twice a week. There was no borough gaol. The provost and county court at Kerry are held here; and the assistant-barrister for the county sits at quarter-sessions and for the trial of civil suits four times in the year. Some of the county police are stationed in the town.

Tralee returns one member to parliament. By the Irish Boundary Act (2 & 3 Wm. IV., c. 89), a boundary was adopted for parliamentary purposes, more restricted than the existing municipal boundary, but comprehending all the town, and allowing space for its extension. The num-
be of electors on the register in 1839-40 was 296, namely 285 ten-pound householders and 11 freemen.

Tralee is a rectory in the diocese of Ardfert, and in the province of Munster, in the county of Kerry, and in the diocese of Dublin: the average value of the living is estimated at £454. 7s. 7d., the net value at £377. 18s.; there is a glebe-house fit for residence. In the Roman Catholic division the parish is united with the greater portion of three adjacent parishes. There are 500 acres of land in the parish, and in the order of the Presentation there were in the year 1835 nine day-schools in the parish of Tralee: one of these, a free-school, with an average attendance of 50 children, was under the superintendence of the rector, and was supported by a grant from Erasmus Smith's fund, and by contributions from the clergy of the establishment; a second free-school was under the same superintendence; two others, free-schools, with an average attendance of 500 children, were under the superintendence of the Roman Catholic clergy, and were partly taught by the nuns of the Presentation; the other five schools, with an average attendance of 35 children each, were respectable schools, kept by ladies, and supported by the payments of the pupils.

The county fever-hospital, the county infirmary, with a dispensary attached, are at Tralee; and there are two asylums for the poor, a neat row of almshouses, a temporary asylum for lunatics before sending them to the large asylum at Limerick, and a prosperous savings bank.

Races are held near the town, and a yearly regatta in the bay. There is a chalybeate spring about three miles west of the town, in Tralee parish, on the northern shore of the bay, round which a small watering-place has risen up, called the Spa of Tralee, or more concisely Spa. There is an excellent strat for bathing. There are several gentlemen's seats round Tralee. Good limestone for building is quarried near the town.

(Reports of Commissioners, and other Parliamentary Papers: Lewis's and Carelse's Topographical Itineraries: Dublin Almanack.)

TRAM-ROADS, a road prepared for the easy transit of trams or wagons, by the insertion, in its surface, of smooth beams of wood, blocks of stone, or plates of iron, as wheel-roads. It is therefore a kind of railway, adapted for the passage of vehicles with wheels of the ordinary form. Of the early kinds of railway which bear the characteristics, and frequently also the name, of tram-roads, an account is given under Railways, vol. x., pp. 245, 246; and of the mode of constructing tram-ways in ordinary roads, and their advantages, a notice will be found under Road, vol. xx., pp. 33, 34.

TRAMMELS, the name of the elliptic compasses, described in that article, in which a bar carrying a pencil is made to move, which moves vehicles.

TRANI, a considerable town of the kingdom of Naples, situated on the coast of Apulia in the province of Terra di Bari, is an archbishop's see, whose archbishop is also bishop in parishes of Nazareth. The Gran Corte Civile, or court of appeal for civil suits, of the two provinces of Terra di Bari and Terra d'Orano, and the Gran Corte CriminaJe of the province of Bari, hold their sittings at Trani. The town is well built: it has a castle, which was built by the emperor Frederick II.; a handsome cathedral with a lofty tower, and several other churches and convents; a harbour for small vessels; and about 15,000 inhabitants, who carry on a considerable trade in agricultural produce, especially oil and corn. Trani is 10 miles S. of Barletta, 20 miles N. of Barletta, 20 miles N.E. of Bari, and 26 miles N. of Brindisi. Neighbouring are the provinces of Taranto and Brindisi, the latter intersected by the Grand Canal, containing an account of the operation performed on the eyes of a boy who was born blind.

The 'Transactions' contain few notices relating to Mineralogy: among the earlier papers is one (1761) on the formation of cloth and paint upon canvas, and another (1731) on the first discovery of diamonds in Brazil.

Under the head of Geology may be placed some important papers concerning the rocks which constitute the crust of the earth; and there are several on petrifications, on shells and zoophytes, and on fossil bones. Among them also is a paper (1791) on the origin of peat, by the earl of Crawford; and one of 1782, by Mr. Walker. Forty-five papers have been published concerning an earthquake at Lisbon, besides several on volcanoes, burning
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&vance.' There is a paper by the Abbé B. N. F. de la Caille giving an account of electrical water flowing through capillary tubes; one by Mr. Wilson (1759) on the heated torsion-arm; and another by the same (1773) on the efficacy of blunt conductors: there are also several papers by Mr. Priestley containing subjects; Mr. Cavendish's theory of electricity (1771); Volta's account (1800) of the galvanic pile; and Sir Humphry Davy's paper containing his great discovery concerning the agency of galvanism in decomposing compound substances: besides the highly valuable papers by Mr. Faraday concerning his experimental researches in electricity. Among the papers on magnetism are that of Dr. Brook Taylor (1715) on the law of magnetic attraction; the hypothesis of Halley concerning the cause of the dip and variation of the needle; and L. Col. Sabine's recent contributions on terrestrial magnetism.

The Transactions are rich in papers on Chemistry, which however are of a miscellaneous nature: among the more important are, the experiments of Dr. Brand on carburetted hydrogen gas; that which states the experiments of Mr. Cavendish (1783) to determine the components of atmospheric air. There is a paper by Dr. Henry of Manchester (1797) on the determination of hydrogen in the production of electricity; and one by Mr. Kirwan (1786), containing an account of his experiments on sulphurbett hydrogen gas.

There are many papers on the subject of Meteorology, but most of them are merely diaries of the weather: among them however is a paper by Dr. Halberden (1760) on the rate at which temperatures diminish in the atmosphere as the distances from the surface of the earth increase.

Among the papers which Dr. Thomson ranks as miscellaneous are the few which relate to Antiquities: these contain accounts of the ruins of Palmyra (1665), Pompey's pillar (1676), the catacombs of Rome and Naples (1676); and there are several papers on the discoveries made in Hierusalem.

TRANSCENDENTAL, a mathematical term of description, the meaning of which is not very uniform. When any particular formula is incapable of being expressed by any particular range of algebraical symbols, it is, with respect to those symbols, transcendental, that is, it transcends or climbs beyond the power of these symbols. The word was perhaps first used by Leibnitz ('Leibnitz Acts,' 1666). He says, 'places which are agaqua prima trium, fontes opera transcedentiam generationem, quaeque curam quaedam, necque neque solida, neque aequi, sed utius, sed omnem accquisitionem algebrae transscendens.' Here then is the first meaning of the word; a transcendental problem is one the equation of which is infinitely high, or contains an infinite series of powers of an unknown quantity, so that its highest degree transcends every degree.

To form an idea of what is now most commonly meant by transcendental, it will be desirable to recapitulate the steps by which algebra has arrived at its present state of expression; or rather, mathematical analysis, as those would say who do not like to call the differential calculus by the name (1768) of algebra. And first we have the state which preceded the time of Vieta, in which formule were mostly described in words, and the adoption of arbitrary symbols of quantity was only casual occurrence.

Next, we have the introduction of arbitrary symbols of quantity by Vieta, but not to the extent of using arbitrary numbers of multiplications, or algebraical exponents. Here we what now call a was transcendental; Vieta would have described a by a cubo-cubum, or a by a quadrato-quadrato-cubum, but a had neither name nor symbol.

Thirdly, we have the state which began with Harriot and Descartes, and which brought ordinary algebra into substantially its present form. During these periods however geometry and arithmetic, without help from algebra,
had brought into use sines, cosines, &c., and logarithms, which were then properly transcendental. The words which in particular modes of drawing lines, circle, or the result of many interpositions of geometrical means between two given numbers, did not place those lines or means among the objects of algebra, and gave no clue to any algebraical properties.

Firstly, we have the short but interesting period in which, before the formal invention of fluxions or the differential calculus, infinite series began to be employed, and the transcendental last alluded to ceased to be absolutely incapable of expression. This was the state in which Leibnitz found the science when he first proposed to distinguish between algebraical and transcendental problems.

Fifthly, we have the period succeeding the invention of the calculus, in which areas and lengths of curves could be expressed, whether they could be reduced into older language or not, by the new signs for fluents or integrals.

Sixthly, we have an alteration which it might be supposed should have come long before, namely, the expression of the old transcendental as recognised functions, and the writing of them accordingly, as \( \log x, \sin x, \cos x, \&c. \) Strange as it may appear, this was never formally and steadily done till the time of Euler. And it is only in our own day that the system has been completed by the recognition of the number whose logarithm is \( x \), the angle whose sign is \( x \), &c. as functions of \( x \), and the adoption of the appropriate symbols \( \log x, \sin x, \cos x, \&c. \)

Seventhly, a most important addition has been coming into use for some centuries, namely, the expression of definite integrals as modes of expression, not merely of functions of the variable of integration, but of other quantities which only enter as constants, or which, if they vary, vary independently of the variable used in integration. So powerful is the mode of expression, that it may almost be suspected to be final; and the word transcendental is rapidly acquiring a new meaning. We predict that it will settle into the following: a transcendental result will be one which is incapable of expression except by a definite integral, or by an infinite series which cannot be otherwise expressed than by a definite integral.

In the meanwhile there are two senses in which the word is used. The first is that just explained; the second has reference to the old distinction of algebraical and transcendental. A function of \( x \) is algebraical when it is finite in form, and \( x \) is never seen, nor any function of it, in an exponent, nor under the symbols of a sine, cosine, &c., or a logarithm. No operation upon \( x \), unless it be one of the four great operations of arithmetic, or else invention or evolution with a definite exponent. Thus in this sense of the word, \( \log x \) and \( \sin x \) are both transcendental, in the modern sense in which transcendental is not opposed to algebraical, but to that which is expressible by ordinary means, \( \log x \) and \( \sin x \) are not transcendental, being among the most common of the present modes of expression, and being, in fact, connected with algebra in a way which, had it been understood when these symbols were first used, would probably have always saved them from the distinctive term.

The roots of equations of the fifth and higher degrees are, properly speaking, transcendental: there is no mode of expression except by infinite series. And, generally speaking, and with the exception of a few cases in which modes of expression have been invented and studied, inverse functions are transcendental. And a result of such inversions, even though, from our ignorance of its real properties, it may be expressible by ordinary means, is transcendental as long as that ignorance lasts. And it is useful to observe that forms of the most different kind may be connected together by such a relation as this, that both are cases contained under the same transcendental.

To exhibit the arrival of one of these transcendental of inversion, as they might be called, let us take the equation of a sphere, \( x = a + b \sin \phi \). A large class of solutions may be obtained as follows:—The equation \( y \log z = c \) has an infinite number of roots, two at most being real, and all the rest of the form \( a + b \sin \phi - 1 \). Let \( a, b, c, \&c. \) be any of these roots, and let \( \phi \) be a function of the form \( \phi = ax^2 + bx^3 + \ldots \)

where one, two, or any number of roots may be taken.

Pleasure: and A, B, &c. are any quantities independent of \( x \). Let \( \psi^{-1} \) be the inverse function of \( \psi \), so that \( \psi(\psi^{-1} x) = x \); then \( \psi(\psi^{-1} x - 1) = 1 \) is a solution of the original equation, or \( \phi x = \psi(\psi^{-1} x - 1) \) gives \( \phi dx = \psi(\phi x) \). Now \( \psi^{-1} x \) is, when more than one root is used, expressible by infinite series: that is, \( \psi(\psi^{-1} x - 1) \) is expressible in common algebraical terms, but even with the assistance of logarithms and trigonometrical functions. Nevertheless, as particular cases of this solution, both \( \psi(x) \) and \( \psi(\psi^{-1} x - 1) \) are found.

This advance, quantities which are now called transcendental will lose the name, and be received among the ordinary modes of expression of analysis. One of the first of these will be the well-known function of \( z \) which is generally denoted by \( z \) and is sometimes called the \( \gamma \)-function, sometimes the factorial function.

where \( \gamma = x! \).

This is a known function, and is generally denoted by \( z \), and is sometimes called the \( \gamma \)-function, sometimes the factorial function.
This brings us to the mention of a defect of reasoning which has frequently vitiated mathematical works, namely, the assumption of the species of a transformation, and the supposition that only the character of the "details" remains to be settled, or the individual of the species to be picked out. In the preceding case, for example, it is often stated as follows:— Required the expansion of $a^r$ in a series of powers of $x$. The form of the series is then assumed, say $a^r = A + Az + Az^2 + 2.3 + ...$ and by the use of the property above alluded to, it is found that the series must be of the form $1 + A + Az + 23^2 + ...$. But, as noticed in Synthesis, all that is here proved is, that if $a^r$ be capable of expansion in integer powers of $x$, the expansion must be of the form $1 + A + Az + ...$. It is true that, looking at what we see in algebra, that science might be strongly suspected to have peculiar power of rejecting false suppositions, or of indicating their falsehood by refusing to furnish rational proofs: thus it certainly does generally happen that when we attempt to select from among series of integer powers, one belonging to an expression which really has no such series, we find infinite coefficients, or some other warning. But it is too much to ask of a beginner that he should take it for granted that algebra has so peculiar a property; nor, in fact, is it true that such a property is quite universal. It is necessary therefore to watch all transformations narrowly, both in their general as well as their specific form: first, because there can be no sound reasoning without such caution; next, because, though it is true that in many parts of algebra the science will refuse to acknowledge and obey a false assumption of form, yet it is almost impossible to draw the line at which this refusal ceases, and the idea that such a power is universal in algebra will lead the student to many a serious difficulty in the higher branches of mathematics.

**TRANSFORMATION OF COORDINATES.** We introduce this article purely for reference: that is, supposing the subject already known, we mean only to put together for formule in such a manner that any one can be used at once.

**Rectilinear coordinates are the only ones which are usually transformed:** such a thing rarely, if ever, happens with polar coordinates, except in investigations each of which has its peculiar method. And first we shall consider rectilinear coordinates in one plane, and afterwards in space. What is usually wanted is to express the coordinates of a first system in terms of those of a second, and consequently given, system. And first as to coordinates in one given plane.

1. **Both systems oblique.** Let $x$ and $y$ be the old coordinates of a point $x'$ and $y'$ the new ones. Let $\mu$ and $\nu$ be the old coordinates of the new origin: the angle the old coordinates $x$ and $y$ the old coordinates $x'$ and $y'$ the new ones. Let $\mu$ and $\nu$ be the old coordinates of the new origin: the angle the old coordinates $x$ and $y$ the new ones.

The angle made by $x$ with $x'$ means the amount of revolution which would bring the positive part of $x'$ into the direction of the positive part of $x$, the revolution being made in the positive direction.

$$x' = \sin (\theta + \phi) x + \cos (\theta + \phi) y$$

2. The oblique coordinate, the new one rectangular.

Here $\psi - \phi$ is a right angle, and

$$x' = \sin (\theta - \phi) x - \cos (\theta - \phi) y$$

3. The oblique coordinate, the new one oblique.

Here, in (1), $\theta$ must be a right angle.

$$x' = \cos \phi x' - \sin \phi y'$$

4. Both systems rectangular. Here $\theta$ and $\phi - \phi$ are both right angles.

$$x' = \cos \phi x' - \sin \phi y'$$

5. The coordinates of the new system parallel to that of the old one. Here

$$x' = x, \quad y' = y$$

In any of the preceding cases, if the new and old origin coincide, we have only to make $\mu = 0, \nu = 0$, and use the formule accordingly.

Next, when the coordinates are those of points in space. The only two cases which are particularly useful are when both systems are rectangular, and when the one is oblique. Let $x, y, z$ be the old coordinates, and $x', y', z'$ the new ones. Let $\lambda, \mu, \nu$ be the old coordinates of the new origin, and let the angle made by $x_1$ and $y_1$ be $\theta$, that of $y_1$ and $z_1$ be $\phi$, and that of $z_1$ and $x_1$ be $\gamma$, which we may thus denote:

$$x_1 = y_1 = z_1 = \lambda, \quad \lambda, \quad \lambda = \mu, \quad \mu, \quad \mu = \nu, \quad \nu, \quad \nu$$

Then we have the following formule:

$$a' = \cos \phi x_1 + \beta \sin \phi y_1 + \gamma \sin \phi z_1$$

Where the meanings of $a, \beta, \gamma$, and the connection of those meanings with the places of the letters in the formule, will be easily caught from the following:

$$a = \cos \phi x_1 + \beta \sin \phi y_1 + \gamma \sin \phi z_1$$

And $a, \beta, \gamma$, and are subject to the following six condition:

$$a^2 + a' + a'' = 1$$

And $a, \beta, \gamma$, and are subject to the following six condition:

$$\beta^2 + \beta' + \beta'' = \cos \xi$$

This case is not much required: the following, in which both systems are rectangular, is of the highest importance. When we speak of the angle made by two axes, we mean, as before, the angle made by the positive side of one with that of the other; but since only sixes are used, the direction of revolution is immaterial. If both systems be rectangular, and if they have the same origin, we have two sets of equations, each of which follows from the other, one set being in each column: the meanings of $a, \beta, \gamma$, being as before,

$$x = ax + by + cz$$

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Besides which, each of the quantities $a, a', \&c.$ may be expressed in terms of the others, as follows:—

$$a = b'y - y''b, \quad \beta = y'a - a', \quad \gamma = e'b - f''a$$

$$a' = b'y' - y''b', \quad \beta' = y'a' - a', \quad \gamma' = e'b' - f''a'$$

For the mode in which these nine quantities are made to depend upon three, we must refer to works on mechanics, in which such reduction is particularly useful. We avoid giving it here, because trifling differences exist in the methods of taking the quantities, all of which the rest are to be reduced, so that no set of equations can be given which can be called universal. As far as we have gone, the expressions of all writers are the same, though the letters used are not always alike.

TRANSPLANTATION OF BLOOD is the operation of transfusing the blood of one animal into the blood-vessels of another, and is sometimes beneficially employed for reviving those who are nearly dying after severe hemorrhage. The operation had long been used as a means of experiment, and in the vain hope that by injecting the blood of a healthy man or animal into the vessels of a diseased one, the health of the latter would be restored; but it had rarely been employed for its only proper purpose, until two series of well-conducted experiments on animals, proved that it might be safely and advantageously employed in men. His observations are published in his "Physiological and Pathological"; and since the arrival of the operation, the lives of many persons have been saved who, in all probability, dying from the loss of blood during or after surgical operations, during gestation, and in other circumstances. The operation has indeed often failed; it has often been unnecessarily performed; and its performance is not unaccompanied by danger to the patient; but still there is sufficient evidence of its high utility in cases which, without it, would have been quite or nearly hopeless to warrant its being resorted to under the guidance of a sound judgment.

The chief instruments employed in the operation are a syringe, with double pipes, a basin of appropriate form, and a fine tube fixed on one of the pipes of the syringe. One of the veins of the arm of the patient being opened just sufficiently to admit the point of the tube, and fixed by a probe, blood must be drawn through a free opening in the vein of some healthy person, and as it flows into the basin must be slowly sucked up, without any mixture of air, by the syringe. When the syringe is filled and carefully cleared from all air by forcing blood up to the very point of the tube, the latter must be introduced into the patient's vein, and the blood steadily and slowly injected. Patients are often sufficiently to revive a patient, and if they produce head-ache, flushings of the face, tendency to fainting, and other unpleasant symptoms, the transfusion should be arrested; but if not, the injection should be continued till it produce some good effect, or till a pint of blood has been transfused. Beyond this it is not safe to carry the operation, nor is it likely to be beneficial. A second or a third injection may be employed when the state of the patient seems to render it necessary.

The experiments of transfusing the blood of various animals into the vessels of man proved only mischievous; and those of transfusing the blood of an animal of one species into that of another are of too little importance and have produced too few general results to be worth recording here. The injection of various medicinal substances into the veins has been tried, but its effects are not sufficiently different from those produced by the ordinary modes of taking medicine, to render it advisable to submit to an operation which itself is dangerous. All the important facts relating to the subject may be read in an article on Transfusion, by Dr. Kay, in the "Cyclopedia of Practical Medicine," and in the works from which he quotes.

TRANSIT, or TRANSIT INSTRUMENT (Instrumens des Passages), was invented by Römer about the year 1690. The description is to be found at page 247 of the "Horologium" by Hevelius, published in 1735; and we recommend the perusal of this book, which contains an account of Römer's inventions and methods to all those who, reading Latin with moderate ease, feel a desire to learn the origin of modern practical astronomy.

The object of the present article is to give some account of Römer's transit instrument as well as to use it with tolerable success. Those who wish for more perfect information must consult the introductions to the Greenwich, Königsburg, Dorpat, Cambridge, Edinburgh, \&c. observations. Unless the reader takes pains to render his apparatus useful, leaving the reader to accommodate what is here said to the powers of his own instrument, or to the practice of the observatory which he adopts for a model.

There are three principal parts of the instrument placed in the plate. The first of these is the carrying the Y's, which with their adjustments the telescope, inserted at right angles through an axis with a small vertical circle for finding or verifying stars; and the cross level. The stand is made of cast-iron, and should be of good form. A transverse mill is immediately under the pivot. The right hand Y is moved in azimuth by a screw, the milled head of which is seen projected upon the lanter. In portable instruments it is very convenient to have the screws made of brass, and to be fixed in a spring, as it is in this instrument. In fixed observations the adjustment is made by two antagonist drawing screws, one of which is tightened and the other loosened; and indeed this is the general construction of instruments of this form. A useful feature of the most eminent astronomers is that they are convenient to be able to move the instrument at pleasure in azimuth while actually looking through the telescope, that we should strongly recommend the adoption of the counter-spring whenever the instrument is small, and is either to be frequently shifted, or is not furnished with a meridional mark. The spring must press strongly against the screw, and there should be a clamping button in each adjustment, to keep all secure.

The frame is made of two ending brass cones soldered on the central sphere. The sphere is cast hollow with two shoulders, over which the cones slip. As this is the most important part of the instrument, great care should be taken of the fitting before the axis is finally put to gether, and the symmetry of the parts as to the centre should be perfect. If the instrument is weak here, it is utterly worthless. In the older English instruments the centre was a cube, and that form is frequently adopted at present. The French astronomical artist Dr. Cassini, and by Gambey, one of the largest and finest instruments in the world, is so constructed. The essential requisition however is symmetrical strength, and any shape is good which fulfills this condition. The pivots are soldered into the bottom of the cones, and are not fixed. One of them is pierced to admit light into the axis. In large instruments the pivots have an outer surface of steel, which is less affected by wear. Greater care is required to guard steel pivots from rust, and must be performed with a diamond cutter, as the heart-knots to which steel is subject resist and jar the ordinary cutter out of its place. The pivots should be turned nearly to the same diameter: the marks of the tool are ground off afterwards by collars, which are made to fit closely on the pivots, and are changed and reversed from time to time. When the surface is perfectly formed, the grinding should be discontinued, as a small difference of size in the pivot is of little consequence, while the addition of the cylindrical form of the pivots, or of the direction of their axes, ruins the instrument. The perforated or illuminated end of the axis is on the right-hand pier in this figure. The light of the lantern shines through this and lights up an annular plate in the collar, which makes an angle of 45° with the axis and with the telescope, and thus light enough is thrown down to the eye-end to illuminate the field very vividly, while the opening allows the rays from the eye-end to pass without the least quantity of light may be regulated by a contrivance for diminishing the aperture of the lantern, or by a shade passing between the lantern and the pivot. In some

* * *
Transit Instrument.

Transits there is a contrivance for altering the angle of the central reflector in the body of the instrument; but this, although very handy, is objectionable, as affecting the symmetry of the instrument. In a thirty-inch transit the lantern is within reach, and may be twisted a little, so as to reduce the light at pleasure. The setting circle, with its level and clamp, are towards the illuminated end of the axis. The tail-piece, which is attached to the verniers and level, is held between the rounded ends of the two screws at a. By screwing one and loosening the other, the bubble of the level is brought to the middle, when the vernier points out the reading of the circle. There is a lens and reflector, for lighting and reading off the circle. The instrument here figured has a vernier which reads single minutes; but the vernier is inconveniently long for a fixed lens, and we should prefer reading to every 2", which is more than sufficiently near for finding or identifying stars. If the small circle is carefully
looked at, two out of three small screws are seen which fix the circle to the axis. When these are released, the circle will turn freely round. This contrivance will save some trouble in adjusting the instrument, for a long time in the same place without reversing, but is scarcely worth being applied to one which is frequently shifted or reversed. The clamp for fixing the telescope in altitude and the slow-motion screw are seen at B. There is a caution to be observed, that these two screws are never to be tightened, unless the instrument is used for observing declinations, and it and the tangent screw must be released when the observer uses the azimuth screw for bisecting any object, each with a mark or a point at a given instant. In large telescopes there are generally two small circles fixed on each side of the transit towards the eye-end. They are here more convenient for setting, and it is easy to pass rapidly from one star to another, when both the circles are previously set. There is great diversity in the graduation of the setting circles. In large instruments which are used for some time in the same position, it is best to make the verniers read polar distance or declination, remembering the circles whenever the transit is reversed. With a portable transit, which is or ought to be very frequently reversed, a graduation to altitudes one way, which becomes zenith distances when reversed, is perhaps as convenient as any, though a slight computation for the other is in many cases more convenient. The telescope in this instrument is not inserted in the ordinary manner. The central portion, from c to d, is in one tube, pierced on the right side to allow the light to pass, and it is then joined, and, f, to the central reflecting plate is fixed in this telescope, and can be turned to throw the light up or down. The object-end and eye-end are screwed on e and d, and are interchangeable. The telescopes are usually in two pieces, which are screwed into the central sphere at e and f. The advantage expected from the present construction is, that there is firmer screwing, and less leverage for any blow or rough handling; and that by interchanging the object and eye end, fresh portions of the pivots are brought into action, thus diminishing wear and equalizing minute errors of form or flexure. The object-glass of the telescope should be carefully selected, and of as large an aperture as will show a good image. The superiority of a large instrument over a small one is wholly in the increased optical power. In all other respects it is probably inferior, i.e., if the support of the smaller instrument be as solid as that of the larger. There are seven fixed vertical wires at equal spaces, and two horizontal wires, between which the star is observed. The head of the micrometer is shown at g. A small prism for observing stars near the zenith is slipped on the eye-piece when required, as at A.

The micrometer is divided into the pivots with its Y’s. There is a pin at each end, which drops into a fork at i, to hold the level safely and upright. This is completely seen at the left pier. At this end is the adjustment for setting the level with the axis. At the other end is an adjustment for raising or depressing, that is, the determination of the level. The level should be very sensible and of the same curvature throughout. The graduation we have found most convenient is to have the principal divisions to 10° and the subdivision to 10" numbered as units and tenths, which, though erroneously, is briefly described by calling the units seconds of time. If this scale should be too fine for the level, a principal division to 30" and subdivisions to 5" numbered as units and tenths, will be found equally convenient. The reading level is generally applied to the instruments which are so large, and consequently the pins so high, that a man cannot apply the level safely while standing on the floor, and also to all instruments of necessity. When the eye-piece is too high, as this is, to the pier. For a transit between stone pierces which does not exceed five or six feet, we prefer a swinging level, which may be applied and read while standing on the pier.

When Troughton undertook, much against his will, to construct a ten-foot transit for the Royal Observatory, he adopted a very ingenious mode of uniting the cones and the part of the tube in which the instrument was described, to be found in the "Phil. Trans." for 1826, p. 423: that part which treats of the construction of the instrument is from Troughton’s own pen. He also added four braces, to connect the telescope with the axis. We are not disposed to attach much value to this mode of connecting the axes of a telescope, which moreover requires very accurate fittings.

There is a great difference of construction between different transits, except what we have already mentioned. It is desirable even for the smallest instruments that the supports should be of stone when they are not perpetually shifted about. The Y’s then are separate pieces fixed by screws to plugs let into the stone. For small transits the stone may be in one or three pieces, according to the size. When practicable, the pier should be high enough and wide enough apart to let the other pier stand between them. This saves perpetual meddling with the eye-piece and the eye is less strained. We have already remarked that the performance of a well-made transit depends rather on the permanence of its fixing than anything else.

The chief advantage of large instruments is that much of their superior performance is to be attributed. The principal use of a transit instrument is that of determining the rise of a celestial body passes the meridian of the place of observation. Now the meridian is a great circle which passes through the zenith and the pole, and the instrument is adjusted when the line of sight passes through a portion of the meridian during the whole rotation of the telescope.

As in all other instruments, the telescope is first to be adjusted for distinct vision. Put on a tolerably high power, and slide the eye-piece out and in till you see the wire sharply without strain on the eye. Then direct the telescope to a bright star or a double star: and if the image of it is distinct, the telescope is in focus. If not, release the screws at A, and draw the tube out or push it in until the image is as perfect as you can make it. There is another opposite screw to A, and the exterior holes allow a little play. Some trouble and guesswork may be saved by making two slight scratches on the eye-piece where the sight of the wires and of the star are respectively most perfect, and drawing the principal tube out or pushing it in this quantity. The operation has succeeded, if, in viewing a slow-moving star, like Polaris, there is no shifting between the star and the wire which bisects it, while the observer is looking at it. The three drops are the generally best made by the instrument-maker, and as it is not liable to alter, we should prefer to have the telescope tube cut the proper length upon his responsibility, so that the position of the wire is permanent. When this adjustment is made, there is to be ascertained a tolerably distinct object, which is to be bisected by the middle wire near the upper part of the field: if on raising the telescope it is also bisected at the lower part of the field, the wire is perfectly parallel to the axis; but if not, the tube is to be twisted without altering the focal length until the object comes half way to bisect which is completed by the azimuth-screw, when the object ought always to be completely bisected, the top of the field when the telescope is depressed. One or two trials are necessary for this purpose, and then the screws at A must be tightened.

The first of the principal adjustments is that of setting the line of sight at right angles to the cross-axis, when it is necessary where they are claimed, that they must be selected not far from the horizon, and bisected by the middle wire, using the azimuth-screw. The axis is then carefully lifted out of its Y’s, and returned end for end, and the other screw is tightened again. It is now to be bisected as before, half by moving the azimuth-screw, and half by the screw at A and its antagonist, each of which draws the plate on which the wires are fixed. The operation must be repeated until no dif
The next adjustment is to make the axis horizontal. In the pole of motion are in the horizon, the great circle which the instrument, freed from collimation, describes, must pass through the zenith. Put on the level, and bring the bubble into the middle. Now rock it a little to and fro the observer, and see whether the bubble still remains in the same place. If in pushing the level from you the bubble runs towards the left hand, this shows that the level tube itself is set askew upon its support, and that the left end, if this be the nearest to the observer, is elevated by that motion above the right end. Screw the small screws (these are pushing screws) until a considerable rocking motion scarcely moves the bubble at all. There is generally a cross level, to show when the principal level is in correct position; and this should be brought to have its bubble in the middle, when the principal level has been adjusted as above. The fork in the present example serves the same purpose when the level itself has been carefully adjusted. To level the axis, bring the bubble of the level to the same reading at each end (the numeration of the division is supposed to begin from the centre) by the elevating screw at the left hand Y. Reverse the level and bring the ends again to the same reading, half by the elevating screws of the Y, and half by the two screws seen at n, which raise or depress the level tube in its supports.

On returning the level to its first position, the bubble should still be in the centre; but if not, it must be brought there, half by the elevating screw and half by the pushing screws; and the operation must be repeated till this is effected, i.e. if the observer cannot or will not calculate the effect of a small error, which may easily be measured.

If he can (and the instrument is a very good one at present who cannot), the process is pretty much as follows. The graduation being supposed to be units each equal to 15°.

Illuminated end West. Telescope South. Altitude 45°. Observer North.

East end of bubble 3°711. West end 5°84.

The level is now reversed for end, and the two ends again read off:

East end 5°24. West end 5°34.

Mean East 5°00. West 5°50.

which is the reading which the level would show in both positions if it were in adjustment. Hence the west end is higher than the east by half the difference, or by 0°293. The level should be applied in reversed positions several times, and a mean taken.

Now let the telescope itself be reversed, and suppose the following entries of observations to be made:


East 4°90. West 5°66.

5°42.

5°19.

Mean East 5°175. Mean West 5°425.

The difference is now 0°25, and the west end is consequently too high by half the difference, or by 0°125, a result which differs from the former (Illuminated end West) by 0°17. If the partial observations have been pretty accordant (we suppose 0°17 to be the mean result of a considerable number of observations), this difference between the values of the inclination, according to the position of the illuminated end, must be supposed to be owing to a difference in the pivots; and if so, a little consideration will show that to obtain the true inclination of the axis in the two positions, 4 of 0°17 must be subtracted from the level error III. end West, and must be added to the error III. end East. The true level errors therefore are

III. West, +0°250—0°125, or +0°125;

III. East, +0°125+0°125, or +0°250.

By the mean of a great many careful observations made increased by 0°036, cos. latitude x sec. of °'s declination. This comes to the same thing as subtracting 0°036 x cos. latitude from the collimation correction.

In lat. 60°20' this value is 0°041. The correction of collimation between 40°10' and 60°20' is

0°04010 x sec. de°. * III. end West.

or 0°10' x sec. de°. * III. end East.

* If the unit were °, the west end would be higher by the whole difference.
when the temperature is steady* and the sky overcast, the difference of the pivots, if it exists, is to be ascertained, and the correction to be applied to that cause is to be applied to the indication of the level.

The error of inclination in the axis being measured, the corresponding correction which is to be applied to the observations is thus required.—If the west end of the transit axis be raised, it is clear that the circle perpendicular to that axis will continue to cut the horizon at the north and south points, but will pass to the east of the zenith, from which it will be removed by an arc equal to the inclination of the transit axis. The star will therefore appear to pass too early, and those below the pole will pass too late; and if the inclination be 15°, the effect in time upon any star will be

\[ \cos \text{zenith distance} \times 15^\circ = \cos \text{declination} \]

Now the level graduated as we have described gives the inclination in parts of which 15° is the unity; hence the corrections to be added to the observed times of passage of stars will be, using the previous example—

<table>
<thead>
<tr>
<th>Position</th>
<th>Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>ll. end West</td>
<td>(+0^h25^m30^s) \times \cos \text{zenith dist.} of star; (\cos \text{declin.} )</td>
</tr>
<tr>
<td>ll. end East</td>
<td>(-0^h16^m7^s) \times \cos \text{zenith dist.} of star; (\cos \text{declin.} )</td>
</tr>
</tbody>
</table>

The above corrections, for errors of collimation and inclination, are purely instrumental; and, as the reader will readily perceive, are generally unnecessary. Before proceeding to the third adjustment, that by which the great vertical circle now described by the telescope is made to pass through the pole, it will be proper to mention, as observations are actually made, how this error is to be corrected or computed. The instrument is in or very near the meridian; a star on entering the field is placed between two horizontal wires. It will then gradually travel through the field, describing a parallel to the horizontal wires, and passing over the vertical wires in succession. The observer looks at his clock a little before the star comes to the first vertical wire, and counting the beats steadily forward by ear, determines as well as he can the second and decimal of a second at which the star is immediately under the wire. He writes this down, counting all the time, and goes through the same process at each of the seven wires with which his instrument is furnished. When the star has passed all the wires, he looks again at the clock to see that his count is right, and then sets down the hour and minute corre- sponding to the last wire. The habit of mentally counting on to sixty while writing down the observation is easily acquired. A careful examination of the diagram, which the star is covered by the wire is a matter of more difficulty, and, with some persons, requires considerable practice.* The observer is to attempt to fix in his mind the places of the star with respect to the wire at the preced- ing instant, and the direction in which they are moving, and, under the care of a practised guide: but the observation is so simple, that every one acquires the power who has the will to try; and we believe that with a little experience one observer is nearly as accurate as any two.

Before applying the instrument to actual observation, the adjustment of the level of the vertical circle must be examined, which we will suppose to be read altitudes when falling, and the telescope is directed at the zenith of the sun. The level will read the same in the two positions, when the axis is reversed. Having levelled the axis approximately, bring the bubble of the small level to the middle by the screws at a hold the tail-piece, fix these firmly, and then direct the telescope in the second point, which is to be placed exactly on the horizontal wire if there is but one, or between the wires if there are two. Read off the vernier, which we will suppose to give an altitude of 4°. Reverse the axis and repeat the former observation; and now read the verniers, by which we will suppose the altitude of 87°.

The sum of these readings is 91°, while it ought to be 90°, showing an excess of 1° in each degree in reading. Now set the vernier at 86° 30', clamp the screws, and so adjust the tail-piece screws that their motion brings the bubble to its proper place between the wires; finally bring the bubble of the small level to the middle by the antagonist capstan-headed screws, which are seen towards the end of the level at 0. The instrument will now show true altitudes and zenith distances within 1° of the operation, which has been nicely performed. When the vernier reads polar distances, the vernier must be set to the polar distance of a known star, the telescope brought to the star, and the bubble of the small level adjusted to bring it to the middle. Inwards brought to the middle, then the instrument may generally be supposed pretty well known: if not, direct the telescope to the polar star, or δ Ursae Minoris, when near their upper or lower culminations, or to the sun, or to any star which the observer can identify when it is near the horizon, and the aim of the observer to be a known object will give a latitude near enough for finding a star from its catalogued place, or for instrumental corrections.

We will now proceed to the azimuthal correction. If the time is known from any other observations, the middle wire of the transit may be made to bisect a star at the time when by calculation it should pass; and if this star be Polaris or δ Ursae Minoris, the instrument will be very nearly in the meridian; but if the observer has nothing but a transit instrument and a chronometer, he must place it as near as he can guess in the meridian,* and level the azimuth very carefully. A moderate knowledge of the heavens will fall what known star is likely to pass soon; and the instrument having been set to the proper altitude (or sweeping for it), the observer must wait patiently till it enters the field. The observation is then made in the manner already described. If the star is near the zenith, this alone will give an approximate clock-error. Now compute the time a star near the pole or horizon should pass, and bisect the star by the middle wire at the computed time. If the error in the position of the instrument be not too small, the star will pass slightly before the stand must be shifted bodily a sufficient angle, and the instrument levelled afresh. In two or three trials it is easy to get the error within command of the azimuth screw; and the observer, if he dislike calculation, may commence by setting his clock to the instant when one of the collimation corrections has been made, then bisecting a star near the pole or horizon at the calculated time with the azimuth-screw, until all stars, high and low, give the same clock-error. The instrument is then in the meridian and the clock-error is the true one. The tentative process may however be considerably abridged by a little easy calculation, which we will proceed to explain.

The errors of collimation and inclination being supposed to be annulled, either by adjustment or calculation, the line of sight must, however, be corrected for the position of the sun and not far from the pole. On drawing the figure, and supposing the deviation to be to the east of the south and west of the north, it will be seen that the effect of the error in the level and west azimuth will be to make the zenith to pass too early, as well as all stars sub po³o; while stars between the zenith and pole pass too late. The effect upon the passage of a star is proportional to the amount of the deviation of the north and south, measured in units of 15°, and the latitude of the place and the de-
correction to be added to the observed passage of each star in respect of the error of deviation is
\[
\sin \left( \phi - \frac{x}{2} \right) \times \cos \frac{\delta}{2}.
\]

Now suppose two stars, \( s \) and \( s' \), to be observed, which differ in good deal in declination, and let the values of
\[
\sin \left( \phi - \frac{x}{2} \right) \text{ for these stars are } p \text{ and } p', \text{ then } s + px \text{ and } s' + px' \text{ are the times at which the stars would have been observed if the instrument had been in the meridian.}
\]

The interval therefore between their transit thus corrected (and also corrected for the rate of the clock, if necessary) will be equal to the difference of their right ascensions, which may be taken from the 'Nautical Almanac.' If the stars are contained in its list, or must be computed from some good catalogue, if they are not. Let the right ascensions of the two stars be \( a \) and \( a' \); and we have the following equation:
\[
(s' + px') - (s + px) = a - a'.
\]

If the value of a revolution of the azimuth screw is known, it is easy to correct for this error at once with considerable accuracy. If \( x \) exceed 1° or 2°, it must be reduced to those limits. Should \( x \) be negative, the deviation is to the west of the south.

The accuracy of the determination of \( x \) depends, certeir paribus, upon the stars which are used for the computation, i.e. upon the value of the denominator of the above fraction, which should be as large as possible. The most favourable condition is, that both stars should be near the pole, one above and the other below: \( \pm \) Ursus Minor and \( \pm \) Cephei 51 Heveli present this combination. It is always desirable that one of the stars should be pretty near the pole—Polaris, if possible. If the instrument is in the meridian, it is better not to touch the azimuth screw, but to determine the value of \( x \) by grouping the stars together, in which
\[
\sin \left( \phi - \frac{x}{2} \right) \cos \frac{\delta}{2}
\]
is nearly of the same magnitude with the same sign. The value of \( x \) may afterwards be used to correct each star separately, and the transit thus corrected will be very nearly such as would have been made if the instrument had been exactly placed in the meridian.

In fixed observatories the meridian error is obtained when possible from consecutive transits of Polaris above and below pole. The observations are corrected for collimation and inclination, and for the rate of the clock. If the times of passage thus corrected differ, there is no meridian error; but if the difference is greater or less than twelve hours, the deviation may be computed thus:—Let \( s \) and \( s' \) be observed times of upper and lower culmination for collimation, or declination rate; let \( a \) and \( a' \) be the apparent right ascension of Polaris, taken from the 'Nautical Almanac': \( x \) the deviation as before; \( p \) and \( p' \) the values of
\[
\sin \left( \phi - \frac{x}{2} \right) \cos \frac{\delta}{2}
\]
for Polaris above and below pole, which have different signs. Then, exactly as before, \( s - px \), and \( s' + px' \), will be the corrected times of transits and
\[
(s' + px') - (s - px) = a' - a,
\]
or
\[
x = \frac{(a'-a) - (s'-s)}{p + p'}.
\]

When three consecutive transits are observed, there is no need of taking any account of the rate of the clock (which is supposed to go uniformly), or the change in right ascension of the star during the interval; only a mean is taken of the first and third transits, which is compared with the second. The difference between these, divided by \( p' + p \), gives the value of \( x \). The sign may be made out by seeing whether the passage from upper to lower culmination is too small, and from lower to upper culmination too large, when the deviation is to the west of north, and therefore to the east of south, and the correction is to be added, or vice versa, when it is to be subtracted. In well-regulated observatories Polaris is always observed when it is convenient, and often when it is not; and the right ascension of the star, as well as the position of the instrument, is deduced from the double transit, which ascension is thus perfectly known, single transits of Polaris may be safely used in combination with other stars, to determine the azimuthal error for those times of the year when the star is one of its culminations passes altogether unseasonably. It is assumed, in this method, that the position of the instrument is the same for twenty-four hours; or that it changes uniformly.

If the reader has fully understood what precedes, he will have no difficulty in comprehending the mode of observing and reducing the observations which is followed at Greenwich and our principal observatories; but the private observer cannot always command a site which is wholly to be relied upon, and very seldom can afford the time for such an uninterrupted series of observations as is required to give full effect to the system just described. The precautions to be taken will depend mainly upon the objects he has in view, but, generally speaking, the private transit observer will do wisely to place the plane of the clock upon the lists furnished by Greenwich, though he may subsequently modify the values into by his own observations. Having done this, it will be easy for him to fix any other object with perfect nornel accuracy, just as if he had at that time most scrupulously, although the steadiness of his transit is not beyond suspicion, and his avocations or inclination should only allow him to observe by fits and starts. We shall proceed to show how he may proceed under different circumstances.

If he has a distant mark or a collimating telescope [see Collimator] with a micrometer to his transit, he proceeds exactly as we have described above to measure the right ascension and direction of the collimation, the quantity and direction of the inclination, and then observes away, only taking care to note as many standard stars as will give him a correct clock-error, and at least some so far apart as will enable him to detect his azimuthal error. If he observe one or two stars near the pole, so much the better. Now calling \( e \) the correction for the clock at the mean of the time of the observations of standard stars; \( s, s', s'' \), etc., as before the observed times of transit, corrected for collimation and level and as before, \( p, p', p'' \), etc., with their proper signs, the correcting factors of the unknown azimuth \( x \): and \( a, a', a'' \), etc., the apparent right ascensions of the standard stars, he has the following series of simple equations:
\[
\begin{align*}
& s + e + p \times x = a, \\
& s' + e + p' \times x' = a', \\
& s'' + e + p'' \times x'' = a''.
\end{align*}
\]

Group together the equations in which the coefficient of \( x \) is nearly (or of the same magnitude and with the same sign, and dividing each group by the number of its component parts, so as to have \( e \) with unity as a coefficient, form at least two equations in which the coefficients of \( x \) differ considerably, and subtracting one from the other, a value of \( x \) will be found with its proper sign. Substituting this \( x \) in each of the equations, \( s = a - e - px \), you will have as many values of \( e \) as you have equations; and taking the mean of those which are derived from the quick moving-stars, you have a good clock correction; if in any one it is not determined, the right ascension of which is required, add (speaking algebraically) the sum of all the corrections for collimation, inclination, declination, and clock-error to the observed transit, and you will have the apparent right ascension.

But it most frequently happens that the observer has no collimating mark and no micrometer to his instrument;
may; he may only have a view out of a window which commands no distant or distinct object, and not be able to see even the zenith, much less the pole. This last is the greatest objection; for the accuracy of the meridian adjustment depends chiefly upon getting stars near the pole.

To compute the correction of collimation of the instrument, observe thus:—After having carefully determined the inclination of the axis, he observes as many well-known stars as he can, especially getting them as high and as low as possible for ascertaining azimuthal error. He must then reduce the set of observations to the mean of the instrument, by the mean of the instrument, and make a similar set of observations. A series of equations must be formed for each position of the instrument, which will be of the following form:—

\[ x = \sin(\theta) \times \text{inclinat.} + \sin(\phi - \phi') \times \text{deviation} \]

and so on, for the stars first observed, and

\[ y = \cos(\theta) \times \text{inclinat.} - \cos(\phi - \phi') \times \text{deviation} \]

and so on, for the stars for the second set after the instrument is observed.

The mode of treating these equations will differ according to circumstances. They might be solved by the method of least squares; but it is scarcely worth while in ordinary cases to use any such refinement. Form four groups of equations, each of which will have the largest and those in which \( x \) has the smallest coefficients, dividing each group by the number of its component parts, so as to leave \( x \) with unity for its coefficient. Call these equations 1, 2, 3, and 4. Subtracting 4 from 1, we eliminate \( e \) and \( f \) will have a coefficient exceeding \( x \), and 2, and in the most difficult case, \( e \), e. when the observer can only look to the south, has a small positive coefficient. Again subtracting (3) from (2), we shall have \( e \) with a positive coefficient and \( x \) with a negligibly small negative coefficient. From these two equations \( e \) can be determined pretty accurately. Substitute this value in equations (1) (2) (3) and (4), group (1) and (3) together, and (2) and (4) together, and we have a pair of equations in which \( x \) has coefficients considerably unequal; and by subtracting one from the other, \( e \) is eliminated and \( x \) determined with tolerable accuracy. Finally, the substitution of these values of \( e \) and \( x \) from the original equations will give the formula for the error of collimation, which is good and pretty numerous, but in which the observer has not more than 50° of clear sky to work upon. The times of transit of other objects must be corrected in the quantifies thus found, and in this way apparent weights of ascensions may be deduced with considerable accuracy.

The clock correction should evidently come out the same in both positions of the instrument, and the difference from the mean fall within the ordinary errors of observation. If this is not the case, and there should be reason to fear any alteration in the position of the stand or the position of the instrument, the value of the perpendicular observations may be assumed to be the same in both groups. If the time of transit is used with external accuracy, the observer may alter the quantity of collimation of the calculation till he gets the same clock-error, although with different deviations, from both sets of observations. This may be done by one or two trials, but generally by making the corrections from both sets will be near enough, and not differ sensibly from the more elaborate calculation. It is not however easy to get the time very satisfactorily without being able to see the pole, or to see the zenith in a view from the instrument.

In what precedes we have supposed the extreme case, i.e. that nothing is to be seen north of the zenith, and that \( x \) therefore has always the same sign. The intelligent reader will be guided in practice by the directions here given, but by the value of the coefficient of \( x \) which was found in other cases, a discretion which some astronomers cannot or will not use.

It is always desirable that the value of the three transit corrections should be small (indeed the formulae are not exact, when the errors are large), to save unnecessary trouble in multiplying. The method of measurement is easy, brought with reasonable limits, if the observer has a micrometer, or can see any fixed object distinctly while he alters the screws. The azimuthal adjustment requires either an object of reference with the amount executed in a few seconds of space. The collimation error is easily brought within reasonable limits, if the observer has a micrometer, or can see any fixed object distinctly while he alters the screws. The azimuthal adjustment requires either an object of reference with the amount executed in a few seconds of space. The collimation error is easily brought within reasonable limits, if the observer has a micrometer, or can see any fixed object distinctly while he alters the screws.

It is convenient that the clock should be a little slow and have a small losing rate, the corrections for error and rate will then be additive to the observed transit of the greater part of the stars observed.

In most cases, the determination of the absolute time at the place is wanted, and this cannot be got without the level or some equivalent which tells how far the instrument swerves from the zenith. But where it is merely required to observe in a meridian by observing for a catalogue, it is more expedient to change the form of the equations. The two factors \( \frac{\cos(\phi - \phi')}{\cos \theta} \times \text{inclinat.} + \sin(\phi - \phi') \times \text{deviation} \) may be expressed by a correction \( c \) of this form: \( m - n \tan \delta, \) where \( m \) and \( n \) are constants to be known by observations, and \( c \) should be observed in zones, and when the sweep is not near the pole, it is easier to destroy the error of collimation by adjustment very nearly than to allow for the error of the amount of declination. The values of this correction may be considered as a constant for the whole sweep, within moderate limits, and for a small value of the colli-

From this value of \( c \) in the mean of the two equations, we have the value of \( m, \) and that with great exactness, if the stars have been well selected, are pretty numerous, and have been taken with external accuracy. To reduce the transits of the other objects observed to apparent \( R.A. \) nothing more is required than to add \( m - n \tan \delta \) to the observed transit, which, besides being a good deal shorter than the method previously described, only requires a table of natural tangents for computing the corrections.

If the observations are made on or near the pole, where the see \( \delta \) varies almost as rapidly as the tangent, a sensible error of collimation would mix itself up in the value of \( \tan \delta. \) If the pole is the only instrument and \( \delta \) is equal, two series

\[ \theta = \cos \Phi + \sin \Phi \sin \phi \]

which agrees with the formula given above, putting

\[ t = \sin \phi - \cos \Phi \times \sin \delta \]

The formula is easily deduced by drawing a figure and referring the latitude to the meridian which cuts the equator at the same point as the circle described by the telescope.
might be observed in reversed positions of the axis, and as \( m \) and \( n \) would have the same value in each, while the sign of collimation changes, the determination of the latter would be entirely different. He will probably make a perfect path, which in steady weather, when observations can be made on consecutive nights and in large masses, is perhaps the best for cataloguing. On the first night observe forty or fifty stars, consisting of all the standards which pass and those stars the plates. As the path of the star best suited to the observer, the sooner he acquires the means of reducing them the better.

The declination of these stars is perfectly known for every day from the Nautical Almanac, but there is a precaution to be taken here, which is unnecessary with quick-moving stars. The stars, as the path of the star best suited to the observer, the sooner he acquires the means of reducing them the better. The declination of these stars is perfectly known for every day from the Nautical Almanac, but there is a precaution to be taken here, which is unnecessary with quick-moving stars. The stars, as the path of the star best suited to the observer, the sooner he acquires the means of reducing them the better.

If the second night the corrected position of the star be altered, and moving from the outer to the inner wires, the motion between the wires is not uniform. The exact formula is

\[
\sin \text{distance of any wire from mean } = \sin \text{mean } + \sin \text{interval,}
\]

and the equatorial interval may be computed by taking the log sin of the intervals — log sin 15°, instead of simply the log interval in seconds of time, as in other stars. Or if the following, and may be found in the first night, the stars have been observed, the rule in this table may be used to compute the corrections required for each of the wires of a close circumpolar star.

This table may also be used when the broken wires of a close circumpolar are to be reduced. Compute the correction for each wire by the ordinary formula, and add to it the number from this table corresponding to the interval, before applying the correction to the observation of the wire.

As the stars subsi do the wires in a contrary direction, the numbers for reducing each star to the mean wire must be taken from the table corresponding to the interval between the reversed position of the instrument, observing directly and to the same thing, they must be reckoned backward with changed signs from the table which belongs to the existing position. When the interval between the mean wire and the other wires is well established, the collimation error must be referred to the mean wire after it has been measured for the middle wire. There is a way of measuring the collimation, when the distance of each wire from the mean is well determined, which is very useful in the absence of a meridian or collimating mark. Polaris or Ursa Minoris, or any slow-moving star, is observed over the first four wires (the inclination error having been previously measured); the instrument is then reversed and the star is observed over the remaining four wires, and the inclination again measured. The first set of observations is reduced to the middle wire by the known intervals at the horizontal position of the axis. The second set is similarly reduced to the mean wire, at the horizontal position. The difference between the two results, if they have not coincided, by lifting the instrument and setting it down again, is the sum of the collimation in two positions; and this is divided by twice the secant of the star's declination, the result is the collimation error required. If the pivots are perfectly equal, the levelling may be omitted except as a precaution against altering the Y's. When the time is wanted with great nicety, it is convenient to observe a series of stars before reversing upon the Polar circles or \( \Upsilon \) Ursa Minoris.

If the pole star has been properly observed and reduced, and the collimation rightly determined, the two series will give nearly the same clock error, and be a check on each other. The instrument must always be used in reversed positions, for determining the time, when this is practicable.

There is a curious anomaly sometimes found in transit observations, viz. that two practical observers will make a noticable difference in observations, the mean of which at which a star passes a wire. Mackay first noticed this singularity in his assistant Kinnebrook, who observed a star 0°-7 later than the Astronomer Royal. Bosell and Angellander have a still larger difference; and we found, on determining the longitude of Breslau, that M. Quetelet, the director of that observatory, noted a transit about 0°-8 earlier than Mr. Henry, one of the transit observers at Greenwich; so that if the time at each place had been simply taken from their observations with-
out any allowance, the longitude would have been erroneous on that account alone 0°-8, which might have been either way. This shows how insecure all nice chronometric results are, and how the determination of the time at both ends of the arc, or unless the relative personal equation of the observer at each end is carefully determined. It would be advisable perhaps, when making these observations, to determine the distance to the star, to reduce the observer, as it seems that fatigue will, in some cases at least, cause a variation in the personal equation, and that two observers may begin a night with one difference and end with another.

In this latter circumstance, it would perhaps be possible to train observers to observe alike, by exhibiting the same phenomena of sound and sight (the relation between which might be established mechanically) to two observers, placing them, like his, near the same place; and such a piece of mechanism would be easily made, though there would be a difficulty in getting observers to submit to the drill. We have found the following practice a good exercise for making the eye and ear work together. The pointer of a clock, with dead-beat escapement, springs forward simultaneously with the sound of the beat. Where there is a good deal of noise, and the clock has a low beat, it is found necessary to have a second clock running slowly, which can be made equally precise and spring forward as it were for the transit clock. The observer makes them beat nearly together, and then listening at the principal clock and noting the difference, he either pushes forward or delays the pendulum of the journeyman to make the clock slow, or fast, and this continued, he cannot distinguish between the two beats when standing close to the transit clock. Let a person try to make this coincidence by looking at the transit clock and listening to the journeyman clock if he can, or can very nearly do this, it is evident that he notes an appearance at the time it happens. Perhaps by trying the same thing when fatigued, he might detect a change in his perceptions, for the coincidence of sounds, as judged of when equalized by standing near the weaker one, is one in which a tolerable ear can scarcely be more than 0°-01 or 0°-02 out at farthest.

The position of the horizontal axis has been all along supposed to be measured by the level, and this is certainly the most ready method. But the level may happen to be broken, or, unless it comes from a very careful maker, it may be sluggish, or unequally divided. The beautiful levels which accompany Ertel's instruments, which are covered at the ends with parchment and filled with ether, are very near the weaker, as we know by experience, with such a difficulty, our celebrated surveyor Captain W. F. Owen raised a tall pole, and having put thereupon a distinct mark, adjusted his instrument by moving the elevation of the wire, raised and lowered the mark directly and by reflexion. In another instance, where the level was broken, an observer of some name was unable to supply its place; and a projected set of observations failed in consequence. The simplest method is that pursued by Captain Owen, substituting the pole star or other slow-moving star at its culmination for the tall pole. When the axis is thus nearly corrected, which may easily be done when the star passes the first wire, it is better to observe the star over the rest of the wires half directly and half by reflexion, and to reduce each set to the mean wire. On drawing the figure it will be seen that any error of level will affect the transit of a star seen directly one way, just as much as it will affect the transit of the same star, seen by reflexion, the other way. The level being, after the first set has been reduced to the mean wire, twice the error due to inclination: that is, the difference of the transits in the two positions is, when the star is above the pole, \[ \cos \beta \times \delta, \]

and may be used for all the other observations. The observation will succeed very well with any slow-moving star, if the observer has time to shift from one position to the other without hurry; or he may use two high stars, each observed over all the wires, if they have the same altitude, or if he should happen to know the other errors of his instrument. Indeed, if he has no objection to solve simple equations with four unknown quantities, he may proceed exactly as shown in footnote A, introducing another term with \( \delta \) and its coefficient, and changing the sign for the observations by reflexion.

Observations by reflexion of Polaris are well suited for another purpose, viz. for examining the value of the level-scale by means proper to the instrument itself. For this purpose the observer places himself at one end of the scale, and by a mean of half a dozen readings, reversing each time, ascertain the error of inclination. Now observe Polaris, exactly as we have before mentioned, or, if the observer wishes to make the test, selects a star so near the north that the bubble of the level may be made as near as possible to the North Star, and by reflexion over the 3rd, 4th, and 5th; reduce each set to the mean wire, and calculate by the formula already given the true inclination of the axis. On a following night repeat the operation, the illuminated end being on the opposite side of the scale. If the result is the same, it is evident in the two experiments, either that the curvature of the level is unequal, or that one pivot is thicker than the other. This may be ascertained by the level alone as we have shown above, or would be indicated by a difference between the direct and reflected observations with the axis being horizontal by the level, or by comparing the inclination obtained from reflexion in the manner has pointed out, in reversed positions of the instrument, supposing the rule to be the same. Thus if the inclination be determined by observing Polaris over the first half of the wires directly and the second half by reflexion, a value of the inclination will be found. Reverse the instrument, and make the same observation with the other half of the wires for the second value of the inclination, which should agree with the former if the pivots are equal, half the difference, if it exists, is the difference in the radii of the pivots. The level however affords much easier, and so becomes a measure of inequality; but it will not show if the pivot be elliptical, which the observations by reflexion would do if stars different altitudes were observed. If the tests agree, it is a reason for believing that the pivots are round within the limits, which a tolerable level will do.
by means of a vertical collimator, which is convenient enough, but, so far as our own experience goes, rather uncertain in its indications, and much inferior in both respects to a good level. A really good level carefully and frequently applied will show the position of the transit axis to about 0°2 or 0°3, or the inclination correction to 0°2 or 0°3, and this is a smaller quantity than a considerable number of careful observations will show.

From what we have already said, it is evident that where exact time is wanted, the collimation, inclination, and deviation factors are perfectly required. The collimation factor is merely a table of sector of declination, and may be taken from any table of natural sectors. The inclination and deviation factors should be computed for each observatory to every 10° of declination, and be tabulated for constant use. For the stars often observed, we find it most convenient to have a catalogue in which the log sectors of declination, the natural sectors and tangents of declination, and the factors for inclination and deviation, are entered in parallel columns with the proper signs. The astronomer royal employs a sliding-rule for these and similar computations. In computing this table for a given latitude, the formula will be advantageously transformed thus:

\[ \text{Inclination factor} = \frac{\cos (\phi - \epsilon)}{\cos \epsilon} = \cos \phi + \sin \phi \tan \epsilon; \]

\[ \text{Deviation factor} = \frac{\sin (\phi - \epsilon)}{\cos \epsilon} = \sin \phi - \cos \phi \tan \epsilon; \]

so that having the natural sine and cosine of latitude, and also the log sine and cosine, the computation reduces itself to adding the log tan declination to these last. The necessary tables may be computed in a few hours as far as is advisable; for, unless the pole the change of declination was so large an effect, that it is necessary to use the exact declination.

Great service would be done to amateur practical astronomers by a judicious set of printed forms, in which to enter and reduce their observations; and by a set of tables sufficient for these small computations, and not containing anything further. This can only be obtained by repeated attempts, and after all, most observers would probably prefer a modification of some form, to adopting it implicitly. We have tried to produce something in this way on which a better attempt may be founded. The astronomer royal has published a portion of the forms used at Greenwich in the last volume of the Observations (1840), and we venture to recommend his practice to other observers, in order that their less able brethren may profit by their superior skill and experience.

While he employed in the Royal Observatory of Heidelberg in the preparation of a method of determining the equinox by observation of the stars and wires and an eye-piece into the other, and the telescope specially adapted to this observation; the divided horizontal circle enables you to set the transit axis in the prime vertical; and as the telescope has a prism at the centre of the axis, to reflect the rays down the transit axis itself, the observer looks horizontally wherever the stars may be. It may be necessary to warn the unpractised observer that in this problem he only gets the exact latitude at once if the telescope passes through the zenith, or if the axis is truly horizontal. If the north end is high, for instance, 5°, the circle described by his instrument will pass 5° to the south of the true zenith, and he will get by the formula given above an apparent latitude too great by 5°.

If the axis is very incorrectly placed with respect to the meridian, the colatitude will be sensibly too small. Let the axis point to the east of the north; then the telescope describes a vertical circle passing through EZW and Pz, which will be the colatitude which results from the formula.

If the true sidereal time be known with moderate accuracy, find how much the middle of the times of the star's transit over the arc of the same vertical, corrected for clock-error, differs from the time at which it actually passes the meridian, i.e., from its right ascension. This difference is the \( \Delta ZFS \), which is consequently known. Now from right-angled triangle ZZS,

\[ \tan Pz = \tan PS \times \cos SPZ; \]

or, \( \cotan \phi = \cotan \delta \times \cos \epsilon \times \text{time elapsed.} \]

If then the declination of the star is known, the latitude is found; or if the same star be observed at two places, the difference of latitude may be found with only an approximate knowledge of its place.

Again, if the same star be observed regularly at the same place, as tan declination = tan latitude \( \times \cos \epsilon \times \text{time elapsed,} \) and as the greatest nicety, the variations of declination can also be measured with great precision. Thus the constants of aberration and nutation may be determined by a transit in the prime vertical instead of a zenith sector, and we suppose some such application is contemplated for those which have been already set up. We think the advantage questionable. The telescope in a zenith sector may be of almost any size, which gives it an immense advantage over the transit. The levies 6S may be applied just as well to one instrument as the other (the plumb-line much better to the zenith sector); and though the division by time in the transit is more perfect than division by arc in the sector, the teleobserver being of the same power, it is evident that the division is not the falling part of the sector. An error in the form of the pivots would be injurious to the transit, and is not readily to be detected; but of little consequence in the sector, and easily detected. It must however be admitted, in returning from this digression, that the zenith sector has not as yet quite equalled the expectations which might be formed of it; and that the modern transit, as it comes from the best makers, is an almost perfect instrument.

In determining the latitude by the portable transit, it is easy to place the instrument with sufficient accuracy, for the error must be considerable to affect the result very sensibly. An object-glass may be inserted in one pivot, and wires and an eye-piece into the other, and the telescope specially adapted to this observation; the divided horizontal circle enables you to set the transit axis in the prime vertical; and as the telescope has a prism at the centre of the axis, to reflect the rays down the transit axis itself, the observer looks horizontally wherever the stars may be. It may be necessary to warn the unpractised observer that in this problem he only gets the exact latitude at once if the telescope passes through the zenith, or if the axis is truly horizontal. If the north end is high, for instance, 5°, the circle described by his instrument will pass 5° to the south of the true zenith, and he will get by the formula given above an apparent latitude too great by 5°.
Tan. PZ. Cos. ZPz = tan. Pz = tan. \(\phi\) \times cos. \(\phi\) elapsed time;

or, tan. \(\phi\) = tan. \(\phi\) \times cos. \(\phi\) time elapsed.

It would be better to deduce the angle ZPz, which is the same for all stars, from a star which does not pass very near to the zenith, as the passage is more easily observed, but the length of time which elapses between the two passages of such a star is inconvenient. If the time is well known, such a passage will do.

If the observer has any means of determining the error in azimuth by a reference to known objects in the horizon, the correct latitude may be easily deduced from the approximate:

\[
\sin \text{PZ} = \cos \text{approximate latitude}.
\]

\[
\text{cos. ZPz} = \cos \text{sin azimuthal error}.
\]

Lastly, as almost all transits have vertical circles, which are or may be tolerably adjusted, the observer may suppose the apparent zenith distances, ZS and Z'S, pretty nearly, and half the difference gives Z'e.

Then cos ZP = cos Pz \times cos Z'e, or sin latitude = sin approximate latitude \times cos of half difference in star's altitude.

By reversing the instrument, any error of collimation or inequality of pivots will produce exactly a contrary effect on the latitude. Observations therefore of two stars on the same day in reversed positions, or of the same star on following days in reversed positions, will correct each other, and the mean will give the true latitude, i.e. as nearly as the declination of the star is known. We have dwelt the longer and more minutely on this problem, because where great accuracy is required with but moderate means, it would seem that this is the best method of determining the latitude, and is therefore especially suited to coast surveying. It has been extensively used in the Russian navy, and has led us to suggest it to those who shall measure longitude. We shall mention one caution which the users of this method must not disregard, and that is, that the position of the instrument be so stable that no motion of theirs while observing can affect the horizontality of the axis. With this precaution, and such transits as are turned out of the best workshops here and abroad, a thirty-inch instrument will give, we conceive, the latitude within 1° or 2', without any particular skill on the part of the observer.

There is one word more to be said on the subject of pivots before concluding. By the mode in which they are turned and finished, they ought to be true cylinders, having their axes in the same right line; and so, no doubt, they are, very nearly, when the axis is strong and the pivots are turned in a good lathe, using a diamond for steel pivots. A little inequality of radius we have shown how to measure and correct for. But if the pivots are elliptical, the fault will not be shown by the level; and its effect will be to give the instrument a small variable error in azimuth, the period of which is 90°. There are several ways of trying whether the pivots have a correct form, but the error is so small as not to offer much hold to any direct method; and yet, if it does exist, no mass of observations and the apparent accuracy of each. Whether this can be accounted for by supposing each catalogue to have a small variable error depending on the form of the pivots, or by many travellers, German and Russian. There is undoubtedly an error, which may be accounted for by the form of the pivots, is more than we can undertake to say, but it is a matter well worthy of investigation in the present state of practical astronomy.

We have described our account of the Astronomical Observator the principal instruments which form our furniture were described. We cannot attempt such a minute delineation as would suffice to guide any one wished to erect such a building. It will be enough to state some of the properties which a well-conducted observatory should possess, and this may help an intelligent person to form a judgment after examining several of those which exist.

An observatory, as was well remarked by Rosen, is nothing more than a covering for the instruments and a protection for the observer from the inclemencies of the weather. This should be sturdily built in mind by an architect who called upon to furnish a plan for such a building, especially if he be limited in cost. The floor should be constructed with a gen- eral immovability not to be obtained. The supports of all instruments which are carefully watched show slow movements depending either on temperature or moisture, and every precaution which be more or less is given to the depth at which the foundations of the pier supporting the instruments should be laid. The deeper, broader, and more solid the better. The outer earth should not touch the base below the surface, and the outer ear shape should stand quite freely from it. The floor should be quite clear of a pier or its foundations. With these precautions the change of position in the instruments will be very slow, and when it is slow and uniform the effect is easily taken into account. In some of the earlier observatories, the instruments are placed high above the ground, and in several of the Italian and some Continental observatories they are at the summits of lofty towers. We need not say that any elevation beyond that which is required to command the horizon and keep the building dry and well ventilated is injurious. If distant meridian marks can be erected to the N. and S. it is of advantage, but this condition is not essential.

The instruments which are required for an observatory depend of course upon the class of observations which are to be pursued there. It has been too much the custom to build observatories nearly alike and to pursue exactly the same methods. We shall mention only those in order which may be considered important enough to give the name of observatory to their enveloping buildings.

The transit and its clock. These, on some scale or other, are required by almost every observer, as the time enters into all very observation, and a transit is the first instrument for getting it, and a good well-fixed clock is wanted for keeping the time when got. In principal observatories the transit is generally from five to ten feet focal length. We think the latter size unnecessarily large for the objects usually observed, and faint objects which require light, and consequently a telescope of large aperture, might be turned over to the large equatorial and micrometer. A five-foot transit with an object-glass of the usual size is probably all that is ever necessary. We shall only consider the transit in order which may be considered important enough to give the name of observatory to their enveloping buildings.

* The Astronomer Royal, when at Cambridge, noted a yearly oscillation of level in his transit pier. Professor Henderson at Edinburgh finds slight affect on transit apparatus. He can predict his error level from the reading of the underground thermometer.
The meridian circle, which, in England at least, is always a mural circle, and, so far as we know, has been used only in surveys, and not in observations, is the instrument that the observing hair is not likely to strike. The windows should be on the north side of the transit and circle rooms.

The transit, meridian circle, and clock are the instruments on which exact astronomy is founded, and they differ from other astronomical instruments in the observatory they require. This should be for each a square or long room, from 14 to 20 feet in its smallest direction, viz. north to south, and 10 or 14 feet high, with a slit of corn 18 to 30 inches wide, cut in the direction of the north, and at the 3/4ths part of its length, so that the transit and observer can see it, and consequently separate apartments, as the transit observer while counting the clock would be disturbed by any noise. Where two observers cannot be afforded, a transit circle may be made to answer both parts; there is a good deal of the meridian circle in the German, Russian, and Italian observatories.

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servatory, we should advise him, after learning what instruments are to be accommodated, to study each of these observatories, and arrange the rooms in the most convenient order. The best appearance which the case admits of may be given afterwards, but he should not be very rigorous as to outside symmetry. It is scarcely possible to unite convenience as an observatory with a regular exterior, especially at a considerable expense.

We will conclude with a few remarks, which are perhaps self-evident, but which nevertheless seem to have escaped the attention of some of those who have founded observatories. It is not enough that a splendid building is filled with magnificent instruments directed by a consummate astronomer; he must have at his disposal numerous subordinate assistants for observation and computation, and funds for printing the observations and results. At present, we have only the only observatory which can be tolerably manned; and even Greenwich is under-handed for fundamental observations. These require that the state of the clock, of the transit, and of the circle should be known at all times, in order that every observation may be available. Now this alone nearly absorbs the time of two assistants, and gives just the same trouble whether many or few additional observations are made. If we are correct in this view, an observatory of this class produces new matters for complaint in proportion to the observers above two. Without insisting very strictly on the exactness of this rule, we say confidently, that an additional assistant at Greenwich, Cambridge, Edinburgh, or Oxford, would do more good than two better men in a new observatory. What is wanted is greater force in all these observatories, if they are expected to keep up their present volumes of observations; or the consequence will necessarily be, that being taskled beyond their strength, they must give in from weakness or sickness. It is only in the English observatories, and since the astronomer royal set the example at Cambridge, that all the observations are completely reduced and published within a short time of their being made; and yet, without this publication and reduction, what is the value of an observatory?*

**TRANSITION ROCKS.** When the general terms 'Primary' and 'Secondary' were much in use among geologists, certain assemblages of rocks, which were of intermediate order, and seemed to unite the mineral aspect of the 'Primary' with the organic enrichments of the 'Secondary,' were for these reasons called 'Transition Gebirge,' 'Rocks of Transition,' and 'Transition Rocks.' The term was very extensively used by the pupils of Werner, and maintained, till within a few years, an important place in geological nomenclature.

By the progress of sound observation this classification has been disturbed: the rocks of fusion have been separated from the aqueous depositions, and thus the original classes of primitive and secondary rocks thrown into new and more appropriate groups; the investigations into ancient organic life have introduced the 'tertiary' strata, and divided them from the earliest marine depositions to the actual sea-bed, a continual succession of 'transitions,' a series of gradations only locally interrupted, unites into one general history all the deposits from water, as a parallel series of inquiries has associated the products of land. It is therefore not longer convenient to give exclusively to the gradations which happen among the earliest rocks a title which is equally applicable to all the others of the series of strata; and the term 'transition' is now almost extinct as designating a class of rocks, and is replaced in nomenclature by other terms.

Some of these are founded on the general idea of successive superposition among the strata. Thus we have,

Mr. Conybeare, the

Superior
Supermedial
Medial
Submedial
Inferior

Orders of strata.

* The observations of the fixed stars, by Bradley, made eighty years ago, were at little use until they were reduced by Israel (Præsidium Astronomicum). The observations of the planets, by Bradley, Maskelyne, and Pond have only recently been reduced and brought into an available shape for the physical astronomer, under the superintendence of the astronomer royal. There are now observed to visit the same objects at the same period, and there is reason to hope that under the observation of the same mind, the observations may be of advantage to the physical astronomer, and may be under the supervision of the astronomer royal. The funds for these computations were furnished by the liberality of the Treasury.

Transits of Venus.

Dec. 4, 1639.
Dec. 8, 1874.
June 8, 1761.
Dec. 6, 1882.
June 8, 2012.
June 8, 1720.

Of these the transits of 1882 and 2004 may be visible in his country.

The use of these transits is threefold. First, they may be employed in correcting the tables of the planet in question; secondly, in computing the longitude of the place observing Venus. Venus is in different positions in the sky near the horizons of the earth, the sun, and the earth; and the fact that the same may be said of the second use. As to the third, the transits of Mercury, which occur with tolerable frequency, are comparatively useless, from the difficulty of the observations; but the transits of Venus are more available, and furnish our most precise mode of ascertaining the distance of the earth from the sun.

It cannot be shown precisely to any but a mathematician, now that it is the observation of a transit of Venus at several different places on the earth's surface is made to answer the above purpose. The phenomenon itself obviously resembles an eclipse of the sun [Sun, p. 282] as distinguished from one of the moon; and is affected in its progress by the rotation of the earth. If a spectator on the earth observes a transit of Venus from a point on the earth's orbit, the sun's disk appears, at any moment, to pass over a certain line on the sun's disk, traced out by a moving line the end of which is in his own eye, and which passes through the centre of Venus: when this line first reaches the point on the disk of the sun, it is seen as a small dark spot somewhere on the disk. The observer may, if he wishes, compute the time at which this moment arrives at any given place on the earth, in the latitude of which the transit of Venus is observable.

This phenomenon is one which is often seen on the face of the earth, but with which we are here concerned is a transit of Venus. The observation is made in the following manner:—

A body has motion of translation when all its points move in parallel straight lines; when, in fact, all its points have the same motion. If all have not the same motion, there is either simple rotation, that is, about one permanent axis; or rotation about a varying axis; or else a compound of translation and rotation. The motion of a single point must always be called translation, rotation being an admixture of the two.

The point which is called the centre of gravity of a system, and which is of so important in the theory of equilibrium, has yet more in that of motion. The motion of a rigid body is, in fact, compounded of the translation of its centre of gravity, and the rotation about an axis (whether always in one direction or not) passing through its centre of gravity. Now whatever the forces may be by which such a system is either set in motion, or acted on while in motion, the translation of its centre of gravity may always be made a distinct problem from the rotation about its centre of gravity, by the following simple rules:—

1. The centre of gravity moves just as it would if the whole system were there collected, and all the forces were there applied.

2. The rotation of a system about its centre of gravity is no other than what it would be if that centre were made a fixed point, and all the forces applied in their proper places.

Suppose, for instance, a bar AB, whose centre of gravity is at C, is sent spinning into void space by a certain blow in the direction DE, communicated at D. Let there be another similar bar BC, and suppose it to be joined to the bar AB by a fixed pivot without friction, and which, being parallel to AB, is struck at the same instant with a similar blow in the direction AE. To find the position of the bar at the end of any given time, say three seconds, is a twofold problem. Suppose all the forces attendant on the bar concentrated at C, and let the blow be struck, with the same force and direction, at the point C. This point will then describe a certain parabola GMH; say that in three seconds it is at H. Next turn to the bar which moves on a fixed pivot, and let g be its position in three
seconds. Draw FG, a position of the bar parallel to \(f \), F being its centre of gravity, and FG will be the real position of the bar at the end of the given time, three seconds; and similarly for any other given time. Thus much of translation, mechanically considered: we now speak of the wider use which the word has, or might have, in geometry; at any rate we have the thing to consider, and perhaps transference might be preferable to translation, as applied to the motion of a figure from one part of space to another. The conception of the possibility of figures differing only in position, and composed of perfectly equal and similar parts of space, similarly bounded, is one which is demanded of the beginner in geometry. Euclid requires this when he speaks of equal figures; and his feat of equality, namely, the possibility of creating a perfect coincidence, requires the notion of one figure being transferred in any requisite manner, whether by what is called in mechanics translation, or by rotation, or both. It must be a sort of copy, or facsimile, of one part of space which is thus moved into and made to occupy another: for it is impossible to imagine space removed, or any part of space made to change place. And this copy, or whatever it may be, must have rigidity, that it may not change form by the way: it must be rigid in our thoughts, at least. We are thus required to imagine space endowed with some of the essential qualities of matter, before we can prove the fourth proposition of Euclid's first book: there must be the consistence of matter without its imperceptibility, but whether it requires force and time to change place, or not, is of no consequence. Even a plane figure must be a sort of rigid consistence with two sides to it, for it is necessary to imagine it turned round, so as to present a different face to the spectator. In the fifth proposition of the first book, the very first step is the application of the fourth proposition to prove the equality of two triangles. Now the fourth proposition requires one triangle to be placed upon the other, which cannot be done in the figure of the fifth, unless one of the triangles be turned round, so as to show the other front to the spectator. If Euclid meant, by giving the triangle two handles, to make it easier to turn, he has been unfortunate, for the proposition has acquired the name of the *œas's bridge*, probably as being that which first stops a dull reader. The following proof is as corrupt as that of Euclid, and it is not much to say that those who do not understand it will not understand the one he gave.

Let ABC be an isosceles triangle, having \(AB = AC\). Let it be turned round (for illustration, the dotted lines show the track of the three points, and two intermediate positions are shown) into the position DEF. Then in the two triangles ABC, DEF, we have \(AB = DE\), for DE is AC (=AB by hypothesis) removed. Also AC = DF, for a similar reason. And the angle BAC = the angle EDF, the second being only the removal of the first. Hence we have \(AB = DE\), \(AC = DF\), and \(\angle BAC = \angle EDF\), and by the fourth proposition it follows that \(\angle ABC = \angle DEF\). But \(\angle DEF\) is only another position of \(\angle ACB\), \(\angle ABC = \angle ACB\), which was to be shown. If one of the triangle ABC might be turned round upon itself, as the reasoning of the fourth proposition applied at once. It is not to be supposed that Euclid did not see the proposition: he is a writer who very likely chooses the most obvious path without some cogernt reason connected with his system. The proof given above would not serve to demonstrate the equality of the external angles without the previous introduction of the properties of adjacent angles; and it has the knowledge of the equality of the external angles is immediately wanted.

**TRANSLATION.**

**TRANSMUTATION OF METALS. [Alchemy.]**

**TRANSPARENCY is that quality in certain substances or media, by which the rays of light incident upon the surfaces are allowed to pass through them. No substance can be said to be perfectly transparent, yet all bodies possess this quality in some degree; the most dense metals as gold, if rendered very thin, will transmit light; and the other hand, the quantity of light which passes through the most transparent media, as water or glass, becomes less, or the transparency diminishes, as the depth of the medium increases.

It was at one time supposed that transparency resulted from the pores of a material being of such magnitude that the particles of light can pass through them in every direction without being impinging upon the solid molecule of the body or medium; but this circumstance is not alone sufficient to account for the phenomena presented by transparent bodies.

Newton assumes (Opticae, lib. ii.) that all bodies are porous, and that the pores constitute a larger portion of the volume of a body than is occupied by the solid particles or atoms. These last he conceives to have certain magnitudes, which may be different in different bodies; and it is assumed that they are transparent like thin plates of any transparent material, the atoms reflect from their surfaces rays of some colour, and transmit through their substance rays of another colour; and this property he conceives the visible colours of bodies to depend.

The thickness of the atoms of a medium, and the extent of the intervals between them, determine the colours which are transmitted and reflected; but a certain thickness, or extent, is necessary in order to allow reflection to take place at the surfaces; and if the atoms were too thin, or the intervals too small, to permit any of the particles of light to be so reflected, the whole of the incident light would be transmitted by the body considered with such atoms and such intervals would be perfectly transparent.

When a substance, as water, glass, diamond, &c., is of nearly uniform density, the attractions exercised by molecules on light being nearly equal in every direction, the luminous particles suffer very little variation in their directions which they experience at the surface, and in the interior of the substance; and thus nearly all of them pass through without interruption. The opacity of such substances as wood, metal, &c., when in masses, is supposed to arise from the numerous changes of direction which the particles of light undergo at or within their surfaces, in consequence of the inequality of the forces exercised upon them by the molecules which they approach; those molecules being supposed to differ from each other in density and in power of attraction: thus the particles of light are either retained in contact with the particles of the material, or are compelled to suffer continual reflections in its interior, few or none of them escaping at its surface. That transparency depends on the deviation of the particles of light, by which the substance receiving the light is composed may be inferred from the fact that diamond, the most transparent of bodies, becomes, when by a different arrangement of its particles it is converted into coal, one of the most opaque.

That an absorption of the particles of light takes place in the interior of certain substances is evident, since pure water, which is very transparent when the depth is small, becomes less so as the depth increases; the violet, indigo, the blue, the green, the yellow, and the orange coloured rays of the spectrum being successively arrested.
and the red rays alone being capable of penetrating far into the water: it has hence been inferred that, at very great depths under the surface of the sea, total darkness prevails. In proof of this, that the opacity results from variations in the atmosphere produced by the molecular vibrations and motions into which it enters, it may be observed that water and oil, which are equally transparent, but which have different refractive powers, become opaque when they are mixed together; and the like may be said of the ice and air which constitute the atmosphere of the earth.

If several thin plates of a transparent substance be placed upon one another, the assemblage becomes opaque, and the thickness which will suffice to produce the effect is uniformly one third that of a single plate of the same substance. A single plate of glass is an undivided mass; the opacity may be conceived to arise from the rays of light being intercepted, and reflected, on the several surfaces at which the plates are placed together. It may be added, that if there be laid upon one another two transparent plates of glass, of different colours, as blue and red, and if a pencil of white light be incident upon one of them, that plate will absorb many of the coloured rays in the pencil, and the other will absorb those rays which may have passed through the former: thus the two plates together will absorb the whole of the light and become completely opaque.

On the other hand, objects which are opaque may be made perfectly transparent by having their surfaces covered with a substance of uniform density. For instance, two pieces of glass be rough-ground on one side, and the ground sides be placed together with a thin layer of oil of turpentine between them, the double glass immediately becomes visible, and may be perfectly filled up with a fluid of nearly the same refractive power as the glass. The porous mineral called hydrophane and the gum called tabatbear, both of which are opaque when dry, become transparent when their pores are filled with water. The like effect will be produced if powdered glass, which, when dry, has the appearance of a white opaque mass from the blending together of the rays of light reflected in every direction at the surfaces of the small transparent particles, is placed in water; this takes place freely through the whole of the mass. Those vibrations being excited by the action at the first surface, and affecting the like ether which is beyond the second, water, glass, or other substance like glass, which is neither harder but little denser; while, in such substances as wood or metal, the vibrations may be greatly impeded or entirely destroyed.

TRANSPORTATION, PULMONARY, is the exhalation of watery vapour which is constantly going on from the blood circulating through the lungs. Its amount is determined on the one hand by the proportion of water in the blood, and on the other by the temperature and hygrometric state of the atmosphere required. It is not commonly observed except in cold weather, or when the atmosphere is saturated with moisture; but may always be made evident by breathing on a cold reflecting surface. [Respiration.]

TRANSPORTATION. [Planting.]—TRANSPLANTATION (trans and porto), removal, banishment to some fixed place; a mode of punishment.

To this head has been referred, not the subject of penal transportation less than the banishment of delinquents generally, although the word banishment is indistinguishably applied to any order and mode in which the subjects are severally treated in this article.

First, we shall treat of Transportation—its origin as a mode of punishment; acts of parliament relating to it; the system under which it was carried into execution in the early history of the Australian colonies; system on which it was recently executed in New South Wales and Van Diemen's Land—assignment; ticket of leave; chain-gangs and road-parties; penal settlements; expense of the transportation system as hitherto enforced; causes of its present prevalence; lastly the last expedient of any of the Australian penal colonies; system of transportation as enforced at Bermuda; theory of transportation.

Secondly, we shall treat of the Hulks—on their origin, design, and history; circumstance of the bulk; discipline of convicts in the hulks; employments; expense of the system.

Thirdly, Prisons—on their state at the end of the last century and the beginning of this; the system of classification; the silent system; the system of practical working; regulations of the prisoners in which this system is in force; the labour imposed on the prisoners—the treadmill, crank-machine; expense of the system; the separate system; its discipline, theory, and objections to it; its origin and history in England; principles of prison construction—employment of prisoners—expense of the system; prisons of England generally; treatment of untried prisoners; disposal of prisoners after their discharge; prisons for juvenile offenders—Parkhurst Reformatory.

Fourthly, Institutions in England auxiliary to those for punishment, or Houses of Reformation; Refuge for the Indigent, Philanthropic Institution, etc. 

Fifthly, Prisons in Scotland and Ireland, and in the British dependencies.

Sixthly, Capital Punishment.

Lastly, Provisions as to reform in foreign countries. 

History of Transportation.—Transportation derived its origin from banishment. [Banishment.] The statute of 39 Elizabeth, c. iv., for the banishment of dangerous rogues and vagabonds, was virtually revived by her successor James I., into an act for transportation to America, by a letter to the treasurer and council of the colony of Virginia, in the year 1619, commanding them to 'send a hundred dissolute persons to Virginia, which knight and gentleman shall do well to consider.' Transportation is not however distinctly mentioned in any English statute prior to the stat. 18 Car. II., c. 3, which gives a power to the judges at their discretion either to 'execute or transport to America for life the mass-troopers of Cumberland and Northumberland.' Until after the passing of the stat. 4 Geo. I., c. 2, continued by stat. 6 Geo. I., c. 23, this mode of punishment was not brought into common operation. By these statutes the courts were enabled to order felons who were by law entitled to their clergy to be transported to the American plantations. Transportation to America under the statutes of George I. lasted from 1718 till the commencement of the War of the American independence in 1775.

The unprecedented accumulation of prisoners in the common gaols of the kingdom during the American war drew the attention of several philanthropic individuals to the question of providing an improved penal system. A plan for the establishment of penitentiaries, which was strongly recommended by Judge Blackstone, Mr. Eden (afterwards Lord Auckland), and Mr. Howard, was taken into consideration by parliament, and the act 19 Geo. III., c. 71, for the erection of penitentiaries, passed. The government failed however to adopt the necessary measures for its execution; and transportation was resumed by an act passed in the 21st year of George III., which empowered his majesty or his council to appoint to what was beyond the seas, either within or without his majesty's dominions, offenders should be transported; and by two orders in council, dated 6th December, 1786, the eastern coast of Australia was made the place to which transportation was directed. In the month of May, 1787, the first band of convicts left England, which in the succeeding year founded the colony of New South Wales.

Acts respecting Transportation.—The present condition of a transported felon is mainly determined by the 3 Geo. IV., c. 84, the Transportation Act, which authorizes the king in council to appoint any place or places beyond the seas, either within or without the British dominions, to which offenders should be transported; and to direct the mode of removal being left to one of the principal secretaries of state. The places so appointed are the two Australian
colonies of New South Wales and Van Diemen's Land; the small volcanic island called Norfolk Island, situated about 900 miles from the eastern shores of Australia; and Ambon. The 5 Geo. IV., c. 64, gives to the governor of a penal colony a property in the services of a transported offender for the period of his sentence, and authorizes him, if he judges it expedient, to change the offenders' destinations. 9 Geo. IV., c. 63, empowers the governor to grant a temporary or partial remission of sentence; and the 2 & 3 Wm. IV., c. 62, limit his power in this respect. Other statutes in which reference is made to transportation merely determine for what crimes it is the punishment. In New South Wales and Van Diemen's Land convicts are subjected to a variety of colonial laws, framed by the local legislatures established under the act 9 Geo. IV., c. 85, 54 Geo. III., c. 93, & 2 Geo. IV., c. 42. System of Transportation as carried into execution in the American Colonies.—Criminals were generally deemed beyond the pale of social rights and interests; the theory of punishment was not studied; and punishment itself was too exclusively regarded as a means of riddance, even more recently than the date of American independence, and the termination of the system under which transportation to America was carried into effect. The colonies to which convicts were transported were those of Virginia, Maryland, Delaware, North Carolina, South Carolina, Georgia, New Jersey, New York, and Pennsylvania. According to an estimate obtained by Lord Auckland, the numbers transported to America were, for many years previous to the discontinuance of transportation to our American colonies, about two thousand annually. But Mr. Jefferson represents the convicts as unworthy enumeration, as 'not sufficient to merit it.' (Memoirs and Correspondence of President Jefferson, vol. i., p. 400.) Dr. Lang, after comparing different estimates, concludes that the number sent there might be about fifty thousand altogether.

The passage of the convicts to the plantations was contracted for by owners and captains of vessels, who were responsible by the laws of the convicts for the period of their sentences. Transported felons were literally bought by the planters for the terms specified in their respective warrants, and worked with the negro slaves under the lash of an overseer. (Lang, p. 37-39.) Among the incidents of this system, it is mentioned by Mr. Bingham, that a rich convict, or one whose friends were rich, might easily be released in the mother country by the payment to the captain of the transport of a better sum than could be paid in the colonial market. (Theory of Punishment, ch. 9. Transportation.)

At first, we are informed by a contemporary historian, the convicts who were thus transported were very acceptable slaves, who considered that their labour would be more beneficial in an American settlement than in the colonies of New South Wales and Van Diemen's Land; and before the convicts were landed in the colonies, the importation of negro slaves into the American colonies however soon lowered the value of convict labour; and it was thought dangerous to mix white men in a state of slavery with an increasing number of negroes. Barbadoes and Maryland successively expressed their aversion to the introduction of British felons: the legislature of Maryland passed an act in 1692 prohibiting ship-masters from landing convicts in that colony. Differences of opinion however continued to exist in the colonies as to the advantages of the system. Where no better description of labour was to be had, it may be concluded, from conflicting accounts, that that of convicts was not much in demand. It is said that the British colonial authorities never received any informations in respect of the practice of forcibly transporting convicts upon the colonists; and being told that it was absolutely necessary to remove them from England, and that they must continue to be transported to America, republican Germany and France were to examine the same reason would justify the Americans in sending their convicts to England?

System of Transportation as carried into execution in the early history of the Australian Colonies.—The system under which transportation was carried into execution in the early stages of the history of New South Wales and Van Diemen's Land was determined in some measure by accidental circumstances, but its main features were these:—Transport vessels were engaged by contract by the British government. Clothing and provisions for the convicts and superintendents were provided by the government and afterwards, were supplied in the same way. The vessel provided a surgeon, approved of at Surgeon's Hall and at the Transport-Office. During the voyage the surgeon, in addition to the care of the health of the convicts, was required to keep a strict account of everything affecting the discipline maintained on board was to be entered; and at the end of the passage, should the conduct of the master of the vessel be shown to have been satisfactory, he was to be compensated by the government. He was liable to be mulcted or prosecuted, according to a article in the contract. Upon the arrival of a transport in the colony, general orders were issued by the local government for the return of the names of men who were left, with the land held in cultivation by them. The trades, ages, characters, and capacities of the convicts were as fully as possible investigated. Artificers were reserved for the service of the government; convicts who had been in a better condition were engaged in the forge and shipyards. A convicts and by other means. The convicts and were generally chosen from the best conducted among the convicts. The gangs worked from six in the morning till three in the afternoon; the remaining, in building, making and repairing roads, and the like; and for being allowed to them to be spent in amusement, or in labour the profits of which were their own. They were clothed, fed, and, for the most part, lodged by government. Convicts who had misused themselves when at work were liable to be punished, by the sentence of a magistrate either by the cat-o'-nine-tails or by hard labour in irons. Those who were distributed among the settlers were clothed, fed, and lodged by them: they worked either as servants or for the average hand they were allotted to them to be spent in amusement, or in labour the profits of which were their own. They were clothed, fed, and, for the most part, lodged by government. Convicts were accustomed to serve as armed guards in the government service; and when their set labour was finished, they were allowed to work on their own account. The master had no judicial power over the convict. It was not until a man had served his time that he was made a magistrate. The estimated expense of a convict in the service of the government was about 40£, per annum; the expense of maintaining a convict to the settler was about 25£ (Commissioner Bigge's Report.) Female convicts were assigned to the same as men, chiefly in the capacity of domestic servants.

At the expiration of the period for which convicts were transported, they were at liberty either to leave the colony (at their own expense) or to remain in it. If they decided, on remaining, a grant was made to the unmarried of forty acres of land, and to the married of an additional number of acres for the wife and each child: tools and stock were also granted to them, and for eighteen months they were encouraged by the government. Convicts were allowed to convicts who were pardoned by the governor.

The whole population of New South Wales in 1810 did not exceed 31,300 persons; the number of convicts included 10,000. The bills drawn upon the British treasury for expenses almost exclusively incident to the convict arrangements amounted to 72,000£. (Report of the House of Commons on Transportation, 1810 July, 19.)

The views of this system need scarcely be pointed out. The facility with which convicts under sentence for the most heinous crimes obtained entire or conditional freedom, prevented that salutary dread which transportation was designed to produce in other cases, and produced a free community of criminals. The educated or 'gentle- men' convicts became the leading lawyers, the newspaper editors, the 'patriots,' the tutors, the chief merchants, the wealthy land and flock owners of New South Wales, with-
out their having passed through any discipline calculated to make them fit for future employment. Convict emancipation, like the operation of the convict system, gives the following illustration of the measures by which fortunes were accumulated by convicts.—Samuel Terry was transported when young. He was married to a young girl named Parramatta, and assisted in the erection of a gaol there. By disposing to other prisoners of his allowance of spirits, and by habits of industry, he was enabled to set up a retail shop, in which he continued the business until his sentence was expired. He was then returned to Sydney, where he extended his business, and by marriage increased his capital. He for many years kept a public house and retail shop, to which the smaller settlers generally emanicipated resorted from the country, and where he was seen frequenting themselves with liquors, signed obligations and warrants of attorney to confess judgment, which were always kept ready for execution. By these means, and by an active use of the common arts of overreaching ignorant and worthless persons, Samuel Terry had been able to accumulate a considerable capital, and about 20,000 acres of land, besides sheep, cattle, &c. This man, when he died about five years since, was worth 20,000L. per annum. (Transportation Report, 1828, p. 115.)

During the long period of thirty or forty years after the establishment of New South Wales as a penal settlement, there was an entire neglect of the religious improvement of the convicts. Spirits were distributed to such an extent as to render them part of the general condition of females in this situation, according to the testimony of every witness examined, is as bad as anything could well be. At times they are excessively drunken, and by causing them still more prolific: they are all of them, with scarcely an exception, drunken and abandoned prostitutes; and even were any of them inclined to be well-conducted, the disproportion of sexes (about one female to ten men) is so great, that they are exposed to irresistible temptation, for instance, in a private family, in the interior of either colony, a convict woman, frequently the only one in the service, perhaps in the neighbourhood, is surrounded by a number of convicts, the treatment of whom she becomes an object of constant pursuit and solicitation; she is generally obliged to select one man as a paramour, to defend her from the importunities of the rest; she seldom remains long in the same place; she either commits some offence for which she is returned to the government; or she becomes pregnant, in which case she is sent to the factory to be there confided; at the expiration of the period of her confinement or punishment, she is re-assigned, and again goes through the same process.

The ticket-of-leave, the first stage in the progress of a convict to restored liberty, is a feature of the transportation system which has been generally commended. Convicts, in the 'Transportation Report,' approves of it in every thing but its relation to a system, the first stage of which, assignment, is liable to all the objections which have been made to slavery. Before coming to the possession of his ticket in assigned service, the convict, instead of being amended, is so much further depauperated, that this relaxation proves in many cases only a step to a worse condition than before, an enlarged opportunity for the commission of crime, and occasion of becoming obnoxious to its penalties,—penalties for offences which an employer has not the same interest in a hired as with an unpaid or assigned servant to conceal; because it is comparatively difficult to make the public service carry the same weight as a free man.

The alteration in the life of a ticket-of-leave convict appears to be between excessive and profitable labour for one season, and excessive and ruinous debauchery for another. Although some convicts of remarkable sagacity are observable in the force of circumstances, of sagacity sometimes remarkable, but more often dishonest in the use of advantages, have arisen to wealth; yet, considering the immense numbers of this class in the Australian penal colonies, and of the great numbers who have not been able to foresee, the number of those who have done this is very small.

As in the early, so in subsequent stages of the history of the penal colonies, distinction has been found among convicts and emancipists. Dr. Lang, writing in T 2
1837, shows that at that period 'the consumption of ardent spirits in New South Wales amounted to 33 imperial gallons annually for every man, woman, and child in the colony; the entire consumption for the United Kingdom being one gallon and a small fraction for each individual. Allowing however (he says) for convicts in actual bondage (in road and chain gangs), the number of spirits so issued, and charged off to the colonists of the colony, who are generally indisposed to the use of ardent spirits, the number of actual consumers is so reduced, that for each consumer there must be the enormous amount of eight gallons a year. During the period of his actual bondage the convict is understood not to be allowed ardent spirits: but in the service of private settlers he has the means of procuring the indulgence independently of his master. Emancipated convicts are scattered all over the territory, and frequently obtain their livelihood not by honest industry, but by corrupting the convict and emancipated convict population—selling ardent spirits on the sly, as it is called, and receiving in exchange property in goods that are generally plundered or stolen from their owners for the purpose of procuring the means of indulgence. (History of Transportation, pp. 83-85.)

The amount of petty offences in the penal colonies and of convictions for drunkenness is very great. In 1837 the number of convicts in New South Wales was about 28,000, and the summary convictions for petty offences in the year were estimated to be about 22,000. (Transportation Report.)

In Van Diemen's Land in 1832 the convictions were as 43½ for every hundred of the convicts. After 1832 the returns from which this proportion is taken are differently made out, and the several heads of offences are multiplied, yet with few exceptions the same general fact is evident. (Australasia, 1838.) From the character of the convict system it is evident that the convictions for petty crime fall greatly short of what is actually committed.

The following returns exhibit the amount of grave crimes committed in New South Wales and Van Diemen's Land, in each year between 1828 and 1836, the description of crimes, with the number of the population:—

<table>
<thead>
<tr>
<th>NEW SOUTH WALES.</th>
<th>1829</th>
<th>1830</th>
<th>1831</th>
<th>1832</th>
<th>1833</th>
<th>1834</th>
<th>1835</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>41,467</td>
<td>46,906</td>
<td>31,115</td>
<td>39,920</td>
<td>69,794</td>
<td>66,229</td>
<td>71,662</td>
</tr>
<tr>
<td>Number of convicts</td>
<td>14,520</td>
<td>19,040</td>
<td>21,400</td>
<td>24,800</td>
<td>27,200</td>
<td>29,600</td>
<td>32,000</td>
</tr>
<tr>
<td>Convicted of crimes committed without violence</td>
<td>19</td>
<td>24</td>
<td>27</td>
<td>32</td>
<td>37</td>
<td>42</td>
<td>47</td>
</tr>
<tr>
<td>Murder</td>
<td>19</td>
<td>24</td>
<td>27</td>
<td>32</td>
<td>37</td>
<td>42</td>
<td>47</td>
</tr>
<tr>
<td>Assaults to murder</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Manslaughter</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Rape</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Unnatural crime</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>High provocation and bush-ranging</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Burglary</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Point and robbery</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Robbery and receiving stolen goods</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>10</td>
<td>10</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Convicted of crimes committed with violence</td>
<td>26</td>
<td>29</td>
<td>31</td>
<td>36</td>
<td>41</td>
<td>46</td>
<td>51</td>
</tr>
<tr>
<td>Assaults without violence</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Arrows</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Forgery</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Desertion</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Commotions</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Prostitution</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Larceny and receiving stolen goods</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td>127</td>
<td>128</td>
<td>129</td>
<td>130</td>
<td>131</td>
<td>132</td>
</tr>
<tr>
<td>General total</td>
<td>242</td>
<td>282</td>
<td>303</td>
<td>323</td>
<td>343</td>
<td>363</td>
<td>383</td>
</tr>
</tbody>
</table>

On the above returns the Transportation Committee in their Report remark: 'They show that, in proportion to the respective population of the two countries, the number of convictions for highway robbery (including bush-ranging) in New South Wales, exceeds the total number of convictions for all offences in England; that rape, murders, and attempts at murders are as common in the former, as petty larcenies in the latter country. In short, in order to give an idea of the amount of crime in New South Wales, it may be supposed that the 17,000 offenders who last year (1837) were convicted in that country for various offences before the several courts of assize and quarter-sessions, had all of them been convicted for capital crimes; that 7000 of them had been executed; and that 3000 had been transported for life; that—is including this; this remark the returns from Van Diemen's Land also—in addition, 120,000 other offenders had been convicted of the minor offences of forgery, sheep-stealing, and the like; then, in proportion to their respective populations, the state of crime and punishment in England and Australian colonies would have been precisely the same.'

The convictions however in New South Wales, it would appear, fell short even more than usually of the number of crimes committed. Judge Burton, in a charge to the grand jury of Sydney, which is frequently adverted to in the Transportation Report, after describing 'the crimes of violence, the murders, the manslaughterers and drunkens revels, the perjury, and the false witnesses from motives of revenge or reward, which in the proceedings before him had been brought to light;' after mentioning 'the mass of offences which were summarily disposed of by the magistrates, and at the several police-offices throughout the colony,' spoke of 'the number of undiscovered crimes which every man who heard him, or to whom the report of his words should come, would at once admit to have occurred within his own circle of knowledge,' and added 'in the picture present to men's minds in the most painful reflection; it would appear to one who could look down upon that community as if the main business of them all were the commission of crime and the punishment of it;' as if the whole colony were in
motion towards the several courts of justice. (Transportation Report, p. 27.)

Road-Parties and Chain-Gangs. — Road-parties, chain-gangs, and penal settlements have been mentioned among the punishments to which a refractory or offending convict, or his servants, the transport of heavy timber on public roads, in breaking stones and the like; the chain-gang being distinguished by the additional severity of a more degrading dress, heavy chains on the legs, and the superintendence of armed soldiers instead of convict overseers. These methods are guarded by the convicts in road and chain gangs are kept removable according to the public wants; they are therefore rudely constructed in every particular, generally consisting of so much wood or iron employed with the greatest possible ingenuity, cow-houses, each of which is adapted to the reception of thirty men, more or less. The convicts are locked up in these places at night with some rough covering for their bedding. In the morning they are brought out under inspection, hear the reading of a chapter or the prayers of the Church of England, and then proceed to work, which is interrupted at stated hours, when they receive their rations. Sir Richard Bourke, late governor of New South Wales, in his evidence before the Transportation Committee, represented the condition of some of the convicts in chain-gangs as one of peculiarly great privation, and unhappiness; the men being locked up from sunset to sun-rising time, being fed by the time for eight men, but in which the whole number can neither stand upright nor sit down at the same time (except with their legs at right-angles to their bodies), and which, in consequence, the convicts do very little work, and have an extended space of width for each individual to lie down upon the bare ground. This feature of a barbarous system has however been discontinued for some years.

The Transportation Committee thus summarily refers the evidence on these portions of the convict system to "Every one of the witnesses spoke in the strongest terms of the disorders, crimes, and demoralization which were occasioned by the road-parties." "All are unanimously deploring the system of ten to two, at which proportion they are conducted."

Penal Settlements. — Penal settlements are designed for the punishment of criminals convicted of very grave offences in the penal colonies, and of criminals who are suspected of the commission of murder. The trial in these cases is conducted by the governor, who was employed at Macquarie Harbour, it was very severe indeed; because it seldom happened that an individual could land upon the rock without getting wet, and the result was that he was obliged either to sleep in his wet clothes, or without any clothing; the greater part slept in their clothes, nine-tenths having on heavy iron: fire was not allowed after eight at night, and the prisoners did not reach the rock till between six and seven. Another kind of punishment, but according to the testimony of the air, and a third was placing them in the chain-gang to work in heavy iron, and to work in water carrying stones or digging for them. The last description of punishment was flagellation with a cat-o’-nine-tails, of double-twist whipcord, and nine-knotted. Executions were common, and were generally performed in the presence of the assembled convicts, under the impression that such spectacles would overawe them and repress crime.

There are reports that out of 116 men who absconded from Macquarie Harbour, 73 are supposed to have perished in the woods, 1 was hanged for murder, and eating his companions, 6 of whom were eaten; 24 escaped; 13 were hanged for bush-ringing, and 2 for murder: making a total of 101 out of 116 who came to an untimely fate. (Evidence of Mr. Barnes, Transportation Report, 1835.)

Macquarie Harbour was entirely abandoned in 1834, in favour of the present penal settlement connected with Van Diemen’s Land, of which a portion was laid in 1830. Port Arthur is admirably fitted by geographical position for the purposes to which it is devoted. It has no communication with the rest of Van Diemen’s Land, except by a narrow neck about 450 yards wide, the north bank of which is chained to lamp-posts, the dogs are fed on raw flesh, and so trained that the very slightest noise by night or day instantly alarms them. The convicts at Port Arthur are employed in cutting timber, making boxes, sawing it, in working in coal-mines, and in different mechanical trades. They are classified according to their description, as ‘gentlemen’ convicts, to the heinousness of their offences, and their conduct while enduring their sentences. The editor of the ‘Van Diemen’s Land Almanack,’ in an account of a visit to this settlement in 1836, mentions as ‘one of the most severe duties the prisoner is put to perform, the carrying of large logs from the interior and almost impassable parts of the woods to the beach, and again landing and transporting them through the water to the dry ground and dock-yard. . . . Self-preservation compels every one to do his best to escape the punishment, which, not being impressed within himself would crush him at once to death, whatever his efforts might be; unless his companions in like manner did their part.’

For the employment of boys is:—Port Arthur, the mode of discipline in respect to whom is as follows:—They rise every morning at five o’clock, and having stowed away their bedding, assemble for worship, after which they are inspected as to personal cleanliness, previous to breakfast, which takes place at seven o’clock: after breakfast they disperse for recreation, and at eight begin the daily labours; at twelve they are again inspected, as before, previous to dinner; labour is suspended until half-past three, when they resume; work is then done, and is retired to work till five o’clock, when they sup. At a quarter past six they musters for school, which continues one hour, and the engagements of the day are closed by singing a hymn, the reading of scripture, and prayer. On Saturday afternoon no work is performed, except by such as have misconducted themselves during the week. On Sunday they rise as usual, attend morning prayers, and at nine o’clock clean linen and soap are issued to them for the week; at ten o’clock clean linen and soap are issued for the week; the rest of the day is spent chiefly in receiving religious education. The school education given to the convict boys is confined to plain reading, writing, and the simple elements of arithmetic, as they are not employed for work in the woods, but as are most likely to be useful to them in a new country, and are the trades of boot and shoe makers, carpenters, blacksmiths, tailors, tailors, cooper, bakers, kitchen-gardeners, and sawyers, book-binding, and turning in the different branches. The boys on their arrival are employed in what is termed the ‘labouring-gang,’ breaking up new ground, cultivating the government garden, carrying saw timber from the pits for use and shipment, making roads, clearing, cross-cutting, splitting timber for firewood for the use of the establishment, carrying the same, washing and cooking, and all duties connected with their own wants and attendance. The boys are allowed to amuse themselves in any manner within the bounds at any of their leisure intervals. The most trivial crime or irregularity is not permitted to pass without some punishment proportioned to its nature. The punishments are various: first, confinement to the musters and ground during recreation from labour, where no amusement is allowed; the next punishment in severity is confinement in a separate cell, the monotony of which is not relieved by employment except at stated times, when the prisoner is permitted to attend the school; the third is to be confined in a cell on bread and water, the allowance of bread not exceeding one pound per diem. The last mode of punishment, which is inflicted in cases of determined violation of the regulations, is deportation. Since the 30th June, 1837, the nature of the discipline at Port Puer (as the boys’ establishment at Port Arthur is
called) has not undergone any change. No regular reports were published by government.

The foregoing details are taken nearly verbatim from a report of the Commandant of Port Arthur to the government of Van Diemen's Land. It is to be observed that the landing of the convicts was open to great objection, so that it is difficult to obtain an unprejudiced view of the operation of the system pursued there. It does appear however from evidence before the Transportation Committee, and from statistical returns, that many of the boys punished there, on their liberation become obnoxious to punishment again.

The discipline of the adult criminals at Port Arthur is excessively degrading; it hardens the convicts, and makes the most despicable laggard of its inmates. The writer in the 'Van Diemen's Land Almanack,' quoted above, remarks that 'the desperation to which some of these wretched men sometimes sink is truly appalling.

Several instances are on record (he continues) of men committing the most barbarous murders in open sight of their companions and superiors, with no other intention than to be arrested, sent up to Hobart Town, tried, convicted, and executed.' The chief police magistrate of Van Diemen's Land says that a convict is sure to return from Port Arthur more vicious and more hardened in guilt than he was before. ( Dispatch on the Convict System of Van Diemen's Land, ordered to be printed April 28, 1837.) The convicts defend themselves only as a means of deterring. Sir George Arthur, late Governor of Van Diemen's Land, says that the moment a convict is released from that settlement, he falls again into crime on the slightest temptation. (Evidence, q. 4321, Transport, 1837.)

Including 270 boys from 10 to 18 years of age, in 1836, there were 1181 prisoners at Port Arthur; 296 prisoners had been sent from the settlement during the previous year, and 461 have been received for the second time. Since 1836 the accommodations at Port Arthur have been increased, and the number of convicts also.

Norfolk Island is described as one of the loveliest spots in the world. It is entirely separated from any land and inaccessible excepting at two points, where at particular seasons a landing for passengers can only be effected by means of boats. The island is about twenty-one miles in circumference, of volcanic origin, and consists of a series of hills and valleys, curiously interfolded, the green ridges rising one above another, until they reach the shaggy sides and crowning summit of Mount Pitt, at the height of 3000 feet above the level of the sea. The establishment is in the form of a capacious triangle of huts for the prisoners, the military barracks, and a series of offices in two ranges. A little farther beyond, continues the writer, whose rather poetical description, for want of any other, we are obliged to adopt, 'on a gentle mountain slope, a magnificent rising, rises the mansion of the commandant, with its barred windows, defensive cannon, and pacing sentry. Straying some distance along a footpath we come upon the cemetery, closed in on three sides by close, thick, melancholy groves of the tear-dropping manchelinal, whilst the fourth is open to the restless sea. The graves are numerous and recent, most of the tenants having reached, by an untimely end, the abode to which they now contend, their hapless remains and hapless story. I have myself witnessed fifteen descents into those houses of mortality, and in every one lies a hand of blood. Their lives were brief, and as agitated and restless as the waves which now break upon their beds, and whose dying sound is their only requiem. The severity of the discipline which has been pursued at Norfolk Island has varied with the character and feelings of commandants, who are usually intrusted with a limited discretion; but its main features in a man of blood. Is it not possible to do better? Do the convicts who come here have the chance of a better education than they can have in their own country? Is it not possible that a man who was ready to sacrifice himself, before the Transportation Committee, to have been very much struck by the peculiar language used by the convicts at Norfolk Island. 'While a prisoner (he said) he had observed, 'It is no longer natural expectations, but what he called 'sacrifice' language of the place; and that a bad man was called a good man. He who was afraid to break a window was considered as a hero. The duty generally was called a bad man. There was quite a vocabulary of terms of that kind, which seemed to have been invented to adapt themselves to the complete subversion of the human heart.'

The number of convicts at Norfolk Island during the period to which the foregoing accounts refer varied from two hundred to a thousand, all, as at the penal settlement of Macquarie Harbour and Port Arthur, being male.

**Expenditure of Convicts.**—Up to the year 1836, 100,000 convicts had been transported from the country to the Australian penal colonies, of whom 13,000 were women. The following estimate of the sums expended on account of those colonies falls short of the true amount:—

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of the transport of convicts</td>
<td>£27,297,790</td>
</tr>
<tr>
<td>Disbursements for general, convict, and colonial services</td>
<td>£4,091,561</td>
</tr>
<tr>
<td>Military expenditure</td>
<td>£1,932,202</td>
</tr>
<tr>
<td>Ordnance</td>
<td>29,846</td>
</tr>
<tr>
<td>Total</td>
<td>£36,458,343</td>
</tr>
</tbody>
</table>

The conveyance of each convict has thus cost about £295, and the various expenses of residence and punishment have been at least £514 a head, making in all more than £800 a head. The expense charged upon this country by the penal colonies has been, on the average since their commencement, 156,388/ a year; but at present the annual expenditure is more than treble that amount, and is rapidly increasing.

The following was the expenditure of this country on account of New South Wales and Van Diemen's Land in the year 1830-7:—

**New South Wales.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordnances of the army</td>
<td>£46,801</td>
</tr>
<tr>
<td>Commissariat</td>
<td>3,430</td>
</tr>
<tr>
<td>Dividends</td>
<td>12,014</td>
</tr>
<tr>
<td>Naval</td>
<td>4,675</td>
</tr>
<tr>
<td>Extraordinary of the army</td>
<td>56,585</td>
</tr>
<tr>
<td>Special disbursements on account of convicts</td>
<td>127,919</td>
</tr>
<tr>
<td>Total</td>
<td>£250,180</td>
</tr>
</tbody>
</table>
Van Diemen's Land.

Ordnances of the army

<table>
<thead>
<tr>
<th>Type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordnance</td>
<td>£16,354</td>
</tr>
<tr>
<td>Navy</td>
<td>20,667</td>
</tr>
<tr>
<td>Merchant</td>
<td>2,009</td>
</tr>
<tr>
<td>Extraordinary</td>
<td>11,025</td>
</tr>
<tr>
<td>Total</td>
<td>£48,613</td>
</tr>
</tbody>
</table>

Transport of convicts: £73,030

In addition to this sum, the colonial expenditure on account of the administration of justice, gaols, and police in 1836-7, was £90,000, an amount nine times as great in proportion to the population as that of the United Kingdom for similar purposes. (Sir William Moresworth.)

In 1837 a committee of the House of Commons was appointed to inquire into the subject of transportation, and to suggest improvements. The labours of that committee have been followed by some changes, and there is a prospect of still greater.

Notes on Convict Management in the Australian Colonies.—At Norfolk Island a system of a novel character is in operation, under the superintendence of its author, Capt. Maconochie; and in Van Diemen's Land a system based on the same of the principles of that of Capt. Maconochie, and embracing also some of its details, is now in process of adoption. Capt. Maconochie conceives that the fundamental error which characterises the usual modes of convict discipline is the non-separation of the processes of punishment and reform. He proposes that they should be distinctly contemplated and distinctly pursued. By the word punishment he does not mean vindictive or exemplary infliction, but the system, moral, religious, and agricultural, by which he believes benefit from the moral influences which he would bring to bear upon it. Thus, it should not (he says) be degrading: it should be in seclusion from the gaze of the free population altogether, at stations which he would have constructed as to be removable at will, according to the scope or demand for useful labour, or other circumstances which should suggest. The process should consist of hard labour (enforced, if necessary, by physical means), with instruction, moral, religious, and agricultural, and special advantages as to the fitness of the offender for the occupation he is to perform, and as to the character of the station to which he is to be sent. The system of Van Diemen's Land is termed a Probation System, and the object to be held in constant view is to teach the convicts habitually to associate in the work of labour and of worship with such of their own number as will, whether they are male or female, be subjected to the desert and consequence of guilt. The discipline is therefore to be rigorous; but at the same time tempered with judicious advice and moral and religious instruction. A principle here acted upon is that the character and conduct of the convicts, and not their immorality alone, are to determine the kind of labour to be allotted to them; those who manifest a bad or restless disposition being always employed upon that which is most irksome. No convict is to have power or control over another, or to be employed in any permanent situation of ease or trust. Cleaning wards, sweeping barracks, cooking, watching, &c., must be performed by the convicts as duties generally; such alone being exempted from those duties as are under temporary increased punishment. Indulgences of any kind are prohibited, such as tobacco and spirits.

The magistrates appointed to visit the probationary parties are enjoined to study the temper and disposition of the men to be punished; for it is obvious that the same description of punishment inflicted upon men of different dispositions and understandings will not be of equal effect. In general, recommendations of short periods of probation are pointed out as the best mode of punishment, excepting in cases of serious crime. In the case of offenders brought before them for sentence, the magistrate is desired to explain calmly and patiently the grounds upon which such sentence is passed, and to give them cheerfully a continua in ill-conduct. Monthly reports are required from each visiting magistrate on the general state of the gaols under his magisterial care, containing any suggestions which may be made him as likely to improve their discipline and conduct.

Upon the superintendent devolves the whole responsibility of the discipline and management of the gaols.
They are charged with the safe custody of the convicts and with the control of the assistant-superintendents. He is to see that the convicts go to their beds and rise at the proper hours; that they are clean in their persons; and that they are marched off to their places of labour at the regular time. Each class with the organisation of which class with the organisation with which men are charged is to be subdivided into other classes, and that they are marched back to the station after their daily labour is over, in the same manner. The superintendent and his assistants are constantly to mix with the gangs while they are at work, as well as in their quarters; they are required to check every kind of irregularity, whether in speech or manner; to advise and remonstrate with the disobedient, and to set as monitors generally to the convicts under their charge. It is only in the emergency of a real need that the local or home superintendent before the visiting magistrate.

The superintendent is to see the ration distributed, to inspect the huts and places of confinement, paying great attention to ventilation, and observing that the separation-boards between the different berths are frequently removed; to inspect the bedding at least once in every week, or to have it aired. He is not to allow anything like reproachful or harsh language to be used by any person in authority; and he is to take care that communication by unauthorized persons with the convicts is prevented.

The gaols are to consist of two hundred and fifty to three hundred men, and to be divided into three classes. The old labour is to be subdivided into other classes, and these into messes of ten men each. The third class is to be subjected to the separate system of confinement; the second is to be hutto in rooms containing ten men each: the number of convicts whose term of probation will soonest terminate, and will be distributed in huts containing twenty men each.

The different classes of convicts are never to be mixed either at labour or elsewhere. The superintendent is to muster and inspect the convicts immediately before they commence work, and afterwards to read prayers. Books are to be circulated among the men for their perusal on Saturday and Sunday (on which days they are to be twice paid); and more days on which the usual labour cannot be performed owing to the state of the weather, as well as on Saturday afternoon, such convicts as are desirous of obtaining instruction in reading will be allowed to attend in a hut for that purpose.

Perfect silence is to be kept at the messes, but it does not form part of the punishment to be enforced when at labour; the hours of labour will vary with the seasons; in the months of November, December, January, and February, being from half-past five A.M. to six o'clock in the evening; allowing from eight to nine o'clock for breakfast, and from twelve to one for dinner; in March, October, and November, from half-past five A.M. to six A.M., and half-past five P.M., the same hours being allowed for breakfast and dinner; May and August, from eight A.M. to five P.M.; and June and July, from eight A.M. to half-past four P.M. The labour required from convicts in probationary gangs will consist in the various works incident to the making and repairing of roads and bridges.

The punishments attached to drunkenness, absence without leave, disobedience of orders, idleness, neglect, and willful mismanagement of work or duty, indecent or abusive language, profane swearing, insolence or other misconduct, are hard labour, in or out of chains, not exceeding one year; and in case of the same punishment not exceeding twenty dollars, or by exposure in the stocks not exceeding six hours, or by whippings, not exceeding thirty-six lashes.

The periods spent in the probation-gangs will depend upon the original sentence of the several convicts, and upon their good or bad conduct in the gaol. * (Standing Orders for the Regulation of the Probation System of Convict Labour in Van Diemen's Land, Hobart, 1841.)

*The above account of the new system of convic discipline in Van Diemen's Land is unimpeachably correct, as the system has been only very recently introduced, and no reports of its operation have been printed.

The theory of Transportation.—Mr. Bentham, Dr. Whately, the present archbishop of Dublin, and other writers on the theory of punishment, have condemned to any home the general principle of transportation; and comparatively little has been urged in opposition to their arguments. Mr. Bentham's objections will be found in a chapter on Transportation, in his 'Theory of Punishments.' The archbishop of Dublin's, in his two Letters to Earl Grey.* Their arguments may be summarily stated as follows:—1st, That transportation has failed in all experiments which have yet been made upon the principle. 2nd, That it is contrary to the best system of punishment observed in the sepa rations made to the country from which the criminals are sent, want of exemplarity. 3rd, That it lays a pernicious foundation for future communities. 4th, That efficient inspection and correction of the convicts cannot be obtained on the present system. To these objections it is replied—1st, That transportation has not failed, but only a particular system of carrying that punishment into execution;—a system is not necessarily connected with transportation;—a system which has not yet been established in the colonies at a time when prisons in the parent country were in the worst state possible;—a system never amended in principle according to the progress of improvements in penal arrangements. 2nd, That transportation, as prescribed by the word example or exemplarity, transportation is not deficient excepting in the supposition that exemplarity is an effect only of the spectacle of criminals enduring punishment, but in that sense, that all experience proves that, instead of preventing crimes, exemplary punishments have frightfully increased them; that in so far as there is any real value in the principle (exemplarity) in question, it is as an indefinite, obscure source or cause of a discredit to the system, and not that it is a principle, in point of fact, in the sense of exemplarity as connected with the spectacle of punishment, that transportation is in the same situation as any home system of punishment. 3rd, That the means of estimating the consequences of any system are either inadmissible or impossible, eg. spectators of the past of the separate system as they are of that under which transportation is carried into effect; that in the sense of general tendency to produce apprehensions independently of exhibited punishment, it has superior recommendations to any home system. 3rd, That the objection, that transportation lays a pernicious social foundation, is made on a presumption involving the primary question which penal institutions are designed to solve, viz. that convicts sentenced to that punishment are always to be criminal in character and habit; but that, on the contrary, the circumstances of society in a new country are economically, in the respects of the labour, and good prospects, much more calculated to establish a moral character to the character of a former criminal wrought by a good system of secondary punishment, than the circumstances of an old society in which employment is uncertain, wages low, and exposure in a state of punishment was introduced into Pennsylvania in 1784, four years after the revolution had been abolished, and the effect was astonishing; for at the end of another period of years, at the beginning of 1792, the population had increased at the rate of four and a half per cent. per annum, and the penal law other than transportation removed unobserved the great third. The decrease of recorded crimes after the introduction of transportation was too great and too continuous to be accounted for by any great external cause of distress, by any increase of prosecutions other than those necessary to the police of the times. And in no part of the subsequent decrease of recorded crimes can so much be accounted for. What better proof can be adduced to this inducement to crime? The increase of crime in the town of Philadelphia is not surprising, for Philadelphia, and all the other cities of the United States, cannot be in a better situation than New York, which has recorded the greatest increase of crime in the country, great though that was; in the experience of the Committee on Prison Discipline, to the Governor-General of India, Calcutta, 1818.)
The convicts were given offices and other rewards, whose keepers corresponded with those of the same grade under the former act. They were to feed and clothe the offender, and keep him in such manner, and to permit him, where the same could be safely done, to labour at such places, and under such directions, limitations, and restrictions, as his majesty or certain justices of the peace should appoint. In case the convict should receive employment, he was to be allowed half the return arising from his labour, and in many cases it was provided that no convict should be obliged to work.

The time of the offender's confinement was to be reckoned in discharge or satisfaction of the term of his transportation, as far as it might extend. Similar returns were also to be made by Parliament's Benches. It was added that the interest of the contractors was limited to that of supplying provisions, clothing, and other necessaries to be consumed in the hulks. The 55 George III., cap. 156, repealed and re-enacted by the 56 George III., cap. 27, which empowered the king on their majesty's behalf to appoint a superintendent, and the persons to be deputy or assistant superintendents, also resident overseers. The latter of these acts was continued by the 1 and 2 George IV. for two years, and its provisions were then re-enacted with some variations, in the 5 George IV., cap. 24. (Statements and Observations concerning the Hulks, by George Hol¬ford, Esq., M.P.)

Mr. Howard frequently visited the hulks, and pointed out some of the abuses incident to their management in his book On the State of Prisons; and in his account of Lazarettoes. These abuses exceeded so much those of the ordinary prisons, that the subject was the subject of a parliamentary inquiry by a Committee of the House of Commons, in 1778. The labours of that committee led to some slight improvement in the accommodation, food, employment, and means of preserving health in the hulks. In 1783 another committee was appointed, which, after investigating the abuses and their effects, had singularly contributed to improve the practice of villainy; that the convicts had formed distinct societies for the more complete in¬fractions of all rules, who after their sentence had expired, continued to serve them, and no prisoners were discharged from the hulks, that being shewn by their former acquaintance, and baffled in every attempt to gain their bread, the danger of starving almost inevitably led them to a renewal of their former crimes.

The act 24 Geo. III., under which the hulks were regulated for the long period of about forty years, transferred the prisoners to the custody and management of commercial contractors; and the consequences of this arrangement, for the most obvious, have been that of the excessive and imprudent maxims of prison discipline, were such as might have been anticipated. The convicts were treated harshly; they were ill fed and clothed; and their moral improvement was entirely neglected. In the beginning of the 1810’s the complaints on these heads had become so loud as to force themselves upon the attention of government, and a Com¬mission of Inquiry into the subject was appointed. This commission pointed out many particular instances, and strongly censured the system of allowing the contractors to manage the convicts by servants of their own. The fruit of its investigation was the appointment by act of parliament of inspectors. This measure had but few effects, and the discipline of the convicts from the contractors, the source of the greatest abuses in the hulks, nor did it involve any immediate reform whatever. In course of time however it led to some attention being given to the health of the convicts, their supply of food and clothing, and their...
protection from acts of cruelty or oppression on the part of those employed in their superintendence; but in everything which affected their moral or religious nature, whatever accrued from the inquiries of the commission.

It was after the office of inspector—the remedy, it has been said, which issued from the labours of the commissioners—had been for many years in exercise, that we find the hulks thus adverted to in a speech in the House of Commons by a member who had paid very great attention to the treatment of offenders under punishment there: 'In every case in which we (in the prisons on board the vessel are all necessarily distributed into three, or at most four decks, or divisions of the ship, after the hatches are closed: from this time till the convicts are let out, proceeds a period which comprehends in the winter season, in the dark days, near sixteen hours of the twenty-four) there is not among them any officer or servant belonging to the establishment; and as the decks of the ship are of very unequal sizes, more than two hundred criminals of different ages and descriptions are often thus locked in together, during this long period, to follow their own inventions, without inspection or control. It appeared by the evidence of the captains of the hulks that the convicts did not dare to complain of ill treatment from each other; the captains acknowledged that they themselves could not venture to disclose the names of individuals from whom they received information of what passed among them, or strongly disagreeing among them, or felt in one of the hulks, that it seemed to be the practice on board the hulk to inflict punishment for offences committed below, without bringing forward the informer in support of the accusation. It was also evident that in some of the ships neither officers nor convicts, but the overseer (or lieutenant himself) could have gone down with safety among the convicts after the hatches were closed.' The practice of coining was carried on in some of the vessels; in others there were manufactures of skeleton keys and of iron toys, the materials of which was chiefly stolen from the yards in which the prisoners were employed. Beer was sold in the hulks by night as well as by day, with the same instances for profit, of the captains. (Speech of Mr. Hoford in 1815.)

In 1826 comparatively little improvement had been effected. Prisoners were allowed to receive money from their friends, and with it to purchase a better description of food than was allowed under the hulk regulations I saw,' says Mr. Hoford, in a speech in this parliament in this year, 'a few months ago on board the Justitia at Woolwich, the convicts employed in the preparation of peppermint drops for sale in the local market, and the officers who went round with me observed that these drops were very much liked by the prisoners, being very comfortable in a raw damp morning, when they were going to work.'

Reports were taken before the Select Committee of the House of Commons appointed in 1832 to inquire into the subject of secondary punishments, and before a Committee of the House of Lords in 1835, we are led to conclude that no special advantages had then been effected in the discipline pursued on board the hulks.

Description of a Hulk.—The description of one hulk may not exactly correspond with that of all the others, but it sufficiently corresponds to afford a general idea. The following description refers to the Warrior convict-hulk, stationed at Woolwich. There are in this vessel three decks or floors, called the upper, middle, and lower decks. The last is terminated by two large openings in the centre and at the foremost end, and the upper deck is divided into each of the latter by partitions. An additional deck is placed above those on the deck below, they form a kind of tube reaching from the hold to the atmosphere above.

The main hulkways are all 4 feet 8 inches square. The fore-hatchway, upper deck, 4 feet 6 inches by 3 feet 6 inches. Middle deck, 4 feet 6 inches by 3 feet 6 inches. Lower deck, 4 feet 6 inches by 4 feet 8 inches. The upper and middle decks are the chapel, containing, after the close of the passages by doors 6 feet wide by 6 feet high. The chapel is a clear space 42 feet wide, 30 feet long, and 14 feet high. The habitation part of the upper deck is 84 feet long and 80 feet wide. There are two parts on each side, measuring 2 feet 9 inches by 2 feet 4 inches, and divided into two lateral portions by a central passage 5 feet wide. The inner boundary is a partition, consisting of iron bars reaching the full height of the deck. Each ward is subdivided by three transverse bulkheads of wood, forming eight classes, but not crossing the passage.

When the convicts have been exercised to the sick, and an open space for the ladder and hatchways, 26 feet 6 inches in length. There are four ports in this space that ventilate the passage. There is a room at the after end of the deck, with a platform of three steps, and a hatchway to the upper deck. The vessels are 97 feet 6 inches long by 45 feet wide. There are seven ports on each side, four bulk-heads, and in all, 101 windows. The hatchways, between each 6 feet 6 inches wide; opens into the chapel. Two small rooms are apart as workshops. The clear space for the ladder and hatchways 19 feet 6 inches. The workshops have ten ports and four large hause-holes; open into the space for workshops.

On the lower deck the prison is 115 feet 6 inches long by 45 feet 6 inches wide; number of ports 15 on each side varying in size, and all smaller than the ports above. The bulk-heads are six, forming 14 classes. Width of the passage 6 feet. The space left forward is 12 feet, with 4 hause-holes opening into it. From the after bulk-head to the stern-ports is a space occupied by the dark cells and store-rooms, leaving the passage free.

These prisons are rated to hold 600 men; of these 124 are disposed on the top deck, 192 on the middle deck, 24 on the lower deck; and this is effected without crowding. Beef, the lower deck is the hold, a large and almost unoccupied space, divided into the passage is 150 feet long, 32 feet high, 7 feet 6 inches wide. The openings from the hold are, 1st, the main-hatch, 4 feet 6 inches square; 2, the fore-scuttle, 2 feet 9 inches square; 3, the hatchway leading to the lower deck; 4, the deck-side, 4 feet by 8 inches; 8, a small scuttle in one of the classes. (M. Bossey's Report; Mr. Capper's Reports, 1842.)

Discipline and Employment of Convicts in the Hulks.—On board no different-hulks are kept by the overseer, in which are entered the names of convicts; and on the first Sunday of every quarter they are mustered, and the character which each convict may have had during the past quarter is determined by the magistrate. He is to be at the muster, and his name in the roll book is known to him the character so given him at each quarterly muster:—v. g. very good; g. good; in. indifferent; f bad; v. b. very bad. The convicts after they are classed are kept in separate compartments on board the ship, so as to be as far as climate permits, and are not allowed to mix with any other class than that to which they belong after the hours of daily labour. Every prisoner is required to serve three years, or as many of his term as may, in the discretion of the overseer, be allowed him. He is to be withheld for misconduct, and when his period is expired, to be discharged, or to continue his period of probation. But in case of misconduct during the period of his punishment, that period is continued until he raises himself in the scale by his good conduct, so as to possess eight good musters without blemish; a prisoner enters his period of probation, his reserve earnings commence, and continue until his ultimate liberation. But any conduct which is a blemish. Whenever any convicts are allowed to earn a sum of money from their labours, one-third of the earnings is one penny per day, is expended in the purchase of bread and vegetables, but on no account is any convict allowed to have money in his own possession: the other two-thirds is reserved until the prisoner's discharge, and in no case is such money to be given to any convict unless he has passed two years of his sentence, and then only provided his conduct has been uniformly good during the period of his confinement. Any convict who makes use of the officers and guards are instructed to use mild and persuasive means to induce him to alter his conduct, and if these should fail, the overseer or officer in command is to
punish him on board the ship, according to the nature of his crime, either by reducing his daily allowance of provisions, or by confining him in a dark cell with no other provisions than bread and water, for a term not exceeding seven days, or of his being confined not exceeding one month, or by moderate whipping; which in any case is not allowed to exceed twenty-four stripes.

The overseer or officer in command is required to make a minute note in the occurrence-book of the name of the convicts, the nature of the offence of which they are convicted, and the punishment inflicted. No convict is allowed to go without an iron upon one or both legs; and those employed on board are locked up and clothed, in the same manner as the convicts; and the management of their food is required to be on the watch all night in the dormitories. Chaplains are appointed in connection with the different vessels, who are required, besides reading prayers and preaching on the Sabbath and the holidays of the Established Church, to attend to the religious wants of the prisoners individually, to distribute according to their discretion the books or tracts provided for the use of the prisoners, to take a general superintendence of the schools for their instruction. A surgeon is employed in connection with the vessels, who is required to attend to the health of the convicts, inspect their provisions occasionally, and see that the wards are properly ventilated. This, however, is the exception, the hospital, the houses of correction and painting, carrying timber for this purpose, in removing chain-mooring, in cleansing the rivers on which they are employed, and in different descriptions of hard labour, and in the purchase of apprentices, on the roads, and in the food of the convicts generally, and making and repairing their clothes. Their periods of labour are from eight to nine hours and a half hour daily, according to the seasons of the year. (Instructions to the Superintendent of Convicts in England, given at Whitehall the 22nd day of November, 1830.)

The stations at which his are maintained in England are Portsmouth, Gosport, Devonport, Chatham, Woolwich, Deal, and St. James's, Bermuda, Gibraltar is designated to be a foreign station.

The following returns relating to the hulks are taken from the latest reports addressed by the superintendent to the government. — On the 1st January, 1841, there were 4352 convicts on board the various hulks in England; and during the year, 3623 more were received into custody, besides 63 transferred from the hulks at Bermuda. Of the convicts in custody, and those received in the course of the year, 9845, 917240, 274737, and 70567; and the following are the gaols in which were confined in 1841, 36213, of whom were bound 18 years of age 36, 28725 sent to Bermuda; 66 were sent to the Penitentiary (Millbank); and to Parkhurst prison; 202 were discharged, 18039 were imprisoned 18039, 1 escaped; leaving 4254 convicts on board the hulks in England on the 31st December, 1841. Of the total number received, 32 were known to have been transported * before the year 1841; 87 had been before in custody; and the remaining 1451 were not known to have been in prison before. Three prisoners were received during the year under 10 years of age; 213 between the ages of 10 and 15; 588 between 15 years and 20; 1012 between the ages of 20 and 30; and 839 who were above 30 years of age. The total expense of the hulks is represented for the year at 65,271l. 10s. 7d.; and the estimated amount appropriated for the support of the gaols and the expenditures of the gaols for the year 1841 was 116,000l.

* This means, had been in the hulks before.*

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The hulks in England are contemplated merely as an intermediate establishment between the common gaols and the penal colonies, for prisoners sentenced to transportation; but in fact in many cases they prove a substitute for that punishment. They are deemed to constitute the worst branch of secondary punishment known in England, and their discontinuance has been more than once advised. Pensions (Prison, French), places of safe custody, of punishment, and reform.

History of Improvements in Prisons.—The history of modern improvements in the prisons of this country begins with the labours of Mr. Howard in the last century. In the first book of his series, "The State of Prisons in England and Wales," which he entitles * A General View of the Distress in Prisons,* published in 1775, he presents a summary of the abuses which existed in the management of our gaols, and declares that the food, he states that in several bridewells there was no allowance of food at all; in some, the keeper farmed what little was allowed to the prisoners, and where he engaged to supply each prisoner with one or two pennies a day, it was known to be shrunk to a half and sometimes less than a half the quantity. In answer to the question, does not their work maintain them? he says, that there were few bridewells in which any work was or could be done. The prisoners had neither tools nor materials of any kind, but spent their time in sloth, profaneness, and debauchery to a degree which was shocking. In the county gaols, debtors had no bread, although it was granted to the highwaymen, and the convicts and debtors, according to the local custom, were required to be on the watch all night in the dormitories. Chaplains are appointed in connection with the different vessels, who are required, besides reading prayers and preaching on the Sabbath and the holidays of the Established Church, to attend to the religious wants of the prisoners individually, to distribute according to their discretion the books or tracts provided for the use of the prisoners, to take a general superintendence of the schools for their instruction. A surgeon is employed in connection with the vessels, who is required to attend to the health of the convicts, inspect their provisions occasionally, and see that the wards are properly ventilated. This, however, is the exception, the hospital, the houses of correction and painting, carrying timber for this purpose, in removing chain-mooring, in cleansing the rivers on which they are employed, and in different descriptions of hard labour, and in the purchase of apprentices, on the roads, and in the food of the convicts generally, and making and repairing their clothes. Their periods of labour are from eight to nine hours and a half hour daily, according to the seasons of the year. (Instructions to the Superintendent of Convicts in England, given at Whitehall the 22nd day of November, 1830.)

The stations at which his are maintained in England are Portsmouth, Gosport, Devonport, Chatham, Woolwich, Deal, and St. James's, Bermuda, Gibraltar is designated to be a foreign station.

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Classification of Offenders.—The argument of those who wished to make the experiment of classifying prisoners is thus succinctly stated by a distinguished American writer in the history of his prison: 'If we are to prevent reform, a prison would soon lose its terrors if its depraved inmates were suffered to enjoy the society within, which they had always preferred when at large; and that, being the best institution that could be devised for instruction in all the mysteries of vice and crime, if the professors of guilt were suffered to make disciples of those who may be comparatively ignorant.'

Classification: first, the young must be separated from the old; then we must make a division between the novice and the practised offenders. Further subdivisions however were found indispensable, in proportion to the number of cases to be dealt with; and they would be found individuals of different degrees of depravity, and of course not only corrupters, but those who were ready to receive their lessons. Accordingly, classes were multiplied, until in some prisons in England we find them amounting to fifteen or more. The same writer exposes the fallacy of this argument in what follows—

'But in consideration of this question these evident truths seem not to have had their proper weight. Indeed, the mind of man is more subject of human observation; nor, if discovered, is it capable of being so nicely appreciated as to enable us to assign to each individual who may be infected with it his comparative place in the scale of the great body of crime; though we may, perhaps, find, that no two individuals could be found contaminated in the same degree; secondly, that if these difficulties could be surmounted, and a class formed of individuals who had advanced themselves not only to the same degree of depravity, but of moral depravity, still their association would produce a further progress in both.' (Livingston's Penal Code for the State of Louisiana: Introductory Report to the Committee on Prisons, Report of the Prison Discipline Society, p. 305.) In illustration of the correct reasoning of the author, the following extract from the evidence of a Middlesex magistrate is quoted:—Classification might in some measure be obtained, certainly, but men are frequently convicted of a trifling offence, and sentenced, that he had been previously guilty of a very heavy crime. As an instance of this, in a prison where classification is attempted, I recollect a man who was tried for cutting off the head of his child, and placing it on a woman's breast when she returned into the room, and where he had escaped the punishment of death by a technical difficulty. I saw this man a few days afterwards as a misdemeanant. His statement is as follows:—

'In May last Mr. Samuel Hoare, Esq. Select Committee of the House of Commons, 1832') Classification continues to be the leading principle of arrangement in many prisons; in others the object contemplated by it, namely, the prevention of communication between prisoners, is the object mainly aimed at. As the prohibition of oral communication between the prisoners, or the prisoners continued in force in many gaols, and one is specified in the Report of the Prison Discipline Society for 1823 (pp. 19, 20), where those charged with felonies were on their first reception double-ironed; and, thus fettered, were at night chained down in the bed, the chain being fixed to the floor of the cell and fastened to the legs of the prisoners. This chain was of sufficient length to enable the prisoner to raise himself in bed; his cell was then locked, and he continued thus chained down from seven to ten o'clock of the next morning. As there were in the county in which this abuse existed but two gaol-deliveries in the year, a prisoner might continue to be thus treated for six or eight months, and be then required as innocent on his trial; the double-irons thus used on the untried prisoner varied in weight from 12 to 14 pounds.

It would be impossible to point out with any degree of minuteness, in a limited compass, the successive steps in prison improvement that had to be taken to effect these changes: but we may say in general that all this was brought about in a manner that will add to the conviction of the utility of the system to which it refers. There is no connexion whatever between the great object of prisons on the principle of Coldbath Fields was not attained. The minds of the prisoners (say the Inspectors of Prisons in their Report for that year) were kept perpetually in a state of suspense, and all means of evading their sentence by means of evading any.
For 'talking and swearing' alone, in Coldbath Fields House of Correction, in 1836, the punishments averaged about 12 per diem; but even these large returns fall short of being a correct index of the discipline. The punishments generally consisted in reduction of food, or confinement in solitary cells, by which health was so much impaired, that the governors were obliged to reduce the severity to a degree which impaired its efficacy. From this discretion interposing between the discipline contemplated and the means required for its enforcement, arose a great disproportion in the amount of punishments in the different prisons on the silent system. In Coldbath Fields House of Correction, with nearly the same number of prisoners as in Wakefield, the punishments were not one-tenth in amount; in Tothill Fields House of Correction, with one-fourth more prisoners than in Wakefield, the punishments were little more than one-tenth in amount. In Stafford House of Correction, with about two-thirds the number of prisoners as in Wakefield, the punishments were not one-tenth in amount; in Westminster Bridgewell, the proportion ascertained to the recommittals was about 40 per cent, and the real proportion was probably much larger. (Inspectors' Report, 1837.)

Sending, under twenty-one years of age, the employment of prisoners as wardens, and in other incidental capacities, has been to a great extent abolished, and an approach has been made to uniformity in the discipline pursued in prisons. In this direction, arrangements have been adopted which on such prisons are conducted almost necessarily involves great and numerous vices.

Regulation of Prisons on the Silent System.—The power of establishing rules for prisons is vested by act of parliament (3 & 6 Wm. IV., c. 38) in the secretary of state for the home department. Distinct divisions of each prison are appropriated to male and female prisoners. The several wards, cells, yards, &c, are devoted to distinct classes of prisoners; there are baths for the cleansing and bathing of prisoners; a fumigating oven for the cleansing and disinfecting of their clothes, linen, or bedding. A competent number of cells adapted to solitary confinement for the punishment of prisoners, and a number of the infirmaries, all of such as may by law be sentenced to confinement therein, is provided. Separate rooms are provided as infirmaries or sick wards for the two sexes, and as far as possible for the different descriptions of prisoners. Every prisoner is provided with suitable bedding, either in separate cells, or in a cell with not less than two other male prisoners. Convenient places are set apart for washing, combing, &c, and separate places from that of the ordinary officers for the inspection of their prisoners. The visiting justices appointed at each quarter-session shall meet periodically at the prison and inspect the several journals, registers, and books, and give such directions as may be necessary that they shall regulate a scale of fines to be levied by the superintended and subordinate officers for negligence in the performance of their duties; that they may suspend any officer; examine from time to time the state of the buildings, the classification, separation, inspection, hard labour, employment, health, and disposal of their earnings, the expenses attending the prison, and any improvement which may be practicable; they are required to direct such books as they think proper the prisoners may be allowed to read, and to make provision for the employment of prisoners in any work or trade within the prison, subject to the sanction of the general or quarter session; they may authorize any prisoner to be employed in the manufacture of articles of clothing or of other necessaries for the use of the prison, or for the service of any officer in control or instruction of any other prisoner; they may order necessary clothing or tools to be given to any prisoner on his discharge, or may pay his passage home, or may order that any part of the wages of money as they may think fit: they are required to make a report respecting the state of the prison at every quarter sessions; in case of contagious disease, or any other emergency, they are empowered to issue an order under their seals and seals, to remove the prisoners to some other prison or place of confinement within their jurisdiction; in case of any criminal prisoner being guilty of repeated offence against the rules of the prison, if of any greater severity than the governor is authorized to punish, a visiting justice may order the offender to be punished by solitary confinement; and in case of absolute necessity, by confinement in irons; a visiting justice may receive the complaint of any prisoner, and all officers are prohibited to any prisoner excepting in cases approved of by the surgeon. For every prisoner it is provided that there shall be a governor, chaplain, and surgeon; and for every female branch a master, mistress, matron, &c. The number of schoolmasters and mistresses, male and female turnkeys, and subordinate officers; none of whom, excepting the chaplain and surgeon, are allowed to hold any office or have any occupation except that of which they are respectively required to reside in and never to be absent from the prison without the deputy-governor being invested with his powers; nor at night, without permission in writing from a visiting justice. He is also required to keep an annual return of all punishments inflicted by his authority, or by that of any justice, with the case thereof: he must, as far as practicable, visit every ward and see every prisoner, and inspect every cell once at least in twenty-four hours; or in case of his omitting to do so, must state the cause of the omission in his journal: he must also from time to time, at an uncertain hour in the night, go through the prison. Before any prisoner is removed from the prison, he must inform the friends or relatives of such prisoner, that they may have an opportunity of receiving him: he must hear all complaints against or by prisoners; and he may punish by solitary confinement, by diet, or by the substitution of bread and water for the usual allowance, any prisoner guilty of offence; he must inspect every letter and parcel to and from prisoners (excepting such as are addressed to a visiting justice, or other proper authority). The chaplain must be a duly licensed clergyman of the Church of England: he is required to read prayers daily, perform divine service on Sabbath and church holidays, administer the sacrament to prisoners whose state he may deem fit for that ordinance; devote a certain portion of time daily to the prisoners, noting the hour at which his labours commence and close, in a journal to be kept by him: must frequently visit the infirmaries and sickrooms at all regular times: he may require spiritual advice and assistance, paying especial attention to juvenile offenders and to prisoners in solitary confinement: he must superintend the distribution of books, and also the manner of their being read; take every Michaelmas quarter sessions do deliver to the justices a written statement as to the religious and moral instruction and condition of the prisoners, with observations thereon. Should any prisoner be of a different persuasion from that of the Established Church, the minister of, at his persuasion, at the request of the prisoner, at reasonable times, and under restrictions imposed by the visiting justices, is allowed to visit him. The surgeon is required to visit the prison, at least once a week, and to see every prisoner confined therein at least twice in the week. His directions to provide improved diet, air, exercise, &c, for any prisoner who is an invalid.
must be attended to. Whenever he has reason to apprehend that the mind or body of a prisoner will be injuriously affected by the discipline of the prison, he is required to report such ease in writing to the governor: he must occasion it immediately to the superintending judge. On this report, see to the proper distribution of the thermometers, take notice of the provisions supplied for the prisoners, and also of the bedding; and upon these particulars he is authorized to report in writing to the prison visitation jury. The party of prisoners to be disposed of each day must be made a record of the state of health among the prisoners, or to report in writing after any death the circumstances under which the deceased was brought under his treatment, the progress, &c. of his complaint; in ease of necessity he may call on the governor for medical assistance, the governor must assume the conduct of the funeral, at the infliction of all corporeal punishments, and his orders for preventing injury to health must be obeyed; no prisoner labouring under acute or dangerous distemper must be discharged from prison unless such prisoner desire it.

On entering the prison all prisoners must be placed in a reception cell; be examined and strictly searched: all property taken from them, and entered in an inventory book, such property being returned on their discharge. Every prisoner must be examined by the surgeon, and after examination cleansed in a warm or cold bath, and have his hair cut, before being passed into the proper ward, or cell; he may be examined before the presence of the governor or a subordinate officer; female prisoners in the presence of the matron or other female officer. No prisoner who is a Jew or a Mahometan is allowed to labour on the Sabbath.

A different dress is worn by a prisoner convicted of felony from one convicted of a misdemeanor: he is employed, unless prevented by sickness, at such hard labour as can be provided, and for so many hours (not exceeding ten) daily, except on Sundays, Christmas, Good-Friday, or any public fast or thanksgiving day. Some descriptions of misdemeanants are allowed to wear their own clothing, if deemed sufficient and proper; they are allowed to maintain as many children as they have in their family, the presence of the governor or a subordinate officer; female prisoners in the presence of the matron or other female officer. No prisoner who is a Jew or a Mahometan is allowed to labour on the Sabbath.

Prisoners Labour on the tread-wheel. Crank-Machines. The labour which is most generally imposed in prisons conducted on the silent system is that of picking oakum, and of the tread-wheel. The first needs no explanation; the second may not be understood without it. The tread-wheel is similar to a common water-wheel. Upon its circumference are stepping-boards of sufficient length to allow standing-room for a row of a given number of persons. The wheel of those persons is the first moving-power of the machine—produces the direct effect when applied upon the circumference of the wheel at or near the level of its axle. To secure therefore this mechanical advantage a screen of boards is fixed up in an inclined position, in order to avoid the prisoners from climbing or stepping up higher than the level required. A hand-rail is fixed upon this screen, by holding which they retain their upright position upon the revolving-wheel, and the risk of injury is lessened. A light shed protects the prisoners in wet weather, and, from the heat of the sun in summer, and it is generally so constructed as to expose all who are employed on the wheel. To the inspection of the overseers. The tread-wheel is so constructed as to turn the tread-wheel. The prisoner upon the tread-wheel ascends by one step at a time, the ascent being one-eighth of a circle; the combined weight of the prisoners acting upon every successive stepping-board, precisely as a stream of water upon the floating boards of a water-wheel. This operation is maintained without intermission during the hours in which the prisoner is allowed an appointment of a certain part of his time to labour in the cell to relieve the party on the wheel. These changes are performed at regular intervals determined by signal when the prisoner at one end of the wheel descends for a few minutes, and the same person stands at the other end. By this method the proper number of men on the wheel is continually kept up, and the work is equally apportioned to every man. The degree of labour to each prisoner in a given time is also determined by regulating the rate of working and resting men one to the other; or, which amounts to the same thing, the relative proportion of those required to work the wheel to the whole number of the class, thus, if ten out of fifteen men are appointed to labour on the tread-wheel, sixty-five hours of hard labour and twenty minutes rest in every hour. In the application of exertion to this species of labour, there are two objects to be considered in the measurement of the amount of labour: thus, if a prisoner moves upon the tread-wheel for fifteen minutes, he will have to move or lift his own weight over 38 feet per minute, or maintain a rate of revolution equal to 2000 feet of ascent per hour. To compute the amount of individual labour in the duration of this rate of exertion is next to be considered. This will be affected by the proportion of resting and labouring prisoners, in which a class or gang is appointed to work on the tread-wheel, and by the number of hours which the regulations of the prison require for daily labour. These where two-thirds of a class are appointed to be on the wheel, and one-third to be off the wheel, and so the number of competent labour for the day are 10, the duration of actual labour will be 64 hours. Then, if the rate of exertion, 2000 feet per hour, be multiplied by 64, we have a result of 13,333 feet ascent to the measure of each man's labour at the wheel for the day. This amount of ascent may be distributed as may be chiefly applied to the grinding of corn and pumpkins water for prison consumption. (See Description of the Tread-wheel for the Employment of Prisoners, with Observations on its Management, published by the Society for the Improvement of Prison Discipline.]

In some prisons females as well as males are employed on the tread-wheel, the application of this mode of punishment to either or both of the sexes being determined by the discretion of the justices of the peace in conjunction with each prison. In Coldbath-Fields prison females are so employed, whereas in Westminster Bridewell they are not. The application of tread-wheel labour to women is liable to cause the most mischievous effects, especially in various ailments of the sex it is apt to produce serious disease: it is injurious also to males when applied for a prolonged period. As a punishment it is very unequal in its severity depending upon the physical strength of those subjected to it; and it is administered with great want of uniformity in different prisons, as the following table will show:—
Another mode of employing prisoners, but one which is not so much in use as the tread-wheel, is with the crank. 

This machine, which is intended for providing labour for the prisoners, is made by the addition of a crank to the existing system; the height being about 3 feet 6 inches; breadth nearly 2 feet, and the thickness about 18 or 20 inches. The fly-wheel belonging to it is about 4 feet in diameter. The crank is made of wrought-iron, not less than 2 inches square at the centre, and a proportionate strength at the ends, on which is fixed the fly on one side, and the crank for the labour of the prisoner at the other; a connecting-rod is attached to the crank, with strong steel bolts. This presents the minds of the prisoners to a parallel motion at the pump-rod moving through the stuffing-box. The pump is a brass cylinder bored very correctly, and about 2 or 2½ inches in diameter, and 10 or 12 inches high. 

The pistem is a vessel made of strong copper, and will contain about four or five gallons of water or any other liquid. The air-valve is also made of strong copper, about 6 inches in diameter and 12 inches in length, connected with the cylinder by a strong brass pipe. To this pipe is fixed a brass valve, which is covered to prevent the water or other fluid from spilling about. This valve, and the rod connected with the valve, is loaded with a weight, and by shifting the weight the degree of labour is varied. 

When the crank is put in motion by the prisoner, the water is received into the pump, a part is forced into the cylinder, and a portion of the labour is thereby taken: this produces a continued round hard labour for any length of time. The crank is generally provided with a gyrometer (γύρομετρον, a circle, and μέτρον, a measure), which calculates the exact number of turns made by the prisoner in a week, at the rate of from 10,000 to 25,000 turns per day, or from 45 to 50 turns per minute, for any number of working hours. The machine is very closely shut from the prisoner; and at any time that the argument needs it can be turned by the guard or left alone by the prisoner, he unlocks the circular door, and the gyrometer at once points out the number of turns that have been made. The rising bottom to the cylinder is made with very small holes, to prevent any substances passing into the pump. The prisoner stands on a step of wood to work, which makes him a proper height for the crank, which should be about 2 feet 6 or 8 inches above his standing-place. The crank-machine may be constructed of different materials, according to the cost and expense of each convect kept in a House of Correction, on the silent system, is about 55L or 56L for four years. (Lord John Russell's Note on Transportation and Secondary Punishments, January 2, 1830.) 

Separate system.—Separate imprisonment differs from that which is understood by solitary imprisonment in the following particulars:—In providing the prisoner with a large, well-ventilated, and lighted apartment, instead of immuring him in a confined, ill-ventilated, and dark cell; in providing him with everything that is necessary to his cleanliness, health, and comfort during the day, and for his repose at night, instead of denying him these advantages; in providing him with food of good quality, instead of confining him to bread and water; in elevating his mental discomfort by giving him employment; by the regular visits of the officers of the prison, of the governors, superintendents, or warders' instructors, and particularly of the chaplain, instead of consigning him to the toga and other bad consequences of idleness, and the misery of unmitigated remorse; in separating him from none of the inmates of the prison except his fellow-prisoners, and the persons belonging to the house, and of the society of human society; in allowing him the privilege of attending both chapel and school, for the purposes of public worship and education in class (securing on these occasions the separation of separate men by the apprehension of his fellows), instead of excluding him from divine service and instruction; in providing him with the means of taking exercise in the open air, whenever it is necessary and proper, instead of confining him to the broken divisions of his cell. (Inspector's Report, 1857.) 

The separate system was contended for by the advocates of the separate system that as a mode of punishment it prevents committing intercourse among criminals, without requiring for that purpose any system of punishments which are attached to breaches of regulation in prisons on the other hand, and that it obviates the necessity of that minute supervision by prison officers likewise characteristic of the silent system, and which, in its operation, is found to be humiliating and degenerating without being effective; that it diminishes the probability of a prisoner being recognised after his restoration to society as having been the subject of penal infliction, and thereby favours his permanent reformation; that it is to the prisoner in persons of different circumstances for receiving new and right impressions; that it does not disturb these impressions in their progress to becoming settled habits; that labour being given as a mitigation; not an aggravation, of confinement, in a separate cell, it is ever afterwards associated in the mind with what is agreeable, instead of with what is degrading and repugnant, as in the case of those prisons where it is imposed as a punishment. 

By the opponents of the separate system the compatibility of the enforcement of that system with the maintenance of the sound state of body and mind of the prisoners has been questioned. The assumption that all association of criminals must necessarily be degrading has been contended; and it has been urged that it is the object for which men are associated, and the principles by which their association is regulated, not the original character of the association, that determines the effect of this association on the individuals. Accordingly it has been contended that while it may be perfectly true that association for exemplary or vindictive punishment is deteriorating, it remains to be proved that association for reform would be so; and it is generally contended, that in a process contemplating reform, success will be aided by association, as in the case of societies for the promotion of temperance and the like. In reply to the argument requiring the repressive effect of the prison after release, it is said the argument may be allowed all its assumed weight if it can be shown that, consistently with justice, the conviction of an offender may take place without the knowledge of more than the parties immediately concerned in his prosecution, or that his release will not involve a renewal of any of the connections of place or person which subsisted before imprisonment. That solitude is favourable to the inculcation of principles not allowed, but it has been contended that the cultivation of principles in the mind is only one-half of a process of conversion, and that without a sphere of action they can neither be matured nor satisfactorily tested. These and other objections have been urged, and it is to be seen how the works of the reader is referred; but it is generally agreed that a satisfactory determination of the question of issue can only be derived from experiments, to enter on which there is less reluctance, seeing that every mode of secondary punishment which has yet been tried has disappointed the expectations in which it originated. (Australiana, or Thoughts on Convict Management; and A General View of the Social System of Convict Management, &c., by Captain Macnagie: The Morns of a House and of a Colonial Process; of a Social and of a Separate System of Convict Management, by F. M. Innes; Reports of the Inspectors of Prisons.) 

The separate system originated in this country in the year 1790, and was first tried in the county gaol, Gloucester. This building was provided with cells in which prisoners were confined apart, day and night, from the hour of admission to that of discharge. These short sentences were denied, those under long sentences were provided with employment. Moral and religious instruction was given in the cells and in the chapel. This plan was afterwards extended as far as Gloucester. During the period there were very few re-commitments. But the increase of population demanding increased prison accommodation, the system was abandoned to make room for additional prisoners. In 1811 the favourable opinion concerning prison by a committee of the House of Commons led to a recommendation "that a separate prison should be erected in the first instance, for the counties of London and Middlesex, and that measures
should be taken for carrying on the penitentiary system, as soon as might be practicable, in different parts of the country.' In the following year (1812) the act 52 Geo. III., c. 44, was framed in conformity with the committee's recommendation, by which act the establishment at Millbank was commenced in 1813—subsequent acts granting leave to increase its accommodations. In 1821 this great prison was completed for the reception of 1200 hundred convicts, for England, Scotland, and Wales. The separate system did not begin to be carried out for years and years, and the detail connected with it. The situation in which the Penitentiary is built, and all connection of it with the separate system, in the nature of a consequence, is denied. (Inspector's Reports.)

A model prison on the separate system has just been completed, and no less than 14 more are projected in different parts of England; the success or failure of which will determine whether the system shall, or shall not, become general. The following are the general principles observed in the construction of the model or Pentonville prison. London:—

Separate Prison Construction.—The boundary-wall is of a height above the ground sufficient to preclude all chance of escape, clambering, and the formation of such a ditch as to prevent undermining in the course of a single night. It presents an even smooth surface on both sides. A clear space is preserved on the outside of the boundary, that no vehicle can approach it, and the exterior walls are not open to inspection; and in like manner the prison wings are not connected with it, but a clear space preserved round the interior. There is only one gateway in this external boundary, which is placed immediately opposite the entrance to the prison, in an inclosed court-yard. The gate being retired a little, it is deemed will be of advantage in affording the means of defending it through loop-holes made in the side-walls, should attempts be made to force it during a general or extraordinary excitement: accommodation is provided within the prison walls for the officers in detached houses. The prison is entered by a broad passage leading through the entrance-building to the central hall, on the sides of which there are convenient apartments for the turnkey, male and female superintendents, and surgeon; and a mess-room for the officers, together with a room for the magistrates, and an office for the governor: these last rooms look into the central hall, and command a view of the interior of the prison: there are likewise staircases leading to the basement, infirmary, and chapel. The basement of the entrance building contains reception cells, a cleansing-room for males, a furnace for the burning of disinfecting prison clothes, store-rooms for clothing and prison stores, such as bedding, &c., water-closet, and a room for the steward or prison officer employed about the kitchen and store departments. A portion of the upper part of this entrance building is appropriated as a chapel, and the remainder as an infirmary, or convalescent rooms; the former opening into the central hall, and the latter entirely detached from the rest of the prison by a partition wall, being a separate staircase from the passage below. The central hall, as before explained, opens from the floor to the roof, and will be used as the principal station of the officers engaged in carrying on the discipline of the prison. A space which is a continuation of that into which the prison rooms or cells open, runs round the central hall about 10 feet above the floor, affording access to the chapel and all the wings; staircases being placed in convenient situations communicating with it. The windows of the hall overlook the yard-yards, and the greater part of the space within the boundary wall. The general kitchen of the prison, the bread-room, scullery, coalcellar, and an apparatus for cooking, and for ventilating and warming the entrance building, are situated in the basement under the central hall and a small portion of the adjacent wings. The prison wings, as before explained, radiate from the central hall, an open passage or corridor being designed to run longitudinally through the centre of each, and the prison rooms or cells open into the corridor; these being ranged in three stories. The lower range is on the level of the floor of the corridor and hall; the upper ranges open upon a narrow gallery attached to the wall, which is continued round the central hall as already explained. At the farther extremity of each prison wing a flight of steps, covered by a trap-door, lead to the punishment cells, which are placed in the basement. In the centre of each wing a circular iron staircase is designed to communicate with the galleries, and to be continued into the store-rooms below. In addition to the stores and ventilating apparatus, placed in the basement under the central of each prison wing, is a large bath, the use of which it is conceived will be essentially conducive to the health of the prisoners. The general dimensions of the cells are about 13 feet long by 7 broad, 9 or 10 feet high, to the under side of the arched ceiling. It is deemed desirable that the length should greatly exceed the breadth, as the affords a better opportunity of taking exercise, and facilitates the unobscured inspection of the interior. The partitions between the cells are not less than 18 inches in thickness, thereby precluding as much as possible the transmission of sound between adjoining cells. The external walls are two bricks and a half thick, or two feet of stone; the internal walls next the corridor or passage two bricks thick, or 18 inches of stone; the flues are 12 by 6 inches, and are worked in the corridor wall and the external wall for ventilation. The windows of the cells are placed close under the arch, and have stone sills. The iron window-frame is a fixture let into a groove, with proper rebates for the glasses, which is unpachable: the general dimensions of the windows are about 3 feet 6 inches long and not exceeding 11 inches in breadth. For additional security a strong wrought-iron bar is placed outside the window-frame, in the direction of its length, so as to divide the opening into two portions of about 5 inches each. The cells have single doors, the frame of which is of oak, 6 inches by 5; the doors, 2 inches thick, of deal, framed flush on both sides, the edges covered with felt, to prevent noise in the transmission of sound; a strong iron plate on the side next the cell, riveted through; and the doors are hung with strong 4½-inch butt hinges, and fastened with a spring lock and latch; a bevelled aperture is cut for the inspection slide, and a trap-door, 6 by 9, is fixed for the door for passing prisoners through, and which is hung on two centres, so as to form a shelf when let down; it is fitted with a strong bottom thumb-bolt to secure it in place. The outer door next the corridor is hung with 4½-inch butt hinges, working on centres, the object being that the door may be opened without noise for inspection; the edge is covered with felt, and shuts into a rebate in the
door frame, flush with the wall. For every cell there are suitable means provided for a constant supply of fresh water, and for necessary relief without entailing unavoidable some-smells. The exercise of prisoners in the open air, without compromising individual separation, is thus obtained. The airing yards radiate from a central point, round which is placed a dark passage affording an inspection into each yard; the advantage of a dark passage is, that it facilitates close and unobserved inspection. The yards have open railings at both extremities, in order to allow a free circulation of air, and they are so constructed that no two persons can see each other. A small room is attached to the division walls, to afford shelter when necessary, and the position of the yards with reference to the doors in the centre of the prison-wings, gives a ready means of access from the cells.

The chapel is fitted up with separate stalls or seating; the sides of each stall, and the doors, which form the continuation of those sides, and shut up the general passage to each row, radiate upon the pulpit so that each prisoner can see, and be seen by, the chaplain. The back of each row of seats is made of such a height as to intercept the communication between the rows, when the prisoners are standing up, and yet not so high as to conceal them from the observation of the prison officers when sitting down. A double passage is made down the centre of the chapel, opening into and communicating with the gallery surrounding the central hall, and thus affording two points of access. A third entrance is formed by a door on a convenient level leading near the upper row of seats, from whence a succession of steps arranged in pairs communicate downwards with each row in front. The ceiling of the chapel is coved, and ventilators are introduced into it; the roof and the beams supporting the seats being made of iron. For the ventilation and warming of the prison rooms or cells, an apparatus is placed in the centre of the basement story of each wing, the object of which is to secure a more complete ventilation than could be obtained if the system had been extended from each floor to each floor, and to supply the prisoners with copious quantities of large tubes or pipes for hot water; and in connection with it there is a large cold-air flue communicating with a shaft cut out of doors, which serves for two wings. The fresh air introduced through the flue in contact with the imprisoned air, passes through the tubes of the apparatus, and may therefore be warmed or left at its natural temperature, as may be desirable. The air thus brought from without then passes to the right and left along the flue which runs horizontally under the floor of the corridor, from whence a communication is established by lateral small flues separately with each cell, both on the lower and upper floor.

The means whereby foul air is extracted from the flues are these: a grating is placed close to the door of each cell, on the side next to the outer wall, and diagonally opposite to where the fresh air is introduced. This grate opens into a flue which passes down the outer wall, and communicates with a main foul-air flue placed under the floor of the basement. These main foul-air flues terminate in a chimney-shaft rising above the top of the building. With a view to intercept the transmitted sound and prevent that communication which might be attempted by means of the flues, the main foul-air flues are divided into three compartments, one for each range of cells. By means of the system of flues which has been described, a communication is established, first, from the outer air through the warm apparatus, to the top of each cell; and then from the floor of each cell back again through the extracting or foul-air flues or chimney into the outer air. In order to regulate the quantity of air admitted into each cell, with apertures of equal size would dif-

in proportion to the distance from the apparatus, a vane or damper may be placed in the extracting flues, close to the door of each cell in the same manner as to close up as not to close it up entirely, but to leave sufficient range to operate upon the circulation; the damper being at the command of the superintendent officer, he is enabled to regulate the circulation of air in each cell. The application of this system of ventilation it has been found that a circulation of air of six to eight cubic feet per minute may be kept up through all the cells, at all times of the year, and under all possible circumstances, when the doors and windows are perfectly closed. (Fourth Report of the Inspectors of Prisons.)

Employments of Prisoners under the Separate System.—In reference to the occupations which will be pursued by prisoners in separate confinement, and the means by which they appear to exist some uncertainty. At Millbank Penitentiary the males are employed in weaving, shoemaking, tailoring, bed-making, and junk-picking; the females in needlework. In the report of J.M. de Metz and Blouet Paris, July 5, 1807, the following list of trades which may be pursued in prisons on the separate system is introduced:—manufactures of polished steel, chaps, hooks, scales, whalebone, jewellery in copper, brasses, horns, and shoes, purses, baskets, girdles, chains, woolen shawls, footstools, shoes, chimney-pieces, carving, coals, stays, spun and twisted cotton, cattley, penicils, glasses, and spectacles, cutting, dressmaking, wattles, window-frame, wharves, cabinet work, scabs, lace, gloves, wood-engravings for types, laces, lamps, spectacles and eye-glasses, mother-of-pearl ornaments, tea and coffee services, umbrellas, combs, pearl, tarts, paper-rollers, cloth and paper bags, sandals, belts, rows, moccasins, bandannas, and upon the roof.

Expense of the Separate System.—Any estimate of the expense per prisoner of the separate system must, until that system has been for some time in operation, be liable to dispute. At Millbank Penitentiary which is allowed to be an imperfect criterion, the net annual expense of each prisoner, deducting his earnings, is said to be 2½s. 6d. Lord John Russell's Note on Transportation and Separate System of Prisons is that the sentence of imprisonment in a separate prison need be only a half or two-thirds the duration of a sentence to any other prison for it to be as severe and as much dreaded, and that the difference of expense will be thus made up.

State of Prisons and Prison Discipline generally.—In the preceding accounts we have treated of different modes of prison management, and we have stated what are the rules laid down by the boards of the prison authorities; but in that prison of the kingdom, there are a great number which can scarcely be said to come under any description whatsoever; and the actual management in prisons, owing to a variety of causes, must not be considered to come up to the rules. The point of a movement in prison discipline is that it is little more than commenced; and even in the metropolis which have been long admitted as such continue in diminished force. The description of the great evil of Newgate, given by the Inspectors of Prisons in their Report for 1837, equally applies in the year 1842:—The prisoners are associated in smaller numbers than formerly, but they are thrown into closer contact, and companionship is more directly facilitated; their mutual acquaintance is more perfect; their knowledge of each other's habits, temper, and capacities is more readily acquired, more firmly established, and more mischievously brought to bear against the interests of society and their own well-being and reformation. What (say the Inspectors) is bad, and inevitably and manifold, can be expected from locking up from morning to night, without intermission and change, in utter idleness in numbers varying from three to fifteen, or even more. The most advanced characters, adepts in crime, compelled associates with the uninstructed or trivial offender? To the Giltspur Street prison language of even more decisive condemnation is applied and continues to apply. Great differences subsist in the modes and methods of the treatment of the health of those confined suffers accordingly. The prevalent prison disease is petechia, or scurvy, which in some cases is attended by prolonged weakness, and in others so violent that the patient never recovers. In some prisons the ventilation is exceedingly bad and thereby sickness is generated; while

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in others colds and consumption originate in the exposure of the prisoners on coming off the tread-wheel in a state of feverish heat. The labour imposed is of a very degree severe; sometimes too light, and in others excessive. Association in its worst forms has not ceased; little provision is made for the moral amendment of the criminals in many places; and to sum up, there is a general disregard in the discipline and physical treatment of the prisoners, productive of the worst results. The appointment of inspectors of prisons, and the annual publication of detailed reports from these officers, may have contributed to check the worst excesses of the prisoners in Ireland, by connecting the state of the prisons there (see below) with the fact that for twenty-five years there have been inspectors of prisons in that country, by whom reports have been annually addressed to the government, which have been published by order of parliament. The circumstance we have stated is not designed to, nor does it, prove the unfitness of the appointment in question, but it tends to show that further means are needed to render the prison system as perfect as what they ought to be.

Other Modes of Punishment.—Criminals are sometimes punished by fine, and sometimes by whipping. Fine is imposed for criminal offences only in peculiar cases,—for instance, where the offender is a wealthy person. Whipping is seldom used excepting in the case of juvenile offenders, or as a disciplinary punishment in the hulks or in prison. By a recent statute (5 and 6 Vic., cap. 51), its public infliction is allowed in respect to any person found guilty of any act intended to alarm or injure the royal person. Not withstanding the act in question, the principle of corporal punishments is in England, as everywhere else, becoming daily more unpopular, and its practice going into disuse. But by the framers of this act, the end contemplated was to attach the most ignominious penalty to the commission of an offence for which there seemed in successive cases to have been no other or more powerful motive than the desire for notoriety. Another mode of punishment, but one which has also nearly passed into desuetude, is that of the stocks. Prisoners before Trial.—Prisoners committed for trial or for examination are permitted to wear their own clothing in prison, provided it be sufficient; they are not compelled to work or labour; but at their own request or with their own consent may be supplied with any work not severe, or they may, at their own expense, procure any employment, materials, and tools which the governor may deem proper. Provided no sort of punishment has been found against a prisoner, or that upon his trial he has been acquitted, he is allowed such a proportion of the amount of his earnings as the visiting justices deem fit and reasonable. But nothing in the above rule interferes to prevent the treatment of the prisoner from reformation of the class to make their own bed, and clean the cells, wards, yards, and passages of the division of the prison to which they belong. An untried prisoner may maintain himself, and may receive at stated hours a reasonable quantity of cooked provisions, and malt liquor, not exceeding one pint in twenty-four hours; and any linen, bedding, clothing, or other necessaries (subject to a strict search and under such regulations as are deemed expedient to prevent extravagance) are purchased and such articles are paid for out of the monies belonging to such prisoner in the hands of the governor. No part of such food, malt liquor, or other articles is allowed to be given, sold to, or exchanged with, any other person; and any prisoner transgressing this rule is prohibited from procuring any other food than the prison allowance, or other articles, for such a period as the visiting justice may direct. Prisoners of both sexes are permitted to see their friends on any weekday without any order, within the hours; and the legal adviser at any reasonable hour. Letters to and from them are subject to the inspection of the governor. They are liable, in case of their being riotous, or disorderly, or being guilty of a breach of the regulations, to be confined in separate cells, and be allowed no other food from the country than bread and water. (See Regulations for Prisons in England and Wales, issued by the Secretary of State, 1841.)

The application of the separate system to untried prisoners remains a subject of controversy. On the one hand, it is contended that any system not absolutely required in order to secure the custody of the individual charged with offence is unjust; and that the isolation of such an individual is an unnecessary infliction. On the other, it is argued that a separate cell, if it be to some prisoners before trial more obnoxious than the association, is not so other, and that if it be in a particular degree at variance with strict justice to impose on individuals of this class any penalty not necessary for the protection of society, it is likewise so more obnoxious and degrading to society to expose them to what is liable to be an inevitable consequence of prison association, contamination. There is probably no solution of this question which is not open to some objection on principle, and its best solution in practice, we think, is frequency of trial. The importance of a good method of procedure in respect to the unconvicted is illustrated by the following statistics:

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>25,944</td>
</tr>
<tr>
<td>Acquitted</td>
<td>4,298</td>
</tr>
<tr>
<td>Not guilty</td>
<td>3,294</td>
</tr>
<tr>
<td>Not convicted</td>
<td>989</td>
</tr>
</tbody>
</table>

Males 5,713 females 3,879

The time during which this number of prisoners was confined, before trial, was as follows:

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under fourteen days</td>
<td>12,230</td>
</tr>
<tr>
<td>Fourteen days and under one month</td>
<td>4,595</td>
</tr>
<tr>
<td>One month and under two months</td>
<td>20</td>
</tr>
<tr>
<td>Two months and under three months</td>
<td>12</td>
</tr>
<tr>
<td>Three months and under six months</td>
<td>15</td>
</tr>
<tr>
<td>Six months and under one year</td>
<td>102</td>
</tr>
</tbody>
</table>

(Inspectors' Report, 1838.)

Besides what the above returns show in condemnation of the existing modes of procedure in reference to the unconvicted, an instance is quoted by the Inspectors of Prisons of a prison where the punishments for breach of regulations incurred by the untried were greater in amount than those incurred by the convicted. In this prison there were 90 untried prisoners, who were visited with 224 punishments; while 230 convicted prisoners were visited with 574.

Disposal of Criminals after their Discharge.—The disposal of criminals after the expiration of the period of their imprisonment is in England one of the most difficult questions connected with punishments, and it is one for which the legislature has no measure and no device. Until this deficiency is supplied, under any system of secondary punishment whatever, the immense amount of recommitments which take place in this country may be deemed the most deplorable of all the classes of prison returns. The recommitments is an evidence not merely of the insufficiency of particular modes of punishment, but probably, more generally, of the difficulty of finding employment in this country. Mr. Bentham suggested several means whereby this object might be met: employment in the army or navy; the encouragement of voluntary emigration to the colonies; the requiring of security for good behaviour, with liberty to the surety to contract for the prisoner's labour; or a subvention to the prisoner from the public, retaining him under a modified kind of imprisonment. Of these means it is not improbable that the encouragement of voluntary emigration will be resolved upon. It is a question whether the emigration should not be compulsory instead of voluntary, as there has been a practice of making emigration thus as it were a punishment or part of a punishment, would tend to render it, by association of ideas, a mark of disgrace, whereas it is desirable that industry should be encouraged to find channels for itself in the colonies.

Punishment of Juvenile Offenders.—Until recently there was no further distinction observed in the discipline of juveniles in the hulks, than by their separate classification from the adults. In the hulks, but in prisons, etc., the prisoners were put to the same or nearly the same routine of duties as the adults; but with the establishment of the Parkhurst Reformatory, in the Isle of Wight, the commencement of
systematic improvement in this respect has been made. Of this prison, as it is to be a model for similar prisons to be erected in other counties, it is necessary to introduce some account. It occupies a square area of about four acres in extent, the enclosure being 410 feet from north to south, and 420 from east to west. It is enclosed by a boundary-wall, which at its lowest part is 15 feet high, with a fire-place and a guard-house in the wall, immediately beneath, and a forecourt with the slate roof, and the governor's house, and the washing-places. (Third Report of the Inspectors of Prisons.)

The objects sought to be attained at the Parkhurst prison are, the separation of the sexes, and the introduction of a system of separate discipline for juvenile offenders generally from the commission of crime, and their moral reformation. In carrying the first of these objects into effect, it is professed that the utmost care has been taken to separate juvenile offenders of the male and female sex, and of the ages of from 10 to 16 years, under the care of inspectors, and for the purpose of gaining a suitable occupation, and for the purpose of giving instruction in the rudiments of the English language. In the second object, every care has been taken to secure the health of the mind and body is excluded. On the 1st January, 1841, 247 juvenile offenders were confined in this prison, which number was increased during the year to 320. The employment in which the boys are trained are those of tailoring, shoemaking, gardening, and agriculture; besides which they receive a general education fitted to their future destination in life, including reading, writing, and the common rules of arithmetic. In 1841 the total expense of the prison, including buildings, alterations, and additions to the buildings, was $5141. 11s. 4d., and the total cash receipts for contract and other work, and for the produce of the prison farm, was $567. 6s. 4d. The average number of prisoners confined in the prison in 1841 was 174. The disposal of the boys at Parkhurst on release appears to be a question of some difficulty. Of those liberated since its establishment some have been apprenticed, and others have been sent to the Refuge for the Destitute, and the Philanthropic Institution, and a considerable number have recently been sent to New Zealand. The adoption of some scheme for their emigration is understood to be in contemplation. (Reports relating to Parkhurst Prison.)

The establishment of a prison for juvenile female criminals, on the principle of Parkhurst prison, has been resolved upon by the legislature.

Institutions auxiliary to those of Punishment. (Houses of Reform.)—There are several institutions auxiliary to the penal institutions of the country, without taking some notice of which the operation of these last cannot be so fully appreciated. The institutions referred to are either wholly supported by voluntary contributions, or partly by voluntary contributions and annual parliamentary grants, and their objects are to receive convict youths after they have endured the sentence of the law, as voluntary inmates, to provide for their education, and to fit them for future useful trades; or to receive destitute offspring of adult convicts who have been executed or transported, or are imprisoned for a lengthened period, and to give them a good education. In many of the models of these institutions are to be found, there are two which may be referred to in illustration. These are the Refuge for the Destitute, and the Philanthropic Society's Institution.

The Refuge for the Destitute was founded in 1808, and incorporated by Act of Parliament in 1838. It is a place of refuge for young persons, of both sexes, discharged from penal confinement; or who, having lost their character by crime, are unable to procure an honest maintenance. The females in the establishment are employed in washing and in needlework, for which the institution contracts with the public, and in household work. The males are employed in shoemaking, tailoring, and preparing food. As an encouragement to good conduct, a portion of their earnings is reserved for those who have been discharged. The objects of the institution having acquired a competent knowledge of religious and moral science, are to be placed in such a situation as may render them useful members of society, a reconciliation to their friends or relations, if persons of character, is attempted: if they are otherwise, the youths are placed out in suitable situations, and sound appreciation of the value of their services is conferred on those who are observed to persevere in good conduct. During the years in which the Refuge has been open nearly 6000 youths have received maintenance and instruction. Throughout its twelve years, many of whom are now respectable members of society.
and some subscribers to the institution to which they owed their rescue from destruction. (The Society’s Reports.)

The Philanthropic Society embraces in its scheme, besides juvenile criminals, the desist from offending of criminals. To this end, the Society’s Institution, to details at the Refuge, includes the trades of printing, book-binding, rope and twine making. To those young men who, after quitting the institution, bring satisfactory testimonials of their masters, are employed, of honesty, sobriety, and steady habits, rewards varying in amount are given at the end of one and two years respectively. The inquiries of the committee of this institution were successful in obtaining information the fact that the system had been retained within 25 years previously to 1842. Of those 180 nearly 150 were steadily pursuing the various branches of industry they had been taught and apprenticed to, and mostly with a fair average success. The committee of the former are their original business for the army, the sea-service, or other occupations, only six had been found guilty of offences against the laws. This institution is entirely dependent upon voluntary contributions. An Account of the Philanthropic Society, 1842, printed at the Institution.

Prisons of Scotland and Ireland.—The prisons of Scotland were in a state of gross mismanagement when, in 1829, a committee of the House of Commons inquired into the subject. The recommendations of that committee, the appointment of inspectors, and the passing of an act of parliament (2 & 3 Vic., c. 42), by which the local boards of guardians of poor, the justices, or the magistrates of counties, and the sessions of Justices, or the magistrates of the city of Edinburgh, were charged with the management of the prisons, have produced very good effects, although the construction of the prisons in which it is carried out is not completely favourable. The difficulty of procuring employment in release from prison has however been so great, that lately criminals in confinement at the Glasgow penitentiary, when in prospect of their liberation, have been found to threaten the commission of crimes by which they might again be sent there. Another separate prison has been established at Perth, and the extension of the system is contemplated by the board of direction in connection with Scotch prisons, provision for the purpose having been already made by parliament.

The gaols of Ireland are regulated by an act of parliament (7 Geo. IV., c. 74) passed in 1826, by which annual reports of the state of the several prisons are required from inspectors of prisons who had been appointed some years previously. From the report of the inspectors a general picture is to be drawn of the management of the prisons so recently as the last year (1841). Industry appears to have been only partially introduced; classification, where it is attempted, is of the most important description; and lunatics are frequently committed to prison simply as being dangerous to society, of which practice the results are, that each prison in the kingdom has charge of from five to ten lunatics, and even more, to the greater injury of the prisoners, at the gaols at the city’s institution, in addition to the prisons in which the accommodations are sufficient for little more than a half of the average number in custody (p. 17), and where the cells intended for one are generally over occupied. Where the cells are overcrowded, there is scarcely any means of ventilation, without light or heat, contained in the hours of night an unhappy maniac (p. 18), and where the prisoners are men. As poor creatures, many of them half naked, lying about in tatters (p. 21). An account of the incidents of the prisons in Ireland. In parts less exposed to notice, the views of the prisons are, if possible, worse. Modifications on the principle of separation are contemplated in respect to such of the Irish prisons as are capable of receiving them, with a view to the adoption of the separate system, should it be found to work well. (Report, p. 5.) The extreme poverty to which many of the Irish are reduced, and the constant distress to which they are subjected, render it difficult to devise a system of treatment which shall not either operate as a temptation to crime or be liable to the charge of undue severity.

Prisons and Prison Discipline.—The attention of the general government of India was drawn some years since to the state of the prisons and convicts discipline in the several provinces of that country, and a very able and comprehensive report on the subject, which contained these subjects was printed in 1836. From this report it appears that the manner in which criminal prisoners have been generally employed has been in working upon the public roads in fettors, under the superintendence of native village police, or had been so in gaols, excepting infirm prisoners, who have gone daily to some distant place to pound bricks. In some cases male prisoners have been employed in weaving cloth in the manufacture of shirts, and on the tread-wheel, when confined to prison; but in others they have been kept completely idle. The classification observed in different gaols has been as diverse as the equipments, and, in the words of the Report, ‘so imperfect has been the practice of the wardens that in many instances they have been customary to supply prisoners with a money allowance with which they have been permitted to purchase their own food from shopkeepers, to whom access to the prisoners was given. As for female prisoners, the ill-treatment of those in such cases has fared better than the agricultural labourers. The means of ascertaining the re-committments have been very imperfect, which renders the average of the following per centages rather below than above the truth: in the lower provinces of the presidency of Bengal, about nine and a half; in the north-western provinces, about ten and a third; in the Bombay territories about six; in the whole of India, about eight and three-quarters. These figures, however, do not largely apply for the imperfections of ascertaining them, it is to be observed that they refer to the numbers who have been before sentenced to the same gaol only.

From various causes the difficulty of establishing a system of punishments in India which shall be free from radical objections is very great. The mere locality of the prison, that which is healthy in one season may become a pest-house by a blast of fever or of cholera in another. The imprisonment is not long enough for artificial selection, bearing upon health, and almost upon life, opposing difficulties against material punishments, such as are not elsewhere to be encountered; and superadded to all this is the absence of fitting instruments for control and management. (Resolution recorded by the Government of India on the 6th of October, 1836: ‘Prison Discipline, Calcutta, 1884.’) In India also, manual labour is so cheap, and machinery so expensive, that it is improbable that the progress of cloth or cotton industry will ever be profitable. The establishment of central penitentiaries for the reception of two thousand prisoners each, and connected with the several gaols of the districts, as recommended by the committee, has been so far approved by the government as to ordain that the system, which has been conducted on improved principles, is now in progress of execution in the Bengal presidency. At this penitentiary labourwards will be fitted up for every description of labor to which the guns, weavers, or other manufacturers are accustomed. A thousand or two hundred cells will be prepared for prisoners to be confined within them by day and night, ten of which to be dark or capable of being darkened, and the rest to have small yards and doors to each. Sleeping-cells are to be constructed for each of the convicts, so that prisoning prisoners, many in a cell into which not more than half that number shall be allowed access at one time. A system of rations will be substituted for money allowances on account of food. Tread-mills will be fixed to work the convicts to the cultivation for all times. For breach of prison rules, solitude in darkness and privation of food are to be the punishments; and if experience proves it to be indispensable, whipping is to be
resorted to. Several measures of reform are likewise to be introduced in the district gaols connected with the central prison, with the object of facilitating inspections, and of making the plan advisable, penitentiary. Experience, however, is to determine every detail which should be introduced or retained; and with a view to bring the results of experience to minister to the public, it is proposed that the inspectors are to be appointed, whose duty it will be to make periodical reports. (Report of the Committee on Prison Discipline to the Governor-General of India in Council, January 8, 1838, Calcutta.)

An act was in force in 1837-8, through Captain Pringle, into the state of the prisons of the British West Indies, which appears at that time to have been very defective. Classification seems only to have been practised, at least officially, in different states, and in different rooms, excepting at Spanish Town and Kingston, where debtors had a separate yard: in the latter the females had also a separate yard; but the general practice was, that all classes, convicted and untried, males, females, and debtors, had almost unrestricted intercourse with each other. Personal cleanliness was not enforced, and for the most part the prisoners were filthy in their persons and clothes. Soup was not given to them. No prison-dress was allowed, and those who belonged to the reformatory prisons were ragged in the extreme. Money was allowed instead of food; the apprentice-convicts (originally slaves) were still heavily fettered with chains on the leg, weighing from nine to fifteen pounds: to prevent escape they were used; no work was allowed from the prisoners, and few were employed. Prisoners in the houses of correction were brought out every morning to work—men and women, men chained in couples, women the same—in gangs, on the roads, quarrying, carving, and breaking stones. The supervisors chained such together as they thought proper, commonly two of unequal strength, to allow less chance of escape: old men were thus found chained to boys, and girls to old women. On many of the plantations where slavery existed, there were cells and dungeons provided with bilboes or chains, and shackles: these places, though very unfit for the purpose, were frequently used, at the time of Captain Pringle's inquiries, as prisons. (Report of Captains Pringle and Carpenter, in the West Indies, July, 1838.) Since 1838 some improvements have been introduced into the penal institutions of the West Indies. An act was passed in that year (1 and 2 Vict. cap. 67), "An Act for the better Government of Prisons in the West Indies," by which rules for the government of the prisons of each colony are ordered to be prepared by the governor and council—the governor is authorised from time to time to appoint inspectors, and in case of any such officer being appointed, the act stipulates: imprisonment is prohibited from taking place in prisons declared to be unfit, and some minor reforms are provided for.

The government of Lower Canada, in 1836, appointed commissioners to visit the United States penitentiaries, and to report upon them, with a view to the introduction of improvements into Canada. These commissioners reported that, according to the Auburn practice, a higher degree of profit was to be obtained from the labour of the convict; according to the Philadelphia practice, a more subdued tone of mind in the convict, and apparently a greater reform in his disposition and habits, but less profit from his labour. Weighing these respective advantages, they recommended the adoption of the separate system: but we are not aware that their recommendation has been yet executed. (Report of the Hon. D. Mondelet and J. Nelson, Esquires, Quebec, 1838.)

Capit al Punishments.— The ordinary mode of inflicting the punishment of death in England is hanging by rope. Murderers, after execution, were formerly either given to be dissected or hung in chains; but by the 4 and 5 William IV., cap. 28, those practices were abolished, as also the custom in the instance of murderers by chain instead of by rope, and the bodies of such criminals are, by the same act, ordered to be buried within the precincts of the prison in which they were confined after conviction. Where, however, or otherwise, there were one hundred and sixty offences to which the penalty of death was attached. At the present time that punishment is confined to a few of the worst crimes only. It is not requisite to introduce some notice of the executions which have been observed in connection with a change so remarkable, and a change which has not been aided in its favourable tendencies by sound institutions for secondary punishment, but rather conformed to a tyrannically inefficient and vicious one. In the year 1821 there were 114 executions in England and Wales; in 1828 the number was reduced to 59; in 1830 to 17; and in 1838 it was only 6. That this change has been effected without diminishing the security of person and property there is this evidence, that there have been a smaller number of highway robberies in the last 7 years, with 5 executions, than in the preceding 7 years, with 56 executions; that there have been a less number of arrests of burglary and house-breaking in the last 7 years, with only 2 executions, than in the preceding 7 years, when 57 persons suffered death for those crimes; that there has been less horse-stealing in the last 7 years, with 5 executions, than in the preceding 7 years, during which for that offence 22 were executed. There have been a less number of commitments for murder in the last 5 years when the executions for that crime were 50 (or 6 annually), than in the five years preceding, when the executions were 60 (or 12 annually).

The following table (in a clear light the statistics of crime in connection with the mitigations of the penal code—)

London and Middlesex.—For crimes capital in 1829.

From Parliamentary Return, No. 165, printed 1837.

<table>
<thead>
<tr>
<th>Years</th>
<th>Executed</th>
<th>Committed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1828-30</td>
<td>52</td>
<td>890</td>
</tr>
<tr>
<td>1831-33</td>
<td>12</td>
<td>890</td>
</tr>
<tr>
<td>1834-36</td>
<td>9</td>
<td>11,382</td>
</tr>
</tbody>
</table>

This return also shows a decrease of the crimes that were capital in the first period. During the same three periods (in London and Middlesex) the committals for minor offences increased, being respectively 9,513, 10,014, and 10,006.

England and Wales.—From Parliamentary Return, No. 547, printed 1839.

<table>
<thead>
<tr>
<th>Years</th>
<th>Executed</th>
<th>Committed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1829-31</td>
<td>259</td>
<td>11,982</td>
</tr>
<tr>
<td>1834-36</td>
<td>96</td>
<td>11,382</td>
</tr>
</tbody>
</table>

To the foregoer shows a decrease of the crimes that were capital in the first period. During the same three periods (in London and Middlesex) the committals for minor offences increased, being respectively 9,513, 10,014, and 10,006.

<table>
<thead>
<tr>
<th>Periods</th>
<th>Executions</th>
<th>Convictions for the same</th>
</tr>
</thead>
<tbody>
<tr>
<td>England and Wales</td>
<td>83</td>
<td>2,988</td>
</tr>
<tr>
<td>1824</td>
<td>3,104</td>
<td>1,530</td>
</tr>
<tr>
<td>1825</td>
<td>1,785</td>
<td>1,785</td>
</tr>
</tbody>
</table>

| Centesimal proportion of convictions to commitments |
|-------------|-------------|
| 40 | 59 |

<table>
<thead>
<tr>
<th>Murder. England and Wales.</th>
<th>Number of</th>
<th>48, printed September, 1841.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periods</td>
<td>Executed</td>
<td>Convicted</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
<td>----------</td>
</tr>
<tr>
<td>5 Years</td>
<td>383</td>
<td>317</td>
</tr>
<tr>
<td>5 Years</td>
<td>330</td>
<td>291</td>
</tr>
<tr>
<td>5 Years</td>
<td>81</td>
<td>57</td>
</tr>
<tr>
<td>5 Years</td>
<td>66</td>
<td>40</td>
</tr>
</tbody>
</table>

| Centesimal proportions of executions to convictions |
|-----------------|-------------|
| 80 | 87 |
| 81 | 45 |

| Centesimal proportion of convictions to commitments |
|-------------|-------------|
| 49 | 23 |
| 49 | 23 |
| 49 | 23 |
| 49 | 23 |

Here it is shown that in the last period, when executions became less frequent, the crime of murder became less
frequent; and that juries convicted one-fourth more criminals, namely the centesimal proportion of 23 instead of 22.

In 1840 a "Parliamentary Return," No. 87, was printed showing, for five consecutive years, the number of persons sentenced to death for murder, of whose punishment was carried out by the country in which they were committed, and stating the number of commitments for murder in the same counties, during the same year, and in the following year. This return exhibits a striking fact, namely, that in not a single instance was there an increase of the crime, although those communiations of the sentence of death extended over fifteen counties.

In the present year, 1842, another document, No. 36, has been printed by order of parliament. It exhibits the numbers for all crimes committed and sentenced in Newgate during 21 years, divided into seven triennial periods; together with the commitments on charges of murder. In one of those periods, namely, the three years 1824, 1825, 1826, no execution whatever took place; and it is shown upon official authority, that that was the only period in which there were no convictions for the crime of murder. (See a paper issued by the Anti-Capital Punishment Society, 1842.)

The punishment of crime is in England always publicly inflicted, and an execution leads to crime by bringing the hardened and the daring together. No picture that has been drawn of the scenes which commonly take place at these times can be too high for a representation of what may be seen on the morning of an execution in the neighbourhood of Newgate. It is difficult to show what good object is effected by the spectacle of an execution; it is equally impossible to calculate the disadvantages which result from it. It has given birth to an opinion in which well-meaning persons sympathize, in favour of the private execution of the sentence of death. But the prejudices of Englishmen are opposed to such a change, and a motion, which was introduced in the House of Commons to that effect, about two years since, was almost unanimously negatived. Opinion is gaining ground in favour of the entire abolition of death punishment; but more efficient provision for society, no doubt, is, it is now evident, the way opposed to capital punishments, is needed in order to render such a step beneficial.

Progress of Penal Reform in Foreign Countries.-The subject of punishments engaged general attention at an earlier period in America than in this country; and from the results of experiments which were tried there some valuable hints for the improvement of penal discipline have been derived by the European states. In 1776 a system was formed in Philadelphia, the objects of which were to obtain a mitigation of the criminal code and a reform in prison management. To the recommendations of this society the legislature of Pennsylvania, in the year 1786, yielded, and established the system of abolition of imprisonment in all except two or three cases. This measure was however nearly counterbalanced by the immediate introduction by law of hard labour in a public and disgraceful manner enforced by corporal punishment. From this measure there resulted a complete demoralization of the convicts and the most pernicious influence upon the free community, frightfully increasing instead of diminishing crime, which obliged the legislature to abolish it within four years from its adoption. Solitary confinement and a liberal employment was then introduced. It appears however that the construction of the prison in which this system was first tried was defective, and that the system could not thus be fairly carried out; and the experiment was a failure. Another prison on the same system was afterwards, in 1818, erected at Pittsburgh; but owing again to errors in the construction of the building, the expectations of the founders were disappointed. The state of Maine next tried the experiment, but with no better success than in the previous instances. Once more it was tried at Auburn in New York, and there several of the prisoners became insane; but the system was not continued, and of others seriously impaired, which led to its abandonment and the introduction of the silent system at Auburn. The advocates of separate imprisonment however still maintained the advantages of that over every other system, and confounded the objections of its enemies with a series of instances which they could not have mentioned. The result of their persevering advocacy was the establishment of the Eastern Penitentiary of Philadelphia in 1829. Since that period the operation of separate confinement in America, besides being subjected to strict criticism, has engaged the attention of the governments of England, France, and Prussia, by whom commissioners have at different times been sent to that country to report upon its penal institutions. (Mr. Crawford's Report, and the Reports, in French, of M. de Beaumarchais and Toquerville, MM. de Metz and Blouet, and that translated from the German, of Dr. Julius.) The three most singular or least common of these authorities is in favour of the separate system of the Philadelphia prison and against the silent system of Auburn. Health, which it was apprehended and urged could not, it is argued, be obtained in a complete separation, has not to the degree supposed apparently suffered from it. The average mortality during the first seven years of its establishment did not exceed three per cent., and of 512 prisoners who lived in that time, 78 were in better health, 186 in equal health, 12 were not worse, 13 in worse health, 4 much worse, 34 dead, including one suicide. (Mr. Crawford's Report.) In 1852 the cases of madness or idiocy were 14 among 387 prisoners; in 1859 they amounted to 26 among 425. M. de Toquerville, from whose statement we quote these proportions, gives it to be understood that previous to 1838 the statistics of madness in the Philadelphia prison are not to be relied on; the same authority says, however, that the improvement of the separate confinement has been so great, that penitentiaries particularly under proper superintendence, the consequences, he thinks, of its having been formed rather with a religious than a political aim. A modification of this austerity would diminish or altogether suppress the evil of this system. An English report fait au nom de la Commission chargées d'examiner le projet de loi tendant à introduire une Réforme dans l'Ordre Général des Prisons, par M. Al. de Toquerville, shows that penitentiaries in France have been opened in Paris, and in the states of New Jersey, Rhode Island, Missouri, and others are in process of erection.

In the prisons of the silent system in the United States silence is enforced by the instant use of the lash, sometimes after barbarous executions.

The reader is referred for further information respecting the prisons of America to the works which have been quoted in this notice.

In Great Britain, the prison management is still behind that in England. The prisons of that kingdom are divided into those for offenders sentenced to hard labour, bagne; for offenders sentenced to terms of imprisonment exceeding one year, maisons centrales; and for offenders sentenced for periods less than a year, maisons départementales. Each of these establishments is provided by the law for prisoners before trial; maisons d'arrêt for persons arrested; maisons de justice for those against whom a warrant of capture has issued from the court; and maison de réforme for the temporary custody of persons apprehended. The bagne of France are similar to our hulks, and are established at Toulon, Brest, and Rochefort. Criminals sentenced to ten years hard labour and under search to Toulon: those condemned for life, or for upwards of ten years, are sent to Brest and Rochefort. At Toulon the prisoners are divided into three categories, les inconnus, les mièvres, les indicibles. The first are kept in the bagne flottant, where they are subjected to hard labour; the second are confined in one establishment, and the third to another by a chain, and the two become inseparable companies. The second division of forçats, or prisoners, bears the name of salte d'épée, and includes such as are guilty of any of the crimes committed by the law from any of the instances we have mentioned. The result of their persevering advocacy was the establishment of the Eastern
The Maisons centrales receive criminals of both sexes. Under the régime old, the maison centrale was confined to the effect of the department where it is situated, under the control of the minister of the interior. Under the present régime, responsible officers intrusted with the discipline, the health, and religious teaching give the prison. The rules are such that each prison is left to a great extent to be made by the effect; the consequence of which is a want of uniformity in the prisons generally. The prisoners are employed in different descriptions of manual industry, and a part of their earnings is reserved for their benefit on discharge. The nature of the classification in the maisons centrales is such as to prevent general corruption; and M. Christophe gives a powerful picture of some which he had himself visited. In 1836 there were 15,870 criminals in the maisons centrales.

The Maisons départementales appear to remain in a worse condition than the maisons centrales. They have been left to the administration of local authorities, ignorant and careless of their earnings for the improvement of the traffic discipline; and associated together in them are to be met the预防s and condemned, the mendicants, the vagrants, the aliens, the women, and the women. There are 27,351 prisoners of both sexes. Tout cela vit ensemble comme une famille attachée au service. Point de travail qui fasse diversion; l'oisiveté. Ces sont des sages à pouces.

The spirit of imprisonment, in all its forms, has hitherto existed. The attention of the government of France has been lately directed to the state of the penal institutions of that kingdom; and the result is, that a prison in the separate system has been provided by the general-chief of the department of the Seine for the traffic discipline; and the superintendence for the purpose is intrusted to the Chamber of Deputies. This commission, in their Report (1842), recommend the adoption of the separate system for the convicted as well as unconvicted; but they appear to have considered the system at Paris, the capital, to be too austere in character; and it is proposed to modify its features in France. A model prison has been set on foot at Versailles.

In France there are several institutions or societies auxiliary to the prisons, for the benefit of liberated convicts. One of the first acts of the government of Belgium after the revolution of 1830 was to mitigate the severity of the criminal law, and to establish commissions to report and reform the prisons. The prisons of Belgium are similarly divided to those of France, into maisons de dépôt et de passage, maisons d'arrêt et de justice, prisons pour peines. M. Christophe represents the greater number of the maisons de dépôt as consisting of an agglomeration of many apartments without courts, where the ages and the sexes are mixed. In other cases a separation, et de justice an attempt is made to classify the prisoners according to their moral character, as well as ages and sexes. The prisons pour peines fail in effecting any of the purposes for which they were designed. The labour of the prisoners (of various kinds) is paid by a weekly allowance, which are allowed to spend in the purchase of beer, tobacco, &c.; so that the prisons, instead of being dreaded, are esteemed agreeable places of confinement.

In Holland the prisons are divided similarly to those of France and Belgium, into prisons for the accused, for the convicted, for female, juvenile, and adult offenders. In the prisons for the convicted there are divisions for criminals under punishment on forfeiture of all their goods and chattels. Association in one form or another is allowed in all the prisons, classification being the only means employed to counteract or control the spread of contamination. The number of the classes is divided, as in France, into four in each prison, consisting of those who are badly conducted and the reformed, the doubtful, and the well behaved. Each class has a yard, a refectory, workshops, and dormitories distinct. The classes are subjected to a régime more or less rigid, consisting, among other particulars, in the interdiction of the visits of parents or friends, and of the indulgence of spirits and tobacco; in depriving them of the most productive employments, thereby diminishing the profits received by them; the refusal to commutate their sentence or alleviate its severity; the prohibition of speech and (a measure, M. Christophe says, but feebly attempted, owing to the deficiency of means) cellular separation. To every prison there is attached a council of regents, which periodically reports to the minister of the interior. The defective state of the prisons of Holland is generally acknowledged in that country, and societies have been instituted there for the purpose of obtaining an improvement and in the meantime of introducing incidental means of improving the criminals. There are also societies for the paroisse of liberated prisoners.

The spirit of imprisonment in penal law and discipline has been excited in different parts of Germany; and although the tortures and floggings of uncivilized ages are not quite discontinued, they are sparingly used, and are rarely even to give place to mild institutions. The progress towards a good system varies in the different states and kingdoms.

A few years since the prisons of Hungary are described as having been in a worse state even than were those of England in the days of Bacon. But the accounts published in 1830, by Boloni Parkas, a Hungarian traveller, of the United States penitentiaries, excited the attention of leading men, and led to the introduction of labour and of improved methods of health into the prisons of France. In 1837 the county of Bihar resolved to make a trial of the Auburn system on about eighty prisoners, the number in confinement in the prison of Bihar being six hundred. The same experiment was shortly afterwards adopted in the county of Assam; and in a few years later, the complete execution of the system was established in county Kamanor. At a more recent period the visit to England and to the Continent of two Hungarians, Steremer and Eddy, the former a member of the Hungarian Penitentiary, the latter a professor of civil and criminal law, furnished similar means, which continue to flourish, on the merits of these systems, in Hungary. Some practical results would have arisen before this from the efforts of the states in these two counties; but in 1840 had previously come to a resolution to introduce a uniform prison discipline throughout the whole country, and a delay was to be allowed to collect the information by which the nature
of that discipline should be determined. Two commissions are now sitting at Pesth; the one intrusted to draw up a project of a criminal, and the other that of a prison code. The commission on prisons has decided in favour of the separate system, and has submitted a project for the establishment of different prisons, to which it is proposed to divide the country into ten districts. The coming diet (for 1843) will take the recommendation of the commission into consideration; but it is impossible to predict what will be the result. The existing prisons are mostly in favour of the separate system; but unless that system carry the approval of the people who control the votes of the deputies in the diet it will not be adopted. We are not aware of any improvements being contemplated in the prisons in other parts of the Austrian empire. At present their state is understood to be very bad.

The employment of prisoners on the wheel was introduced into some of the prisons of Prussia a few years since, on the recommendation of Dr. Julius. Classification to a limited extent was adopted about the same time; and, following the progress of improvement in this country, the silent system was next brought into operation there, as well as in other parts of Germany. At a subsequent date (1834) Dr. Julius was dispatched to the United States to inquire into the state of the prisons of that country; and having reported decidedly in favour of the separate system of prison management he was brought into operation in the Prussian dominions. No separate prison has yet been built in Prussia, but we are enabled to state, on the authority of Dr. Julius, that four are about to be built, one at Königsberg, one at Kiensberg, and another at Memel and Westphalia, and the fourth at Ratisbon. The two first are to be constructed on the plan of the Model Prison at Pen-toville.

A plan now in operation in Mecklenburg a penitentiary has been for some time in operation, which consists of three distinct buildings, the one appropriated to the execution of the silent, the other to that of the separate system, and the third as a place of residence for the governor and superintendents. At the end of these buildings are contained one hundred and sixty-eight cells, and the next seventy cells adapted for day use. The silent system is applied to minor offenders; the separate to those who have been guilty of grave crimes. At a short distance from this penitentiary there is a prison for the untried.

At Hamburg a plan has been drawn up by director Wumel of a penitentiary similar to that at Butzow; but its adoption is at present doubtful.

The estimates of the separate system are differently estimated by the distinguished writers and thinkers of Germany. Professor Mittermaier of Heidelberg has declared his opinion against it on these among other grounds, that in less than ten years the prisoners of the separate system contains one hundred and sixty-eight cells; the second seventy cells adapted for day use. The silent system is applied to minor offenders; the separate to those who have been guilty of grave crimes. At a short distance from this penitentiary there is a prison for the untried.

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cases of conviction for felony, where the convict was liable to the punishment of death, of granting a pardon, on condition that the convict should consent to be banished either for his life or a less time. The full sentence of the law was passed upon the convict, and in the condition under which he obtained his pardon, the sentence was held to revive, and might be executed upon him. Convicts thus banished were assigned, under indentures, to persons residing in the North American colonies, that they might plant and cultivate plantations. These plantations were entitled to their labour during the period of the indentures, paying, the latter part of the time, a certain amount of wages. At the end of it the convicts received from the government stock, and a certain sum. By these means judges and justices before whom an offender is convicted are first expressly empowered to grant him a reprieve, and transport him to the plantations, there to be kept to hard labour. If he refuses to be transported, or returns before the expiration of the time, he is to be put to execution upon the judgment pronounced. The Halbans Cursor Act, 31 Ch. II., c. 2, s. 14, recognises the existence of this power. By the 4 Geo. I., c. 11, transportation is substituted as a punishment for a variety of offences there named, in lieu of burning in the hand, whipping, &c. Many other acts have since passed determining the offences punishable by transportation, regulating the mode in which the sentence is to be carried into effect, the service of the transported convict, &c. 2, 3, Geo. II., c. 2, it having become necessary, in consequence of the independence of America, to appoint a new place for the reception of convicts, and New South Wales having been selected, the governor was enabled to open the holding courts for their trial in case of subsequent offenders, &c. The law regulating the transportation of offenders has been since revised and consolidated into one act, the 5 Geo. IV., c. 84 (amended by 11 Geo. IV. and 1 Will. IV., c. 60), which contains the principal provisions now in force on the subject. The 6 Geo. IV., c. 60, regulates the punishment of offences committed by transports sent to labour in the colonies. The governors of such colonies have power to lessen the period for which a convict is transported; but by 2 and 3 Will. IV., c. 62, the extent to which they can do this is limited in the cases of transportation for seven, fourteen years, and for life, to a remission of the punishment to four, six, and eight years respectively. Persons rescuing or aiding a transport to escape are guilty of the same offence as if he had been confined in gaol. (Hawkins, P. C., b. 2, c. 33; Russell, On Crimes and Misdemeanours, b. 2, c. 35.)

SUBSTANTIATION. [Sacraments.] TRANSVERSAL, a name lately given to a line which is drawn across several others, and cut them all. The word is used in this sense in the writings of Carnot, Poncelet, Chasles, &c.

Let there be a triangle ABC (the reader may easily draw the figures of this article for himself) and let BD cut the transversal BC in a, externally, let AB cut the transversal in b, BC in a, and CA in b. Then will

\[ A \times B = C \times b = C \times a \times b \]

and the converse, namely, if a, b, c, be points taken on the line of interest in order, or externally, then these three points are on the same line straight line. In the language of Euclid, the ratio compounded of the three ratios of AC to BC, to Ca to Cb, and Cb to Ab, is the ratio of a line to its equal.

This proposition is now frequently demonstrated in elementary works on geometry as follows:—From any one of the vertical points A, B, C, draw a parallel to either of the sides of the triangle which does not pass through that point; from C, for instance, draw CM parallel to AB, cutting the transversal in M. Then we have two pairs of similar triangles, MCB, CAa, and MBc, ACM, which give

\[ PC \times AC = CM \times CM \]

or Ca : CB :: AC x BA : AB x RC; whence the proposition required is obvious. The converse readily follows by demonstration.

Let any point P be taken inside or outside of the triangle ABC, and let AP, BP, CP cut BC, CA, AB in a, b, c, then

\[ A \times B = C \times b = C \times a \times b \]

which is proved by using the former property in the triangle ABP with the transversal PC, and the triangle ACB with the transversal PB. The converse is also easily proved, namely, that if a, b, c be so taken on the sides as to satisfy the above relation, then AA, BB, CC all meet in one point.

The same proposition as the first is true of any polygon whatsoever: thus, let ABCDE be a pentagon, the sides of which are cut externally or internally by a line, namely, AB in D, BC in E, CD in a, DE in b, EA in c. Then

\[ A \times B \times C = D \times E \times a \times b \times c \]

by multiplication of which the theorem follows.

If the transversal be parallel to either of the sides, the two segments, which are then infinite, are considered, equal, and removed from both sides of the equation.

In the article Projection a test is given which being satisfied, shows that a proposition is true of any figure, if it is true of any one of its projections. This test is satisfied in all the preceding cases, so that it is enough to prove any one case of these propositions, that is, for any one projection of the figure. Now there is no case in which they are obviously true, a priori, except for that projection in which the transversal becomes the vanishing line, or all the segments become infinite. If we put the first proposition of all in this form

\[ A \times B = C \times b \]

\[ A \times B = C \times a \times b \]

it is obviously true when the line abe is at an infinite distance, each of the ratios being then unity. It would not be safe, upon the proof given in the article cited, to allow this extreme case of projection to enter into the use of the theorem: nevertheless, other proof might be given, which would make this very simple and perceptible instance, the truth of which is seen to be one, sufficient evidence of the others. We mention this only to show the very great power of the geometry of projections: our limits do not allow of our entering further into the subject.

The theory of projections may be made useful in surveying, particularly in military surveying: as an instance take the following. There is an inaccessible point A, from which to B it is required to find the distance without any instruments except signal-poles and a measuring-line. At B set up a signal, and another, C, at a certain distance between B and A. Choose another signal-point, D, and between D and B set up a signal at E, and another at F, between D and C, and also between E and A. All this must be done by trial. Then measure DB, EB, FB, FD, and B. The triangle DBE, cut by the transversal EFA, give the following relation:

\[ DE \times FA = EB \times CA \times FD \]

where

\[ EB \times FB = EC \times EB \times DF \]

The projection of figures may therefore be put into such different forms that lines which, in Euclid's mode of speaking, would be called sides, become diagonals, and sides versa. The distinction of diagonal and side therefore becomes an incumbrance, and a new mode of viewing polygons is introduced which is called transversals. A figure contained by four straight lines is, generally speaking, one which has six points: since four straight lines meet two and two in six points; thus, the four-sided figure EFB has the six points E, F, B, C, D, A; all which points are in the two fundamental lines BF, CE, DA, of which only the two first are commonly called diagonals: but all three have common pro-

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The AN is generally known to Wallachia.—1. The pass of Zalak in the valley of the Hatzeg, in the county of Hunyad. This pass is called the 'Iron Door' on account of the high and steep rocks by which it is bounded. 2. The pass of Alm, near the village of Kriavda, in the county of Hunyad. It gives the finest view for the bloody battles to which the Hungarian nation has been reduced in the course of wars. 3. The pass of the Rothen-Thurm, or the 'Red Tower,' the most remarkable of all. Formed by the narrow valley of the Alt, it begins near the village of Boita or Ochsenkopf in Transylvania, and it ends near the convent of Kosia in Wallachia. The length of this pass is eleven leagues, and the greatest part of the road is hewn in the rock. 4. The pass of Fortschwara or Terenburg in the district of Kronstadt. The route of this pass, Tonosch, south or across by the river Tonosch. 5. The pass of Besau in the district of Kronstadt. It traverses Gyotosch, Gymosh, and Partesch, and Berecz, leading into Moldavia, and the Borgo pass makes the communication with Bukowina.

Transylvania is a table-land, bounded on the east and the south by the principal range of the Carpathians; on the north by a branch of the Carpathian, which commences near Mount Gallatz, and crosses Mount Pleska, and thence to the north-west as far as Mount Pretrosa in Hungary; and on the west by an extensive system of mountains which is composed of three large groups. The first or southern group begins on the Mount Koszta, in 45° 13' N. lat. and 22° 40' E. long., stretching to the north as far as the river Maros: the centre of this group, Mount Rusa-Poyana, is 9900 feet, or perhaps 10000 feet, high. The second group lies in the middle of the Maros in the south, and 47° N. lat.; it forms out lofty and extensive branches to the east and to the west. The third group begins in 47° N. lat., and stretches as far as 47° 33' N. lat.; the southern part of it is called the Reuss-Mountains, and the northern part passes by the German name of the Buch-Gebirge. Between the northern slopes of the Buch-Gebirge and Mount Pleska in the east, lies the valley of the Samos, which is one of the largest passes between Transylvania and Hungary, another formed by the valley of the river Maros by high and woody mountains, and containing the sources of many rivers, Transylvania has a striking resemblance to Bohemia, although her natural barriers present more difficult obstacles. The Maros is traversed by several parallel ranges of mountains, which, being links between the Carpathians in the east, and the Hungarian-Transylvanian mountains on the frontier in the west, are the source of the stream of a gigantic gridiron. The direction of these ranges is generally from north-east to south-west; the elevation of the summits is less than that of the Carpathians, and in many districts they are mere hills. The first or northern of these ranges begins at Mount Maros in the east, and proceeds to the west in 46° 30' N. lat.; it is not interrupted by any river or plain, and separates the valley of the Samos, or the northernmost part of the country, from the valley of the Maros.

The second lies between the Maros and the river Little Kocz; the third is between the Little Koczel and the Great Koczel; and the fourth forms a barrier between the Great Koczel and the river Alt. Plains are rare in Transylvania. Extensive tracts of the full and mountainous parts are crossed with forests, and the whole territory is of little importance to the other affluents of the Danube. 1. The Maros (Moros) has its sources on the eastern frontier at the foot of Mount Tarko or Tartarhagro. It runs first north-west and west for about 28 miles, and afterwards south-west, west, and south-south-west for about 170 miles till it reaches the great town of Sziget at 600 feet wide, and becomes navigable for boats at Kursberg; it contains abundance of fish, and it brings down particles of gold. The most important of its southern tributary rivers is the Great Koczal (Kökülő), which receives the Little Koczel (Kökülő).
On its northern side the Maros receives the Aranyos, which has its sources in the west on the frontiers of Hungary, and with a few exceptions flows parallel to the Maros. The latter part of the Aranyos is navigable.

2. The Sattoth (Szamos) is formed by the junction of the Great and the Little Szamos. The Great Szamos comes from Mount Kahlbeg, or Gallatz, in the district of Bistrita, in the Wallachian department, and is navigable as far as Dece, where it is joined by the Little Szamos, the sources of which are at the foot of Mount Kalata, in the district of Klausenburg, on the frontiers of Hungary. The division is about three miles.

From Dece the united stream of the two Szamos first runs north-west, then south-west, and at last north, till it reaches the frontiers of Hungary a little above Szaza: it joins the Theiss at the village of Apati. The whole length of the river, especially in upper Black Danube, and three fourths of its length are within Transylvania. 3. The sources of the Alt (Aluta) are in a part of the Carpathians called Nagy-Hagymas, a little distance south of the sources of the Great Szamos. The Alt runs at first from north to south in an alpine valley bordered by high and steep rocks, till it reaches the limits of the district of Kronstadt, near Illyetfalva. There it turns suddenly to the north-east, but soon again changes its direction, which is generally north or north-west, in the region of Hermannstadt, where it turns to the south, and keeps this direction through the pass of the Rothen-Thurm, and as far as its junction with the Danube opposite Nikopol. The river is broad and deep, but its tributaries, and the whole length of 181 miles are within Transylvania. The navigation on the Alt within Transylvania has many obstacles, the bed of the river being full of rocks, part of which however have been blown up by order of the Austrian government. This river affords a natural communication between Southern Transylvania and Wallachia and the Danube, and is therefore of great importance for commerce, especially as the valley of the Alt is the most fertile and the most civilized part of Transylvania, being almost entirely inhabited by German colonists. The Danube being sufficiently deep for sea-ships at Nikopol, any productions of foreign countries might be sent direct to that town, whence they could be transported by means of boats into the very heart of Transylvania. But the government of Wallachia is far from imitating the Austrian government in its care for the navigation of the Alt, and the whole Wallachian part of this river is still in a state of primitive wildness. There are some lakes of importance. The lake of Hados in the county of Doboka is 16 miles long; the lake of St. Anna near Lazarfalva in the country of the Szeklers is 10 miles long and as many broad; the lake of Pithecz in the Carpathians is renowned for its gaseous emanations, which suffocate birds that fly over it: the Holt-Maro is a lake formed by the Maros near Karlsburg.

Climate.—The temperature is generally very variable. Severe cold varies with extreme heat: the summer days are not very hot, and the nights cold in the northern and southern parts of the country, and the nights are cold in the winter the cold is almost insupportable. In the east the temperature is wet and cold, and not favourable for grain. Cold winds prevail in the spring and autumn, and they blow with great regularity. Dreadful storms followed by sudden severe cold are frequent; they have given the name to a district called Burzenland, or 'the country of the storms.' The regular winds have different names in different parts: the cold winds which sweep over the flat district of Szamos are called winds of the Rothen-Thurm, because they blow from south to north, bursting with irresistible violence through the northern opening of that long defile; in the district of Haromne they are called the Haromne wind, and in the country of the Szeklers they have the name of the winds of Thorda-hashadek. Notwithstanding these phenomena Transylvania produces abundance of fruits of all kinds.

Soil, Productions, and Commerce.—The southern and southwestern counties have the most fertile soil; it has a yellow or red-brown earth, and is well adapted to the culture of corn, and wheat, of vine, olive, and fig, and in many places to the culture of meadows. The northern and eastern counties have the most fertile soil; it is of great fertility: the eastern and northern parts and a narrow tract along the western frontier are covered with forests, and the soil is stony in many districts; the cloud over the whole surface is covered with a layer of clay which renders it fit for agriculture. The country is far from being equally well cultivated in all parts. Transylvania produced, in 1834, iron, 51,228 cwt.; lead, 2353 cwt.; copper, 906 cwt.; quicksilver, 26 cwt.; sulphur, 38 cwt.; silver, 5431 marks; gold, 3030 marks; rock-salt, in six mines, 770,706 cwt.; the greater part of which is exported to Hungary and Bukowina; salt, from 112 salines. There are several quarries of marble, and many of it is sent to the seat of the Roman Catholic bishop of Transylvania. In the environs are the richest gold-mines of Europe, the principal among which are those of Serekemuth, Zalasina or Golden Mark, Abrudanysa, and Sosun: the gold is found in the middle of the earth, and reaches the surface of the ground. There are pearls, feret, and amethysts in the high mountains; agates, opals, chalcedony, and cornelian in the hills and rivers. The mineral waters are celebrated. Besides enormous quantities of gold, there are large quantities of iron, timber, flax, hemp, and emery, and a great number of manufactories. There is a very great quantity of copper, and others of tin, in abundance, especially in the valley of the Alt, of excellent quality, though not so strong as the Hungarian. The iron is of very good quality and in abundance, especially in the valley of the Alt. The mining of cattle chiefly occupies the Wallachians in Transylvania: sheep are numerous, and their flesh has that aromatic taste which distinguishes the sheep that feed on the mountain pastures. There are fish, wild and tame fowl, and game of all sorts, in abundance; wolves are frequent in the Carpathians, and even bears and lynxes appear. The horses are of small size, but swift, and very fit for light cavalry. Manufactures scarcely exist, except in the valley of the Alt, where the Germans produce some fine dyed cloths and cotton, fine felt-hats, and leather-ware, and a considerable quantity of linen. The commerce with Wallachia, Moldavia, and Russia is considerable, and the produce of this country will increase in proportion with the progress of navigation on the Danube. Sulzer states that towards the end of the past century the commerce of Transylvania was almost entirely monopolized by the Danube, but in a few years greatly increased since that time, even Transylvania has felt the favourable influence of this circumstance, notwithstanding the prohibitory tariff of the Austrian government. At present the manufactures are in the hands of the Germans, and commerce is carried on by Greeks and Armenians. The total value of the exports in 1834 was 246,243fl., and that of the imports was 222,472fl. The total length of good roads in 1834 was 246 Austrian post-miles, or 966 English miles.

Political Divisions and Population.—Transylvania is divided into three political divisions, viz. 1. The country of the Hungarians; 2. The country of the Szeklers; 3. The country of the Roman Catholics. The population of these three countries in 1832 was 2,092,200 inhabitants.

1. The country of the Hungarians occupies the northern, middle, and south-western parts of Transylvania; it is divided into 11 counties (comitatus) and 2 districts. The counties are—1. Hunyad, area 2935 English square miles, 181,226 inhabitants in 1832; 2. Zarand, 641 square miles, 47,267 inhabitants; 3. Kraschina (Krasna), 420 square miles, 61,784 inhabitants; 4. Mittel-Szolnok (Koper-Szolnok), 64 square miles, 50,214 inhabitants; 5. Domok (Bello-Szolnok), 1337 square miles, 130,167 inhabitants; 6. Dobok (Doboka), 1160 square miles, 111,513 inhabitants; 7. Klausenburg (Kolos), 1034 square miles, 141,060 inhabitants; 8. Thorenburg (Thorda), 1853 square miles, 104,381 inhabitants; 9. Oltenburg (Oeltenburg), 787 square miles, 56,490 inhabitants; 10. Unter-Weissenburg (Als- feyer), 1866 square miles, 94,465 inhabitants; 11. Ober- Weissenburg (Felső-feyer), 645 square miles, 49,426 inhabitants. Districts: 1. Fagaros (Fagor), 681 square miles, 76,192 inhabitants; 2. Kovar, 366 square miles, 54,061 inhabitants.

The counties of Zarand, Mittel-Szolnok, and Kraschina are to be, or have already been, ceded to Hungary. In 1831, 182,912 inhabitants, the surface of Transylvania after the cession will not reach 1024-90 geographical, or 21,678 English square miles, with 1,678,246 inhabitants.

2. The country of the Szeklers is—Klausenburg (Kolovar), on the Little Szamos [Claussenburg]. Karlsruhe or Weissenburg (in Latin, Alba-Julia; in Hungarian, Gyula-Fejervar; in Slavonic, Bialogrud), a strongly fortified town, with 6000 inhabitants, on the Danube, in the region of the ancient capital of the kingdom of the Romans, the first capital of the Szeklers, and the seat of the Roman Catholic bishop of Transylvania. In the environs are the richest gold-mines of Europe, the principal among which are those of Serekemuth, Zalasina or Golden Mark, Abrudanysa, and Sosun: the gold and silver mines of Verespolak were known to the Romans. Nagy-Enyed, with 6000 inhabitants, and a college, which is the principal school for those of the Reformed religion. Varieny (Gredyfe) is in the
beautiful valley of the Hatzeg, in the county of Hunyad, on the site of Zarnice-Gethusa, the capital of the ancient Transylvania Tribes Trajanian Romans. The environs are full of Roman antiquities, among which the most remarkable are the remains of an amphitheatre, and the foundation of a Roman house containing the pavement of two rooms, which are in fine mosaic representing scenes from the labours of Hercules. Thorensburg (Thorda), with 6000 inhabitants, has rich mines of rock-salt, which produce 240,000 cwt. per annum.

The country of the Saxkesh (Pars Sibilorum) extends along the eastern frontier or the range of the Carpathians, and is bounded on the north and north-west by the principal part of the Hungarians; on the north-east and east by Moldavia; on the south-east and south by Wallachia; and on the south-west by a small partial part of the country of the Hungarians and by the country of the Saxons. It contains five 'Jurisdictions,' viz. 1. Aranyos (Aranyos), 2. Neumarkt or Marosch (Maros), 615 square miles, 57,611 inhabitants; 2. Udavely, 1082 square miles, 46,576 inhabitants; 4. Csik (Cai-Szke), 1806 square miles, 33,383 inhabitants; 5. Haromsheke (Haromsetek), 1857 square miles, 92,686 inhabitants.

The most remarkable town is Hirsohom (Mares-van-highly), with 10,000 inhabitants: it contains the chief seat of justice of the country of the Saxkesh, a Roman Catholic gymnasium, a Reformed college, a mineralogical museum, and a public library, the largest and best in Transylvania. Szeklerland (Szeklerland) 1800 inhabitants. 3. St. Miklos, Sepsi St. Gyorgy, and Felvine are small towns.

3. The country of the Saxons. The main or southern part of it is bounded on the east and north-east by the country of the Saxkesh, and on the north-west, west, and south by the country of the Hungarians; and in the south by Wallachia. Another smaller part, the district of Bistritz, lies in the north-eastern corner of Transylvania, on the frontier of Moldavia. The country of the Saxons is divided into nine Jurisdictions and two districts. Jurisdictions: 1. Repe or Rappes (Ko-halom), 227 English square miles, 31,000 inhabitants; 2. Schussegg (Sesevagar), 219 square miles, 27,391 inhabitants; 3. Gross-Schenk (Nagy-Senek), 246 square miles, 28,822 inhabitants; 4. Moldoch or Medvahy (Medyaga), 237 square miles, 37,906 inhabitants; 5. Lezechkirch (Vj-Egyhaz), 123 square miles, 18,950 inhabitants; 6. Hermannstadt (Szeken-Seeke), 788 square miles, 90,521 inhabitants; 7. Reisamarkt (Sterchdegely), 81 square miles, 21,813 inhabitants; 8. Muhlenbach (Szaz-Szebe), 119 square miles, 18,104 inhabitants; 9. Broos (Szaz-Varos), 172 square miles, 21,989 inhabitants. Districts: 1. Bistritz (Beszterec), 1458 square miles, 165,554 inhabitants; 2. Kamenstadt (Brasso-Videke), 692 square miles, 91,788 inhabitants.

The popular division of the country of the Saxons is as follows:—1. Weinland, with the capital Schussegg; 2. Altland, with the capital Hermannstadt; 3. Land von Walde, with the capital Muhlenbach; 4. Burzenland, with the capital Schussegg.

The principal towns of the country of the Saxons are the following: Hermannstadt, Nagy-Senek; in Latin, Chinabium, the capital of Transylvania with regard to administration and finances, is said to have been built by a certain Hermann of Nurnberg, one of the leaders of the first German colonists, who came to Transylvania between 1103 and 1105. The town is situated on the river Zibil, a short distance north-west of the Altland, in the west part of the country of the Saxons, and is surrounded by most beautiful environs. It has upwards of 20,000 inhabitants, among whom there are about 9000 Luthers. It consists of two parts, the upper town, which is situated on a hill with an old fortress, and the lower town, which lies at the foot of this hill; they are enclosed by a double wall. The market-place is very fine, and the streets are regular. The town is surrounded by beautiful buildings of the Lutheran cathedral, built in 1460; the palace of Bruckenthal, containing the Bruckenthal gymnasium, a museum, a public library, and a room with 16,000 medals, and many antiquities, none of which the Hungarians or Saxons have acquired; many Roman remains are found in Transylvania; and the town—hall, an old Gothic building of beautiful workmanship, which is the meeting-house of the Saxony nation, and contains the archives of the Saxons. Among the public institutions the most remarkable are—two gymnasiums, two national schools, two orphan-houses, an establishment for military education, four hospitals, one military hospital, a poorhouse, a workhouse, a fire-house, and a number of printing-rooms or the court of finance of Transylvania; and the residence of the commander-in-chief of the Austrian forces in Transylvania, and of a Greek bishop and his chapter. The inhabitants fabricate 40,000 pieces of cloth per annum, moreover they manufacture wools, saddle-cloth, and gunpowder; there are two printing-offices, and one publisher. In the environs there are several places for bleaching of wool. The village of Heits near Hermannstadt is renowned for the beauty of its inhabitants, who are generally inhabited by Germans, but the population of the three suburbs is composed of Wallachians. Kronstadt (Csonstrat), Schabsburg (Sesevagar), on the Great Kocb, in a beautiful valley, with 6000 inhabitants, produces magnificent carpets of cotton; wine is made of the excellent wine which the environs. Briztits (Beszterce), on the river Bistritz, opposite to the Bolog Pass, has 5000 inhabitants, who fabricate cloth, leather, and soap, and carry on commerce with Bukowina, Austrian Poland, and Moldavia.

That tract of Transylvania which lies on the frontier of Moldavia and Wallachia belongs to the Austrian military frontier [Militär Frontiere], and has a separate administration from the rest of that kingdom. 

Inhabitants.—The inhabitants belong to different nations. According to Malte-Brun there are, 526,000 Hungarians (Magyars and Szeklers); 483,000 Saxons; 920,000 Wallachians; 90,000 gypsies; 10,000 Slavonians; 6000 Austrians; 30,000 Romanians; 9000 Italians. Among the Saxons there is a number of Magyars from the district of Rajuz (Marahl Marjom) about the number of the different nations in Transylvania are generally too high; according to him there are 120,000 Armenians, which is about the same as the Szeklers. The Saxons, however, is of high importance in Transylvania, for the political rights of the individuals depend upon their origin.

Constitution.—The nation in the political sense of the word is composed of three bodies or 'nations,' the Hungarians, the Saxons, and the Szeklers; and the Saxons, who have the collective name of the 'Uniti.' But political rights are not only personal, they are also territorial: if for instance a member of the body of the Hungarians settles in the country of the Saxons, he will cease to belong to the Hungarian body, and will be entitled to the rights of a Saxo, without prejudice, however, to his personal rights as a nobleman. The Saxons having no nobles among them, a Saxon who settles in the country of the Saxons will be entitled to the rights of a Hungarian, but he will not become noble, and therefore not acquire those privileges which depend upon nobility. The privilege of nobility is personal and territorial in its sense, that if any freeman of the three nations acquires a noble quality, he will have the same rights as a nobleman of his nation. The Wallachians have no political rights, but they have lately ceased to be serfs; some families among them are of ancient freedom, and others belong to their national nobility. Moreover, they have possession of any political rights unless they are received among the Hungarians, Saxons, or Szeklers, or become citizens among the Saxons. When a Hungarian or Szekler nobleman of Transylvania settles in Hungary, he is entitled to all the privileges of noblemen in Hungary, but the nobles of Hungary do not acquire the same privileges with regard to Transylvania when they settle there. The principal privilege of the nobles is exemption from taxes. The Aralists, however, or those petty nobles who possess no estates, are considered nobles, and so do the Saxons, and generally all the rest of the people except the nobles. The different charters of the Transylvanian constitution are as follows:—1, the 'Puncta Unionis' of 1542; 2, the 'Diploma Leopoldinum' of the 4th of June, 1631; 3, the 'Sancti Spiritus' from 1744; the 'Artificial dioceses.' The high commission which is intrusted with the administration of Transylvania sits in Vienna, and is called 'Die hohe Siebenbärgische Hof-Kanzlei,' or the high chancellor. All other affairs are administered by the immediate control of the emperor and his minister. Transylvania is in every respect separated from and independent of Hungary, and the emperor styles himself grand-prince of Transylvania. The revenue of Transylvania in 1834 amounted to 325,400, of which the revenue from the post-office was only 90,000.

History.—The early history of Transylvania has been given under Dacia. From the fifth century it was successively occupied by different nations [Goths; Attii]...
trappa,'

So in 1860, while Hungarian or Magyar conquers the country between the Carpathians and Germany, they settled in Transylvania and subdued or drove out the Peteshnegues. Hungary became independent of Hungary until it was conquered by King Stephen III, which afterwards emperor under the name of Ferdinand I, was supported by the Turks, and he at last compelled Ferdinand to allow him to possess Transylvania as an independent principality.

But Zapolya was forced in his turn to acknowledge himself a vassal of the Osmanis. During 160 years Transylvania was governed by princes of the houses of Zapolya and Budak, and some of her princes, especially Belzen Gabor and George Ragon were dangerous enemies of the house of Austria. [Thirty Years' War.] Leopold I conquered Transylvania in 1687, and the Porte was obliged to renounce her supremacy over it by the peace of Carlowitz in 1699. Transylvania however became only a vassal state of Austria, until the death of her last prince, Michael Apafi II, who died in 1713. In 1705 the empress Maria Theresa erected Transylvania into a grand-principality.

The most of Transylvania by Stephen I, the country was almost entirely German, and the line in the country was gradually repopulated by foreign colonists. The first arrival of the German colonists is generally said to have taken place under King Gyoes II in 1143, but in fact they cannot now be traced back with certainty, either to the Transylvania, the Lower Rhine, and the Low Countries, some also from Lower Saxony, and they were called Saxons, either because they generally spoke the low German language, or because several northern nations, especially the Frisians, Frisians, and Frisians, called the Germans by the name of Saxons. The number of these colonists, who received great privileges, was augmented after the Reformation by Protestant refugees from different parts of Germany, and the colony has continued to be peopled, and still called, the Germans by the name of Saxons. The Turks, however, in the course of time, have increased the population, and have repelled all his Protestant subjects.

The Germans are the most civilized inhabitants of Transylvania, and though separated from their fatherland by an extensive and half-barbarous country, they still keep up a connection with Germany. The German universities are frequented by a considerable number of Transylvanian students, especially for divinity. The Szeklers are said to be the descendants of the Turkish Peteshnegues, who were allowed to remain in Transylvania, after the partition of the rivers Nila and Tisza, and have formed independent tribes, from the invasions of the eastern barbarians; but they are now quite Hungarians. The important question whether the Wallachians, who are so numerous in Transylvania, are of Persian origin or not, is still debated. The nation belongs to the history of Wallachia. [Wallachia.]

[Marienburg, Geographie des Grossfurthesthums Siebenbienren; Schlieber, Dichter in Lippe; Suhler, Transylvischer Buchhand; Schneid, Die Deutschen in Siebenbienren; Sulzer, Transylvania des Tacaci (although this book treat principally of the history of the Wallachians beyond the Carpathians, it contains very valuable notices concerning Transylvania, where the author lived thirty years); Denzin, Tabula Geographica Transylvaniae Hung.; é, et de la Grande Principauté de Transylvanie, from the German; Der Verfassungs-Staat der Sächsische Nation in Siebenbienren, Hermannstadt, 1790, 8vo; Lenck von Treuser, Lieutenante, Siebenbienren, 1791, 4to; Georgi, geographisch-topographisch-statistisch-hydrographisch-argographisches Lexicon, 3 vols. 8vo, 1839. (This book is written with great care; of every village the author mentions the different nations who inhabit it, and the produce they make, with the number of inhabitants. An inconvenience for foreign readers is that the Hungarian names are put at the head of the articles, although the German names are much more known. He who seeks for Hermannstadt must look for Nymphenburg.)

TRAP. This geological term, one of the most general use and comprehensive meaning, seems to have been originally employed by Bergman and the German and Swedish geologists, in the sense of the word 'trappa, Swedish,' or 'trappe,' German, meaning stairs, and the aspect of the rocks now called Trap, in successive terraces on hills side, is as much as often to be the case of a geology, which works on topographical geology a very great proportion of the ancient rocks of fusion are familiarly called 'trap,' not because they have any certain mineral composition, but because, whether granitic, alpine, porphryitic, or hornblende, it is in their name or appearance, that they appear to the author to have followed the same geological age. In this sense the term is purely geological, and we have as distinct designations 'eruptive trap,' 'contemporaneous trap,' 'overlying trap,' 'interposed trap,' &c. By this term we understand the term of the rocks, that there are left out such massive and generally deep-seated rocks as granite, or even contracted to the hornblende and felspatho- hornblende rocks, which appear as dykes, interposed beds, and overlying masses. It thus applies to more or less intrusive and extrusive deposits. In a geological sense it may be replaced by descriptive words, such as 'irruptive,' 'interposed,' 'overlying,' &c, and in a mineralogical sense it is advantageously changed for 'basalt,' 'greenstone,' 'felsparite,' 'sienite,' 'serpentine,' 'discharge rock,' &c. (Macculloch On Rocks.)

TRAPA, a genus of plants of the natural family of Onagraceae, but sometimes appended to the Haloragaceae, sometimes formed into a distinct order, Hydrocoriates, water-nuts. It is named from being abridged from Calice-trapa, the low Latin name of an instrument called waltzels, furnished with four prongs, which was formerly employed to impede the progress of cavalry, but according to others is the name derived from the general custom of the Turks, in fighting, furnished with spines, and the species are commonly called water-caltrops, from the plants floating on the surface of lakes, and on that of slow-running waters. They are found in the temperate parts of Europe and of Asia, in India, Cochín-China, and China. The genus is characterized by having a 4-parted adherent calyx; petals and stamens 4; ovary 2-celled, with solitary pendulous ovules. The fruit is hard, mahogny, 1-celled and 1-seeded. The seed is large and abundant; the two styles are very unequal. The floating habit and clustered leaves easily distinguish these plants. The leaves under water are cut into capillary segments, and the petioles are tendril in the middle. A species of much greater importance than many which are more conspicuous or better known, from the large seeds of all consisting of pure edible feecuts. Trap naorus, the European species, is remarkable for its fruit with four spines, being of a blackish colour and large size, and its seed, which nearly fills it, being farinaceous and good to eat, whether raw, roasted, or in soups, and is somewhat like a chestnut in taste. It was known to the antients by the name of Tribulus. Pliny says (lib. xxx., c. 58), "About the south part of the Propontis, the natives esteem the nourishment of their meat." They used to be sold in Venice under the name of Jesuits' nuts, and are still to be found in the markets of the south of France and in Italy. They are good to be preserved by drying, and are sometimes found within the folds of the summer-cloth.

The Indian and Chinese species have each only two horns. The former is the Trapis bispinosa of Roxb. (Corom. Fl. ii. 254), with the nut having two opposite, straight, barbed, spinous horns, noticed by Mr. W. Jones under the Sanscrit name of Singara; it is commonly known all over India by the name Singara, both names having reference to its formed appearance. It is also found in the lake of Cashmer. In India the nuts are sold in all the bazaars, as their furmurous kernels are much esteemed by the Hindus. A species called by the same name, Singhara, forms a considerable portion of the food of the inhabitants of Cashmere, as well as of Mr. Foster that in his time it yielded the government a revenue of about 2,000L. Mr. Moorcroft mentions a similar sun as Runjit Singh's share from the tax on 96,000 to 128,000 neglects of this nut yielded by the Volier lake. So Mr. Vigne says, the Singhara, or water-hemp, is used by the natives of Cashmere as a very considerable article of revenue. In the month of December I have seen many dozens of boats, and several men in each, collecting the singhara. The roots are boiled and the root-meal of the two tops, and iron prongs are used in collecting them.

The Chinese species, or Trap bicornis, is distinguished from T. bispinosa by its two horns being recurved and very obtuse. It is carefully cultivated in India, and its place of origin is the Chinese Lin-ho; it is distinct from their Pi-tsi, or Scirpus turgidus, which
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TRAPANI, Trapani or Province of, comprises the west coast of Sicily, and is bounded on the north-east by the province of Palermo, and by that of Girgenti on the south-east, being separated from the latter by the river Belice, the antient Hypsa. The province is divided into three districts, Trapani, Mazzara, and Alcamo; and it includes a considerable territory. Trapani, the seat of the bishop, stands on the south side of the river Belice, which forms the boundary between it and Girgenti on the north-east. Another town bearing the name of Trapani is situated on the island of Levanzo, near the promontory of Mistra, on the coast of Trapani in February, March, and April, sailed down and exported. Sumach is also exported from Trapani. (De Welz, Saggio su i Mezzi di moltiplicare il Ricchezza della Sicilia.) The seamen of Trapani are among the best in Sicily. Trapani has a college of churches, and several palaces, among others that of the Monte Leone family. Six miles south of Castel Vetrano is the site of the antient Selinus, on the coast, with the ruins of several temples, consisting of extensive heaps of broken columns, capitals, and other fragments. Fragments of marble, alti-relivi of curious workmanship, and sculptures, are discovered in many parts of Selinus. 

SICILY, Antient History of, at the end.) The style of these sculptures, which are known by the name of Selinuntine marbles, is noticed under Sculpture. 4. About east miles of Castel Vetrano, on the island of Levanzo, is a fortress of 12,000 inhabitants, with a suburb called Rabat. 5. East of Selami, in the mountains, is Gibellina, with a castle and 5000 inhabitants. 6. Farther north is Calastamini, a town, 10 miles inland, with several churches. The best cheese in Sicily is made in its territory. 7, Proceeding towards the northern coast of the island is Alcamo. All this part of Sicily came earliest into possession of the Saracens, from whom most of the towns have derived their antient names. A few miles west of Alcamo, in the midst of a solitude, are the remains of Segesta, consisting of a fine Dorian temple in good preservation, the ruins of a theatre, and part of the city walls. On the neighbouring sea-coast, was formerly the port of Segesta, in the small town of Castellamare, with a fortress, and about 4000 inhabitants, who carry on some trade by sea, chiefly in corn. Castellamare gives its name to the deep gulf formerly called Sinus Segestanus. 8. Parata, an inland town east of Castel Vetrano, has about 10,000 inhabitants. 9. Near Trapani is the town of San Giuliano, on Mount Eryx, with about 9000 inhabitants.

The islands of Favignana, Levanzo, and Maretino, as well as the small island of the Aragonese and the small island of Cape Lilybaeum, one of which is the antient Motya, an early Phoenician and Carthaginian colony, belong to the administrative province of Trapani. The whole population of the province by the census of 1831 consisted of 173,297 inhabitants.

(Territoria, Statistica dell'Italia; Scasso Borrello, Descrizione Geografica della Sicilia; Paternò, Viaggio per le Antichità della Sicilia; Neigebar, Gemälde Italiens.)

TRAPAPU, a town on the N.W. coast of Sicily, is built on the site of the antient Drepanon, on a point of land projecting into the sea, and facing the island of Levanzo, which is ten miles west of it. (SICILY, of the Towns of the Trapani islands.) East of Trapani rises the Monte San Giuliano, the summit of the famous temple of Venus Erycina, consisting of some broken columns and part of the substructure. It was on Mount Eryx that Hamilcar Barca maintained himself for years against the forces till the end of the First Punic war. There is a recent work on Mount Eryx by Sammarinino e Salerno: 'Saggio storico, statistic, mineralogico, medico, botanico, sul Monte Eryxe, sua Città, e suo d'Intorno, Svo., Palermo, 1826.' Drepanon was a place of traffic from the oldest times on record, and its Greek name, 'Drepanon,' a scythe, express the form of the promontory on which it stands. There are however no remains of antiquity at Trapani, but on an insulated rock which stands at the entrance of the harbour is a small fort called Columbara, consisting of an antient tower, which was restored in the early part of the 18th century, according to the testimony of Fazello, the historian of Sicily. The harbour of Trapani is formed by nature, being an inlet of the sea between the promontory and the mainland, protected on the west by the rock above mentioned, but open to the brea. It is south-west wind, which is most dangerous on this coast. Trapani is one of the principal ports of Sicily, and carries on a considerable trade. One of the chief articles of export is salt, which is obtained by the evaporation of sea-water in the extensive salterns, or salt-pans, along the coast. Another article of traffic is tunny fish, which is caught in May and June in various tonsure, or established places on the coast north of Trapani and in the island of Favignana. The salt of Trapani is much esteemed, and is exported to Italy and to the ports in the Baltic. The tunny fish is pickled and sent to Naples and other parts of Italy. The coral fishery is another branch of trade. The boats from Trapani gather the coral along the neighbouring coast of Barbary, after which they worked in the town, from whence it is exported to the Levant, to England, the East Indies, and other places. A great quantity of anchovies are also caught along the coast of Trapani in February, March, and April, sailed down and exported. Sumach is also exported from Trapani. (De Welz, Saggio su i Mezzi di moltiplicare il Ricchezza della Sicilia.) The seamen of Trapani are among the best in Sicily. Trapani has a college of churches, and several palaces, among others that of the Jesus and Carmelites who are the most worthy of notice; a handsome town-house with a fine facade and adorned with the statues of Philip V. of Spain and of Victor Amadeus of Savoy, both kings of Sicily, seven palaces of the nobility, a royal college, an orphan asylum, several hospitals, a Monte di Pieta, and about 12,000 inhabitants, according to Neigebar and the Italian guide-books, though Balbi reckons its population at 24,000. The women of Trapani are remarked for their beauty and regular features. The town is enclosed by walls, and is defended by a fortress. The streets are wide and well paved with flag-stones.

(Scasso Borrello, Descrizione Geografica dell'Isola di Sicilia; Neigebar.)

TRAPELUS, Cuvier's name for a genus of Lizard which have the form and teeth of the Agamae [Agamae] but their scales are small and without spines. They have no pores on the thighs.

Example, Trupelus Aegyptius.
more promptly than those of the Chameleon; hence the 
French name of Le Changeant d'Espagne. Courier remarks 
that the young animal is entirely smooth; the adult has 
greater scales scattered over the body among the 

Mr. J. E. Gray places Trapaecus in the family Agamidae, 
between Agama and Stelloc. 

The revenues were enlarged in 1695, if 
meanings were parallel to one another: Hutton repeals this, but says it 
to be a trapezium, two (only) of whose sides 
parallel to each other. What the solid figure with 
trapezoid means we do not know; but the idea is never 
used, we omit all inquiry about it. Words however are so 
care in mathematical language, that it is a pity when 
become obsolete. If we were to suggest 
characters, we should propose that 
should be the general word for plane four-sided figures, parallelo-
and all; and that trapezoid should denote a four-
figure whose sides are not in the same plane. 
Perhaps this is what was intended by the solid figure of four 
sides, which is by no means unnecessary to state that 

TRAPEZUS. [TREHZONE.] 
TRAPP, JOSEPH, D.D., was born at Cherrington in 
1662, in the age of twelve years, at the Fadham College, Oxford, in 1685, took his degree of 
Faster of Arts in 1702, and was chosen a Fellow of his col-
lege in 1704. In 1708 he was appointed the first professor 
of poetry at Oxford, and at the expiration of his term of 
life he published the lectures he had delivered on the sub-
ject, under the title of 'Prelectiones Poeticæ,' in 3 vols., 
1718. Dr. Trapp was warmly attached to the Tory 
party in the government, and took an active part in the 
affairs of the time. He acted as manager for 
Sacheverell on his trial in 1710, and upon the Tories 
coming into power in the autumn of the same year he was 
appointed chaplain to Sir Constantine Philips, lord 
chancellor of Ireland. He was afterwards appointed chaplain 
Lord Bolingbroke, and wrote several papers in the subject. 

The Examiner in defence of his administration. He obtained 
the living of Dunlizey in Wiltshire in 1729, but resigned 
in the following year upon obtaining the vicarage of the 
clerical parishes of Christ Church, Newgate-Street, and St. 

carlisle's, Forster-Lane, London. In 1733 he was pro-

ced to the living of Harningham in Middlesex by Lord 

Trapp, a hard student, and published numerous 
works, which acquired for him considerable reputation in 
the literary world; 'Tottie,' which was published after 
his death, is very interesting. One of his best works is said to be 
't Notes upon the Gospels,' first published in 1747. He published several 
tracts, which he preached upon various occasions, and 
no numerous pamphlets against the Whigs, but these 
were generally without his name. His translation of 
Tirgo into blank verse, published in 1717, in 2 vols. 4to., 
generally succeeds in giving the meaning of the original, 
it is a complete failure as a work of art. His Latin 
Latin translation of 'Amoareae' and of Milton's 'Para-

The abbey, of, was founded in 1140 by 
De Trapp, the Prior of the Perche. It is situated in the department 

Of late years the ponds which abounded in the valley have 
been drained, and it is now healthy enough, but formerly it 
was the constant abode of sickness. La Trappe is the name 
which the valley has borne as long as it is known to have 
possessed a name, and is a greater blessing to the others.
menced his noviciate in the abbey of Pemegne, which was subject to the rules of the Strict Observance; in 1664 he took all the vows, in company with an attached domestic, who had taken the habit in his retreat from the world, and was confirmed abbot by Maurice Plumett, titular bishop of Ardagh.

His zeal and eloquence soon prevailed upon his associates to adopt as much of the ancient rigour of their order as he deemed possible in the altered circumstances of society. The community devoted themselves to the observance of strict silence, to hard labour, to total abstinence from wine, eggs, fish, and all seasoning of their simple diet of bread and vegetables. Excited by his representations, the monks wished to bind themselves at once by a vow; but their experienced and judicious superior refused to permit this until they had ascertained experimentally that the discipline which he proposed and such mortification as the body was permanent. This anxious care to save his flock from the entanglement of rash vows was not the only occasion on which the Abbé de la Trappe showed that judgment held divided empire in his mind with imagination. His advice was in request at the counsels of his order, and even at the worldly-minded court of Rome. Bossuet took pleasure in retiring to La Trappe and holding converse with its abbot. In 1686 De Rancy resigned his office of superior; he survived till the 27th of October, 1700.

The reputation which the abbey acquired under the author of the new reform continued undiminished till the Revolution. There were in all ten abbeys under the re-founded scheme: 1. Armand Jean de Rancy, regular abbot from 1694 to 1686, when he resigned: died in 1700, aged seventy-four. 2. Zoizime I. (his secular name was Pierre Foisal), born at Bellesme: held the office ten years, and died in 1696, aged thirty-five. 3. François Armand Gervaise, born at Paris: resigned his charge in 1698, after holding it two years: the year of his death is uncertain. 4. Jacques la Cour, born at Soissons: resigned in 1713, and died in 1720. 5. Isidore (his secular name was Maximilien Dannetière), born at Tournai: died in 1727, at the age of sixty-six. 6. François Augustin Gouche, born at Eu, died in 1724, at the age of fifty-two. 7. Zoizime II. (Hurel), born in the French Vexin, died in 1747, at the age of seventy-seven. 8. Malachie Brun, died in 1746, at the age of seventy-seven. 9. Theodos Chambon, appears to have died at the close of 1783. 10. Pierre Olivier, was elected in January, 1784, and was the head of the community when all religious orders were suppressed in France.

The Trappists having been involved in the common suppression of the religious orders, notwithstanding the petition made to the government by the community in their favour only four or five availed themselves of the opportunity of returning to the world. The rest, under the guidance of Dom Augustin (his secular name was Lestrangé), sought and found a refuge in a valley of the Swiss canton of Friburg, to which they gave the name of Val-Sainte. Here the brethren agreed to render still more strict the reform of the Abbé de la Trappe. These additional severities consisted in, 1. the abandonment of separate cells for each individual living in company with mattresses; 3. shortening their time for sleeping by one hour; 4. restricting themselves to water for their drink; 5. increased strictness of their fasts; 6. three additional hours of labour every day; and 7. the prolongation of their ceremonial devotions. When the French government suspended them, the Trappists fixed before them; but after shifting their place of residence for some years, they were allowed to return to Val-Sainte. Bonaparte showed, on his first accession to power, an inclination towards them. He endowed a house of Trappists on Mont Genève with 30,000 francs per annum; and another at Corvans, near Genos, with 10,000, but a dispute which he had in 1811 with the superior of Corvans about the water for the fountains led to the restoration of the Bourbon, the Trappists were allowed to return to France. They contrived to purchase the site of their dilapidated monastery and some of the adjoining fields, but the extensive forests, in the innermost recesses of which they are situated, remain the property of the state. Complaints were raised against the Trappists by some of the French bishops, and Dom Augustin was obliged to return, with success from his mission, but was attacked at Lyon by a complaint, which terminated fatally on the 18th of July, 1827. He left in tranquillity the ordure which his skill and courage had piloted through the Revolution. The decorations of the Royal establishment, a number of the Trappists settled at Aigues-Belles, in the diocese of Valence: the brethren who had emigrated to America returned and settled at Bellefontaine in the diocese of Quebec, where he who had found asylum in England established themselves at Melleray, in the diocese of Nantes. The original monastery of La Trappe is called, by way of distinction, La Grande Trappe de Persan. In the year of August, 1833, the new church and monastery were consecrated by the bishop of Stéz. The monks enjoy much of the reputation of their predecessors; and their services as physicians and (notwithstanding their curtailed means) as almovers to the penury of the surrounding districts entitle them to the reputation.

(Déscription de l'Abbaye de la Trappe, Paris, 1670; Le Trappe missionnaire, Paris, 1834.)

TRAIE (TRAI), a province of Portugal, so called from its being situated beyond the mountains of Xerez ao, el-Maraon, which separate it from the province of Ente Minho e Douro. It extends 22 Portuguese leagues from east to west, and 15 from north to south. It is divided into four parishes, named Mirandelo, Balão, Sorra corvo, and Villa Real; and contains, besides the capita' cities, 15 large 'villors' or towns, and 260 'fuegos' or fire. It is watered by the rivers Sabor, Tuela, Tarneja, and many less considerable streams. The soil is generally barren and unproductive, with the exception of the valley which are highly cultivated, and yield abundant crops of oil, corn, and a large amount of wine.

TRAUE (TRAU). A deposit of volcanic sand and scoria thrown out from the Eftp volcano, and accumulated in valleys and old lakes under the influence of water is the designated. It is equivalent, or nearly so, to the puzulana of the Neapolitans. (Lyell's Principles of Geology.)

TRAXEMENIKA, LAKAIN [TRAXEMENIANE LAIKAI, [TRAXIMENOS].

TRAU is the chief town of a district of the same name in the circle of Spalatro, in the Austrian kingdom of Dalmatia, the area of which is 1,962 square miles, and the population (in 1832) 17,054 Roman Catholics, and 427 or united Greeks. Trau is built on a small island, which is connected with the continent by a wooden bridge fifty paces in length. On the other side there is a channel 30 feet deep, and when it and the island are connected by a mole, with a drawbridge to allow ships to pass, the numerous coasting vessels preferring this channel to the open sea. Trau is an old ill-built town, with narrow streets, and several small hills rise above the town. It has a handsome Gothic cathedral, six other churches, three convents, and an hospital. The ancient and feudal and fortifications are now in ruins. A bishop and chapter, under the archbishop of Spalatro, reside here. There is a small pretty good harbour, which is now no longer frequented. The inhabitants, about 3000 in number, have a pretty considerable trade in the produce of the country;—wine, olives, figs, almonds, and other fruits; also in fish. The trade of the islands in length, produces the above fruit in great abundance. (Die österreichische Monarchie, anonymous; Blumenbach, Gerichte der österreichischen Monarchien; Stein, Geography.)

TRAVELLERS' JOYS.

TRAVEMÜNE, a small seaport of the Baltic, in the territory of the free Hanseatic city of Lübeck, is situated in 53° 58' N. lat. and 10° 50' E. long., at the mouth of the river Trave (its name importes), about ten miles from Lübeck and forty-two from Hamburg. The river Trave is 650 feet broad, and has sufficient depth of water for the largest merchantmen. The town lies on the north-west bank of the river, and has a wall and moat on the land side. There are 1200 inhabitants, who are for the most part fishermen and pilots. No painful accident can make the harbour secure and convenient. A lighthouse, 120 feet high, which is visible at the distance of 35 miles,
stands on a sand-bank near the coast of the Baltic. Trav- 
emile is much frequented in the summer for the benefit of 
sea-bathing. The importance of this small town has been 
much increased of late years by the establishment of 
steamboats between it and St. Petersburg. By this means 
the mails from Russia, which used to come all the way by 
land, and were a fortnight or longer on the way, now 
arrive at Lübeck in three days and a half or four days, and 
require but from five to seven days for the voyage of Hamburg in a week, instead of 
eighteen days or more. 

(See, Ansichten von Lübeck; Stein, Lexicon; Von 
Schlieben, Die Deutschen Bundesstaaten.)

TRAVESARI, AMBROGIO, called also Ambrosio 
Camaldulensis, a great scholar and public character of the 
fifteenth century, was born in the village of Patrico near 
Forli, Italy, in 1416. So far as his family is concerned, he 
was a member of the Traversari, who once ruled over 
Ravenna. At fourteen 
years of age Ambrogio entered the order of the Camel 
dulenses at Florence. He is said to have studied Greek 
under Francesco Barbaro, Leonardo Giustinian, and other 
learned men and patrons of learning of that age. When Cosmo 
and his brother Lorenzo the elder were in banishment at 
Venice, who was in love with Laura, whom he often 
visited, and he speaks of them in his letters with 
esteeem and affection. He instructed several pupils, and 
among others Giannozzo Manetti, who became a dis 
tinguished scholar. Travessari travelled much for the 
affaires of the Church, and studied under the guidance 
of his 'Hodeasponicon,' which is a description of what he 
had seen, containing many particulars concerning the lit 
urgical history of that time, and the various libraries then 
existing in Italy, which was published at Venice, 1518. 
He also collected valuable MSS. which helped Cosimo to form the public library in the 
convent of St. Marco, together with the collection of 
Niccolo Niccoli and of Persi and Salutati. In 1435 
Pope Eugenius IV. sent Travessari to the stormy 
council of Basle, where he exerted himself with 
much ability in favour of Eugenius, and was instrumental in 
withdrawing the learned Cardinal Cesarni, the president of the council, who suddenly 
left Basle and repaired to Ferrara, whither the pope had 
transferred the council in January, 1438. Travessari was sent 
from Basle into Germany on a mission from the pope to 
the Holy Roman Emperor, and it is said that he was 
deputed to Venice to receive the emperor Palaeologus and the 
patriarch of Constantinople, and to conduct them to 
Ferrara, whence the council was soon after removed 
to the imperial court, but in the interval had declared 
its independence of the emperor, and proceeded to 
interpose between the Greeks and the Latins, and he had 
the satisfaction of seeing the reunion of the two churches. He 
soon after died at Florence, in October, 1430. He left 
Latin translations of many Greek works, especially of 
ecclesiastical writers, such as Chrysostom, Basilus, Ath 
anasius, Ephrem Syrus, Johannes Climachus, and others, 
of which, as well as of other inedited works of Travessari, his 
biographers Mehus, Castani, Giannini, and Zeno have given 
excellent accounts. It is said that Travossari's positions in the 
Church, dedicated by him to his friend Cosimo de' Medici, 
were printed at Venice in 1475. Some of his Orations delivered 
in the council of Basle are also printed. His numerous 
letters were collected by Father Cassali, and published 
with the addition of learned notes and a biography of Trav 
ossari, by Lorenzo Mehus: 'Travessari Ambrosii Episcopi 
Latini et alicue ad ipsum, curante P. Cassali, em 
Ambrosii Vita, studio L. Mehus,' 2 vols. fol., Florence, 1579, 
an important work for the literary history of Italy 
during the fourteenth and fifteenth centuries.

Tiraboschi, Storia della Letteratura Italiana; Lombardi, 
contemporary of Tiraboschi.

TRAVESARY, in Law, is a contradiction of some matter 
of fact alleged in pleading by the opposite party. It 
ought to be expressed words and not argumentatively. Generally 
all matter of fact, that is material, ought to be either 
confessed or denied. He who does not deny a fact, or 
acknowledge it to be true, as to one particular time and place, or confesses and 
P. C. No. 1573.

avoids in one respect, he ought to traverse it as to all other. 
Otherwise what is materially alleged will be taken to 
be admitted. But matter of law when not connected with 
fact ought not to be traversed, nor should matter of record, 
or matter which is not triable, for the object of a 
traverse is to raise an issue for the decision of a jury. 

Traverse of an immaterial fact, or of a mere supposition, 
or of implication, is bad, for it is not an answer to 
the question. For the traverse of an immaterial fact is 
bad, as, where, in an action for stopping three lights, the 
defendant traverses the stopping of all three, for the 
action would lie although he stopped only one. It is also bad if the 
party which is not triable is materia for traverse, 

Thus, a traverse is tendered as to a material point by one party, the 
other must accept it; he cannot waive it and tender 

another traverse. (Com. Dig.; tit. 'Pleader, Geo. I.; Sec.) 

In criminal pleading traverse of an indictment is the 
taking issue and denying some material point in it. Not 
guilty is a general traverse, which throws on the prosecutor 
the necessity of proving all the material facts. 

By the common law, the defendant in a case of misde 
meant, might, or the plundering of the king's land, 

was not to traverse the trial to the next sessions or assizes; but now, in all 
cases except those for the non-repair of bridges or high 
ways, he must, if he has been in custody or on bail twenty 

days, pay the same charge, plead and be tried immediately. (1 Geo. IV. c. 4.)

TRAVESARY TABLE, a table used in navigation, in 

what is called traverse sailing, which is merely the sailing 

on different points of the compass, for short distances, in 

the open sea. It is used in the sea-room cases, where 

being a small and handy trigonometrical canon, as 

follows:—The angle a ship makes with the meridian is 

the angle of the course; the distance run in that course 
is the right-angled triangle, the hypotenuse of whose 

is the distance run from it by the ship. The traverse 

table is a table of double entry, into which, 

going with the angle of the course and the distance run, 

we find in two columns the corresponding departure, and 

length of the side called difference of latitude. Thus, in 

Garrard's Tables, London, 1759, which are among the 

largest of traverse tables, we find all units of distance run, 

from 1 to 300, with every angle of the course which is a 

multiple of 10°. For instance, at a course of 24° 40' 

with a distance run of 108° 09', the departure and 

the side called difference of latitude, are 108° 09' and 235° 37' for the 

side called difference of latitude: meaning that a 

right-angled triangle with an hypotenuse of 235°, and one of the 

angles 24° 40', have their opposite sides, whose sum is 

the angle and side 235° 37'. Such a table as this is 

overlooked by many who might use it with profit, simply 

because it seems only a technical table of navigation. 

Sometimes it is made only to quarter points of the compass 

for the angles, with various limits of distance.

TRAVESIES, in Fortification, are usually masses 
of earth which are raised at intervals across the terreplein of 

a rampart or across the covered-way of a fortress: their 

purpose is to prevent a battering ram or projecting 

parapet, on its interior side, for the purpose of securing 

the defenders against a fire from the ground in their 

rear, is called a parapet. 

Parapets are placed along the parapets, in order to 

prevent the avoidable safety of the parapets, and also 

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the interior side of the glaci, is a strong gate, or barrier, which is closed in the event of the defenders being obliged to retire from one traverse to the next, or to abandon the covered-way entirely.

As, at the time of an assault being made at the salient part of a covered-way, the defenders might be bayoneted in attempting to retire along the passages between the traverses, the bayonets being the only help (without being hampered by the enemy), it has been recommended to form other passages about four feet wide between the opposite extremities of the traverses and the top of the counter-scarp: in this way, the enemy may be driven up without molestation, a line of palisades is planted from each traverse to the next along the middle of the covered-way, in addition to the line which is always planted along the foot of the interior slope of the glacis. The traverses in this situation are usually above eighteen feet thick at the upper part, in order that they may not be immediately destroyed by the heavy artillery of the enemy; but the French engineers recommend that all the traverses in the covered-way, except those which are close to the re-entering places of arms L, L [Fortrification], should not exceed twelve feet in thickness, as it may be advantageous for the defenders to destroy them in the event of the enemy endeavouring to protect himself by them during the operation of cutting a trench across the covered-way for the purpose of making a descent into the ditch of the fortress.

Since the covered-way being attacked by main force, the traverses are frequently abandoned without resistance, Boussard proposes that they should be made in the form of redana, and, have, in the thickness of the parapet of each face, a small gallery with loop-holes, through which, as soon as the top of the traverse, a fire of musketry may be directed into the covered-way. The traverses are to be protected by fraizes planted on the exterior slopes; and it is supposed that the fire from the two tiers of mensalis will entirely prevent the success of an attack which is not carried on by the regular process of sapping. The gallery in the traverse is to communicate with the magistral gallery of the countermine, so that the defenders, if they be compelled within the enceinte, may pass through the latter gallery, and through that which is formed in the caponniere, without being observed by the enemy.

TRAVERTIN, the Italian term for concretionary limestone produced from springs holding carbonate of lime in solution. It is not exactly equivalent to the term 'tufa,' which expresses the loose and porous surface deposit from calcareous springs, while traver tin applies to the more compact, less frequently found in lakes on hill sides. Waters charged with carbonate of lime abound in many countries, and the production of tufa is an extremely common phenomenon; but the accumulation of tufa in country appears to be often associated with centres and lines of springs, and is accompanied with great natural features of the strata. A large proportion of the most splendid edifices of antient and modern Rome are built of travertin derived from the quarries of Ponte Lusco. Lyell, 'Principles of Geology,' book ii., chap. iii., may be consulted for a large and interesting collection of facts relating to the accumulation of these calcareous deposits.

TRAVEL. [Burlesque; Parody.]

TRACEL. [Melaners.]

TREAD-WHEEL. [Transportation.]

TREASON. This term, in its legal signification, is derived from the French 'traitre,' and in conformity with this derivation, the offences designated by it in English law always contained the notion of treachery, or a breach of that allegiance supposed to be due from an inferior to a superior. Thus petit-treason was the murder of a husband by his wife, or a master by his servant, or a bishop by his subordinate in the church; and high treason consists in an attack upon the king as the political head of the state. The former of these two kinds of treason was placed in another class of times by the statute of Geo. IV., c. 2, which enacts that 'every offence, which, before that act, would have amounted to petit-treason, should be deemed to be murder only, and no greater offence.' The only act now known to be treason under this term is high treason, which, as it consists of numerous acts and circumstances, constructively and remotely, as well as immediately, affecting the safety of the king's person, cannot be accurately described by any simple phrase.

In early periods of the history of England, the law upon this subject was extremely vague and uncertain, in consequence of the great variety of acts which were held to constitute high treason as tending to diminish the power, or diminish the dignity of the king, or to destroy, or to kill the king's father or brother, or even his messenger, refusing to answer in the king's courts, and summoning an English subject to appear and defend himself against charges of high treason. From this arises the difficulty of determining what shall be acts of treason. (3 Inst. 7; Hawk. 'Plays of the Crown, b. i., c. 17.) Indeed, immediately before the date of the statute of treasons, a knight was indicted for high treason in usurping royal power within the kingdom. In the trial an alternative was brought before the jury, namely, that the defendant should be put to the horse and detained him until he paid 50l. (Hale's 'Plays of the Crown, vol. i., p. 80.) From these and many other instances which are to be found in law books, it appears that almost every act that could be in any way considered as a breach of the allegiance due to the king, or as obstructive assumption of royal authority, was deemed to be high treason, as an 'acccrocchement of royal power.' The statute of treasons reduced to a single intelligible definition of the crime of treason, and, notwithstanding the total change of national habits, still continues after the lapse of five centuries, to be the governing law on the subjects of this law understood in the comparatively rude times in which it was made, the inadequacy of its provisions to meet the complicated relations of a more refined state of society has frequently required supplementation; but it has been the cause of those subtle and forced interpretations in simple language, which have introduced scarcely less uncertainty and injustice into this department of the criminal law than prevailed before its enactment.

The several acts and circumstances constituting high treason by the 'Statute of Treasons' are as follows:—

1. Compassing or imagining the death of the king, the queen consort, or their eldest son and heir. 2. Violating the king's companionship (by way of treason common), or the king's eldest daughter unmarried, or the wife of the king's eldest son and heir. 3. Lying in wait against the king within his realm. 4. Being adherent to the king's enemies, giving them aid and comfort in his realm or elsewhere. 5. Counterfeiting the king's privy seal. 6. Counterfeiting the king's money, or knowingly bringing false money into the realm counterfeit to the money of England, to merchandise and make payment. 7. Being an active and voluntary excited and designing, as a fact in law, an enterpriser, or chancellor, treasurer, or the king's justices of either branch, justices in eye, justices of assize, or any other justices assigned to hear and determine, being in their places doing their offices. As several of the offences enumerated are acts of the mind, and consist in intending the act, the statute declares that in such cases the intention, in order to come within the meaning of the law, must be manifested by some open or overt act done towards the accomplishment of the traitorous intent. This provision, although by its position in the statute it is apparently limited to the offence of adhering to the king's enemies, has been held to apply to all the treasons before mentioned. (Hale's 'Plays of the Crown, vol. i., p. 106.)

The word 'king,' used in the first clause of the statute describing the offence of compassing the king's death, comprehends the case of a queen regnant; as she is invested by the constitution with full royal authority, and is entitled to the allegiance of her subjects. But the husband of the queen regnant is not within the words or meaning of the statute. The precise meaning of the words 'compass' and 'imagine' in this clause of the statute has been the subject of some discussion. Mr. Lord Brougham defined upon their signification by collecting the instances in which the same language has been used in writings contemporaneous with the statute; and although attempts have been made to give them a more confined signification, it is clear that they mean nothing more than 'attempt.'
convicted upon the oath of two lawful and credible witnesses, shall be adjudged a traitor, and suffer as in cases of high treason. It was no doubt the intention of the legislature that this statute should put an end to all artificial contrivances of the state of felony III.; nevertheless the practice of resorting to these forfeitures for any other than for treason, which has been continued, and sanctioned by the approbation of the judges in several subsequent prosecutions for high treason. (Sixth Report of Commissioners on Criminal Law, p. 16.)

The second kind of treason declared in the Statute of Treasons is the violation of females of the royal family, and was obviously intended to preserve the purity of the succession to the throne. With a view to this design, a statute has been held to apply to a criminal connection by consent as well as to a forcible violation. It is worthy of remark, as one of the numerous circumstances showing the inapplicability of this antient law to modern times, that a queen regnant, whether married or single, is not within this clause of the statute.

The third species of treason above mentioned is 'levying war against the king in his realm. It amounts to treason under this clause of the statute to take arms against the king, not only with the object of destroying him, but where it is intended by open violence to reform religion or the laws, or to remove evil counsellors, or other grievances, without any attempt to depose the king. (Hawkes's Pleas of the Crown, b. i., c. xvii., s. 25.) The plain words of this clause of the statute have been still more extravagantly extended by legal construction than those of the clause relating to the king's death. Thus it has been held that where the object has been to destroy all property of any particular class, such as to pull down all meeting-houses, or to destroy all inclosures, have been held to be treason in all who join them, by reason of the generality of the description of inclosures. (Luders, On Constructive Treasons: Sixth Report of Commissioners on Criminal Law, p. 15.) This doctrine, however, has been questioned and in recent times; and to the extent formerly contended for, would probably not be countenanced by the judges at the present day. (Luders, On Constructive Treasons: Sixth Report of Commissioners on Criminal Law, p. 15.)

The fourth kind of treason mentioned in the Statute of Treasons is the adherence to the king's enemies. The enemies to which it is referred have been pointed out to be the king of England is at war, and who owe him no allegiance; and therefore an adherence to British subjects in a state of rebellion against the king will not constitute treason, although allegiance has been owing to the king in the article of levying war. This kind of treason must, like compassing the king's death, or levying war against him, be evidenced by some overt act, such as putting together or collecting a strength, or supplying arms, or giving information to an enemy.

The fifth kind of treason mentioned in the statute of Treasons is counterfeiting the king's seals; which offence was continued as a capital treason by the Forgery Consolidation Act, 31 Geo. IV. and 1 Will. IV., c. 66. The punishment of death being however repealed in all cases of forgery excepting the forgery of wills and powers of attorney, by the stat. 2 & 3 Will. IV., c. 123, the offence of counterfeiting the royal seals in the annexed sense was, although punished as treason in the article of levying war. This kind of treason must, like compassing the king's death, or levying war against him, be evidenced by some overt act, such as putting together or collecting a strength, or supplying arms, or giving information to an enemy.
Besides the several treasons above enumerated, a large class of offences has been created by various statutes passed from time to time in the reigns of Elizabeth and James I., with the object of strengthening Protestant ascendancy at the expense of the designs of Roman Catholics. But as many of these statutes have not been the subject of prosecution for nearly three centuries, and many others have never been enforced at all, they may perhaps be considered as virtually void, and do not require to be particularly noticed in this article. (Sixth Report of Commissioners on Criminal Law, p. 35.)

With a view to diminish the peculiar disadvantage under which a person charged with treason was supposed to labour in having to defend himself against a prosecution in which so powerful an adversary as the crown was interested, several privileges as to process, evidence, and trial had been granted to persons accused of treason. The first of these privileges is declared by the stat. 7 Will. III., c. 3, s. 2. to no person whatsoever shall be indicted, tried, or attainted of high treason or of misprision of treason, but upon the oaths of two lawful witnesses, unless the party indicted shall willingly, without violence, in open court confess the same. And by the third section of the same statute, it is declared that if two or more distinct treasons of divers heads or kinds shall be alleged in one indictment, one witness produced to prove each separate treason, and if another witness of the other of the treasons, shall not be deemed to be two witnesses to the same treason within the meaning of the statute. The same statute of the 7 Will. III., c. 3, also enacted that it should be lawful for any treason (except an attempt to assassinate the king) unless the indictment be found within three years after the offence committed. Moreover the prisoner is to be furnished with a copy of the indictment five days, and a copy of the panel of juries two days, before the trial. He is to have the same compulsory process to enforce the attendance of his witnesses as was at the time of the statute exclusively applicable to the prosecutor's witnesses; and he is to have full defence. It is further directed by the statute that no person who has constitutional privileges of abode in the kingdom, nor the owner or person who deposited them is unknown, the property becomes vested in the king by virtue of his prerogative. But if the owner is known, or is ascertained after the treasure is seized, the property shall not pass to the king. The civil law gave treasure found in general to the finder; but if found accidentally in another man's land, was half given to the finder, and half to the owner of the land, and if found in the land of the emperor, it was to be equally divided between him and the finder. (Just. lib. ii., tit. i., § 39; Cod., lib. x. tit. 13.) Grotius says that the title of the prince to treasure-trove had in modern times been so generally established in Europe as to have become quasi gentium (De Jure Belli et Pacis, lib. ii., c. v. § 7). The law of England adopts the definition of treasure-trove from the civil law as 'ventus deposito pecurur cujus dominus ignoratur' (Paulus, lib. xxx., § 1), and to entitle the crown to the property, it must appear to have been hidden or deposited by some one who at the time had the intention of reclaiming it. Whenever therefore the inventor is known, the property must pass to the owner. Thus a found property, for instance, where the property has been found in the sea, or in a pond or river, or even openly placed upon the surface of the earth—it belongs to the finder. In England the possession of treasure-trove from the king was deemed to belong to the king, and the queen, as charged with the revenue and the return of its use to the crown, is deemed punishable by fine and imprisonment. (Blackstone's Commentaries, vol. i., p. 289.)

**TREASURY**

A department of government which has control over the management, collection, and expenditure of the public revenue. It is the business of another department, the Exchequer, to take care that no issues of public money are made by the Treasury without the authority specially enacted by parliament. What money is paid on account of the public service, this is almost always done on the authority of a Treasury warrant; and in other cases the countersign of the Treasury is requisite. The Board of Treasury consists of the prime minister and the chancellor of the exchequer. The real office which the Premier holds is generally that of first lord of the Treasury. There are also four junior lords, who have usually seats in the House of Lords, and who are appointed for this purpose by the Treasury. The departments immediately subordinate to the Treasury are the boards of customs, of excise, of stamps and taxes, and the post-office, the various officers in which are chosen by the crown, and who are appointed by the lords of the Treasury; and this constitutes an important department of the management of the ministry. The control of the Treasury over the different boards of revenue and other departments is said to be much less complete now than it was fifty years ago. Constitutionally, its authority ought to be paramount. The
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duties of the board of Treasury are heavy and multifarious, all exceptional cases in matters relating to the revenue being referred to it. Previous to 1839 the annual parlia-

mentary expenses of the Treasury were about £90,000, but by

the act of 1839 the Treasury was enabled to raise £100,000

a year for the purposes of the board, and the expenses of the

Treasury were reduced to £40,000. But even after a treaty has been ratified, it is really

binding only so long as the contracting parties choose to adhere to it. It is plain that this must be so, from the

existence of no superior authority which can enforce the abid-

ance of its engagements by any of the parties. Various

contrivances indeed have been resorted to in different ages

with the view of strengthening the moral bond constituted

between independent political societies by a treaty; not to

speak of oaths in war, and an assumption of mutual pre-

clusion of the censures of the church, and other religious or

eclesiastical appliances; formerly sometimes pledges were

deposited, and forfeits established; sometimes individuals

were named as guarantors for the observance of the con-

tract; in case of its being violated by their own sovereign or feudal

superior, were thereby absolved from their allegiance and

placed under an obligation to assist with all their means the

party seeking redress. But even in such cases, guarantees that can be taken

are found to have really much effect; the maintenance of a

relationship will always principally depend upon the interests or

the inclinations of the parties to it. If the parties should quarrel and go to war, the existence of such guarantees is not

enough to confer any rights or advantages to either of them in the contest which it would not have enjoyed although there had been no

treaty. The occurrence of actual hostilities, we may suppose, will be

increased by treaties of alliance or commerce, or of whatever sort, is

to annul all such previously subsisting arrange-

ments; and they must be formally entered into anew after the

peace, if it be desired that they should come again into operation.

It is not however to be supposed, from what has been

said, that nations will not ordinarily feel themselves to be

in some degree restrained even by the moral obligations

which a treaty imposes upon them, although there is no

power that can enforce their observance. A government

would at least suffer in that unimportant element of

strength, its character, by lightly casting off the bond of

a treaty into which it had solemnly entered. It has been

customary accordingly in all such cases for explanations to

be put forward by which it is attempted to be made to

appear either that it is the other party which has really

violated its engagements, or that the abandonment of the

treaty has been unavoidable, or otherwise justified by cir-

cumstances. Such apologies, having any plausibility, are

not always to be found when they are wanted without

some trouble; and this difficulty may in some cases

sustain a treaty for a period of years, and prevent it from

gaining a footing. Still it is always possible for a country

which desires to break with another to find some pretence of

quarrel, even apart from any of the engagements which it

has entered into with each other, and in each of those cases

the arguments therefore are for the most part only to be depended

upon so long as they are for the advantage of the one

party as well as of the other. Hence the best and most

durable treaty is always that which is the fairest and the

most equal. But the main purpose and utility of a treaty, after

all, is not that it may secure certain advantages to

either party, but that it makes clear and fixes those rela-

tions between the two which would otherwise remain ob-

jective and subjective, and which are the object of discus-

sion or controversy. It will be found that all human

laws and enactments which have any considerable sta-

bility are, in so far as they relate to matters of prin-

ciple as distinguished from mere expediency, rather declaratory than anything else: they establish certain things, but these things for the most part have

existed in another way before they were so established;

they were ideas in the general mind, or they were cus-

tomary, imperially observed, and so became established by
decency, which the law only confirms and proclaims.

But the advantages of this proclamation, whether by a law

or by a treaty, are immense: independently altogether of the

sanctions by which the law or the treaty may be enforced,

or sought to be enforced, the mere effective of the mere

distinct announcement which either makes is to substitute

all the inestimable conveniences of certainty and order, in

the place of doubt and confusion.

In so far as what is called the law of nations is
or determined, and not mere matter of argument and speculation, it is, with the exception only of a few usages of ancient origin, no longer a question of one state, but of one system, or a chain of nations, of which the various nations of Europe and the states founded by European colonies in North and South America. It is remarked by the Abbé de Mably (in his Principes des Négociations), that from the decline of the house of Charlemagne to the end of the sixteenth century, the history of Europe is a series of wars and wars of religion, and the other acquisitions from the emperor's territories it had made during the war beyond the bounds of Alsace, and also the cities of Friburg, Briash, andolphinberg, and consented to re-establish the duchy of Lorraine. Holland and Flanders were restored to her. The emperor ceded to France the territory of Italy, which it retained as being dependencies of Charles-mon Manbeuge, and other places which it continued to hold under preceding treaties. All conquests made during the war were restored by the Treaty of Utrecht, and France acknowledged William III. England was engaged not to furnish any succours to James II. By a treaty previously concluded with the duke of Savoy (at Turin, 29th August, 1696) France granted to that prince the fortress of Piemont, and the privilege of royal honours for his ambassadors.

1713. Treaties of Utrecht: concluded by France with Great Britain, with Portugal, with Prussia, with Holland, and with the duke of Savoy, 11th April; by Great Britain and the duke of Savoy, 13th August. The arrangements made at Utrecht, the Savoy, 13th August. France acknowledged Queen Anne as queen of Great Britain, guaranteed the succession of the House of Hanover, and withdrew its protection from the Pretender; restored Newfoundland and Hudson's Bay, and ceded New Amsterdam, Jamaica, and St. Kitts, for the purpose of demolishing the fortifications of Dunkirk; and engaged that the crowns of France and Spain should never be united in the same person. France consented that both banks of the river Rhine should be held by the Rhineland to Portugal; it being agreed that there should be no commerce between the inhabitants at the mouth of that river and the Portuguese at Cayenne. To Prussia France ceded all the Spanish possessions, renounced all claims to the principality of Orange. France also acknowledged the regal title of the king of Prussia, which had been assumed by Frederic I, in 1701. As fundamental articles it was stipulated,—1. That the kingdoms of France and the empire should not be held together; 2. That no part of the Spanish Netherlands should ever be ceded or transferred to France, or to any prince or princess of French extraction. To carry out these principles it was arranged that Philip V. (grandson of Louis XIV. of France), being recognised as Philip V. of Spain, should renounce all right to the crown of France, that, failing his descendants, the crown of Spain should go to the family of the duke of Savoy, now recognised as king of Sicily, and that the Spanish succession to the French crown be represented by the Spanish crown, and that all the conquests which had been made by the Spanish crown should be restored to France, including the provinces of the Low Countries, with their towns and cities, and the title of king of the Low Countries. Justice was to be done to all parties, and the rights of the Low Countries were to be respected. The treaty of Utrecht was concluded by the treaty of the Pyrenees, the treaty of the Pyrenees was concluded by the treaty of Westphalia, and Westphalia was concluded by the treaty of Utrecht.
tions and duties, and reciprocity of commercial privileges in all respects, between the two countries) had been made conditional.

The Treaty of the Quadruple Alliance: signed at London, 23rd August, between France, the emperor, Great Britain, and Holland; and to the duke of Savoy, 10th November; and by the king of Spain, 25th January, 1738. The treaty was to the withdrawal of the king of Spain from the arrangements made at the peace of Utrecht, which had left Philip V. and the emperor still unreconciled upon the question of the Spanish succession. The emperor now renounced all claim to the crown of Spain; granted to him by Philip's death, and his second marriage; the reversion of the grand-duchy of Tuscany, and of the duchies of Parma and Placentia, to be held as fiefmale of the empire, after the failure of the immediate right of conquest of France and of Savoy; and of the possession they then were; and ceded Sardinia and the regal title to the duke of Savoy; Philip of Spain renounced his claims to the Low Countries and to the possessions of the emperor in Italy; and both he and the duke of Savoy renounced, in favour of the emperor, their rights to Sicily, which Spain had recently conquered from Savoy.

1738. Definitive Treaty of Vienna: concluded between France and the emperor, 8th November; and assented to by Great Britain, 10th November. It terminated by the withdrawal of the kings of Spain and of the Two Sicilies, 12th April. The elector of Saxony was acknowledged king of Poland by the title of Augustus III.; his rival Stanislaus (the father-in-law of Louis XV.) was to be king of Poland, as the exception only of the regal title, and receiving in exchange the duchies of Lorraine and Bar (to be united however to France on his death, which they accordingly were in 1766). The grand-duchy of Tuscany, whose last sovereign of the house of Medici had died in 1737, was given to the duke of Lorraine. The kingdom of the Two Sicilies, with the ports of Tuscany, was guaranteed to its actual possessor, the king of Spain's son, Don Carlos, who on the death of his father surrendered the duchies of Parma and Placentia to the emperor the duchies of Parma and Placentia. The emperor also recovered all the places that had been taken from him in the provinces of Milan and Mantua; except only the districts of Novara and Tortona, which, together with Campi Maggiore and other small fiefs, he ceded to the king of Sardinia. Finally, France guaranteed the decree, or Pragmatic Sanction, published by the emperor Charles V.I. in 1718, by which he declared, that in default of issue male of his own body, all the Austrian dominions should descend to his daughter Maria Theresa, who had married Francis, formerly duke of Lorraine, now grand-duke of Tuscany.

1748. Treaty of Aix-la-Chapelle, signed by France, England, and Holland, 18th October; the preliminaries having been previously acceded to by the queen of Hungary (Maria Theresa, whose husband was now emperor, and regarded as the successor of her father, the Holy Roman emperor, as the only legitimate member of the line of Francis I., the last grand-duke of Modena, the king of Spain, and the republic of Genoa. All the preceding treaties, from that of Westphalia inclusive, were renewed, and generally confirmed; and all the conquests made during the war, which had begun in 1741, were mutually restored. Thus, France restored the Low Countries to the House of Austria; Bergen-op-zoom and Maastricht to Holland; Savoy and Nice to the king of Sardinia; and England restored the Breton to France. The dukedom of Modena and the Genoese also recovered all the territories they had enjoyed before the war. Silesia, and Glatz were guaranteed to the king of Prussia; the Pragmatic Sanction of 1713 to the emperor quitted his dominions. France engaged to the king of England, in favour of whom the king of France also engaged to expel the Pretender from his dominions. With regard to the fortifications of Dunkirk, it was stipulated that those on the land side should remain as they were, but that those on the sea side should be destroyed. And the Assiento was renewed to England for four years, in consideration of the previous contract having been interrupted for three years. France admitted Parma, Placentia, and Guastalla were ceded to Don Philip (the younger brother of Don Carlos, king of the Two Sicilies), who had married the daughter of Louis XV. of France; but it was declared that Parma and Guastalla, which belonged to the house of Austria, should be placed to the king of Sardinia, in case either of the failure of the male descendants of Don Philip, or of his brother Don Carlos, succeeding to the throne of Spain, on which it was assumed that Don Philip would become king of the Two Sicilies. But as the Treaty of Vienna was signed before the fall of Don Carlos and his posterity without any reservation, that sovereign refused to accede to the present arrangement; and in point of fact, when he succeeded to the throne of Spain in 1759, he renounced the kingdom of the Two Sicilies in his title of Ferdinand, and accordingly reigned till his death in 1808 as Ferdinand IV.

1763. Treaty of Paris, signed by France, Great Britain, Spain, and Portugal, 10th February. England retained most of the conquests she had made from France during the war; including the factories on the Sonegal, the islands of Grenada, the Grenadines, St. Vincent, Dominica, and Tobago, Cape Breton, with the islands and coasts of the southern entrance of the Gulf of Florida. The sovereignty of Martinique, Guadaloupe, Mariegalante, Desirada, and St. Lucia, in the West Indies, and that of Goree in Africa, were given back to France; as were also the forts and factories she had formerly possessed in the East Indies, under the restriction however that she should keep up no military force in Bengal. And permission was given to her to fish on a part of the coasts of Newfoundland, and to occupy, but not to fortify, the islands of St. Pierre and Miquelon. The British ceded to France all the islands between the other possessions of the two nations in North America, everything on the left bank of that river being given up to England, with the exception only of the city of New Orleans. France ceded likewise to England the island of Minorca, and also to the English king and his allies whatever conquests she had made in their German dominions. In return she received back Belleisle from England to and with regard to Dunkirk, was assured that the fortifications should be kept in the state appointed by the treaty of Aix-la-Chapelle. To Spain England restored the island of Cuba; Spain in return ceding to England Florida, with the fort of St. Augustine and the bay of Pensacola, as charter of the Mississippi, which would be the north-east of North America to the east or south-east of the Mississippi, and also the right of cutting logwood in the Bay of Honduras. Whatever had been taken by Spain from Portugal, both in Europe and in America, was restored. By the treaty of Hubertusburg, concluded between the emperor and Prussia, on the 15th of the same month, the emperor surrendered to Prussia the province of Glatz and the districts of Silesia, and the fortresses of Weseil and Schwarzenberg. The treaty concluded the same day between the king of Prussia and the elector of Saxony (Fredericus Augustus III., king of Poland) the former restored all the territories he had taken by conquest, by a convention, by which it was agreed that Paris on the 10th of June in the same year between France, Spain, and the king of Sardinia, it was agreed that the king of Sardinia should waive his right of reversion under the treaty of Aix-la-Chapelle to the duchy of Placentia on being in the same year between France, Spain, and the king of Sardinia, the latter that the treaty should have derived from the dutch.
part of the 31st degree of N. lat., thence south by a line to be drawn due east (such are the terms) to the middle of the Rhine, thence along the middle of that river to its junction with the Flint River, thence straight to the head of St. Mary's River, thence along the middle of that river to the Atlantic Ocean, and finally from the mouth of the river St. Croix in the Bay of Fundy, along the boundary lines two leagues of coast, and thence to the said Highlands, comprehending likewise all islands within twenty leagues of the coast of the United States, and lying between lines drawn due east from the points where the boundary lines described include the coast of Bay of Fundy, and the Atlantic Ocean. The navigation of the river Mississippi, from its source to the ocean, was left free to both nations; and the right of fishing on the banks of the Mississippi was conceded, under certain restrictions, to the Americans. With France all former treaties were renewed, except in so far as altered by the present. England restored or resigned the islands of St. Pierre and Miquelon, St. Lucie and Tobago, Goree, and the forts and factories on the Senegal, the French establishments in Bengal, and at Pondicherry, Mahe, and Surat; and recovered from France in return the islands of Grenada and its dependencies, St. Vincent, Dominica, St. Christopher, Nevis, and Montserrat. All the isles ceded of former treaties with regard to the fortifications of Dunkirk were abrogated. All the conquests made from one another during the war by Spain and England were mutually restored; Spain granting back to England the island of Providence Islands, Bahama, and England ceding to Spain Minorca and East Florida; retaining, however, the right of cutting logwood in the Bay of Honduras. By a fourth treaty, concluded between France and Holland, signed 12th May, still all conquests between these two powers were mutually restored; and Holland ceded the town of Negapatam with its dependencies.

1802. Treaty of Amiens: between England on the one part, Spain, and Holland on the other, signed in French the 26th, English the 27th March. England restored to France and her allies all the conquests she had made from them during the war, except only the island of Trinculo taken by the Dutch. The Republic of the Seven Ionian Islands (formerly belonging to Venice) was recognised by France. Egypt was restored to the Porte. France engaged to evacuate the kingdom of Naples and the States of the Church; and England to evacuate Porto Ferrao, and whatever other ports and islands she occupied in the Mediterranean and the Adriatic. It was stipulated that Malta should be surrendered to England to the King of John of Jerusalem, to be held by them under the protection and guarantee of France, Great Britain, Austria, Spain, Russia, and Prussia; but Russia and Prussia having declined to undertake that guarantee, England refused to perform this article, which refusal eventually led to the recommencement of the war.

1814. Treaties of Paris, signed 30th May, between France on the one part, and Austria, Russia, Great Britain, and Prussia on the other. The limits of the kingdom of France were declared to be the same as they stood on the 1st of January, 1792, with the addition of Avignon and Vaison, and also certain augmentations on the north side. The navigation of the Rhine and its tributaries was to be free. It was agreed that Holland should be placed under the sovereignty of the House of Orange, and should receive an increase of territory; that the states of Germany should be independent, and united in a federation; that Switzerland should continue independent; that Italy, with the exception of the portions of it which were to be restored to the dominion of Austria, should consist of sovereign states; that Malta and its dependencies should belong to Great Britain; that Great Britain should restore to France all the colonies, fisheries, factories, and establishments of every kind which France possessed on the 1st of January, 1792, in the seas and on the continents of America, Africa, and Asia, with the islands of the group of Tentul and the Isle of Triton, the Isle of France and its dependencies; and that France should cede to Spain the French portion of the island of St. Domingo, and receive back Guadaloupe from Sweden, all from Portugal, and arrangements were afterwards assented to by Spain, Portugal, and Sweden.

1815. Treaty of Vienna, signed 9th June, between Aus-

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trève, de neutralité, de commerce, d'échange, de protection, et de garantie, de toutes les Conventions, &c., depuis le règne de l'Empereur Charles IX jusque à la présente année. Ce procédé, &c., a été suivi de la même manière dans la septième et huitième éditions, et dans la seconde partie (2nd ed., 1817), qui a été préparée pour la presser le manuscript of the next four volumes, which were brought out in 1728, the second in 1731, under the superintendence of Jean Rousset. The third volume consists of three parts; the first contains the treaties in the original collection, from a.d. 800 to 1337; the second, from 1339 to 1436; the third, from 1436 to 1500; the fourth, from 1501 to 1555; the fifth, from 1566 to 1638; the sixteenth, from 1700 to 1750; the seventh, from 1751 to 1800. The eight volumes were followed by a Supplement, in five volumes, which appeared in 1730, also under the superintendence of Rousset. Of this Supplement, the first volume consists of what is entitled ' Le Histoire des Anciens Traitées;' drawn up by Professor Barbyce, of Groningen; part 1st (374 pp.), containing the treaties from a.d. 1496 to the commencement of the Christian era; part 2nd (387 pp.), those from a.d. 1501 to 1648; part 3rd (337 pp.), those from a.d. 1649 to 1740; part 4th (292 pp.), those from a.d. 1741 to 1776; and part 5th (800 pp.), those from a.d. 1777 to 1824. The whole work consists of 13 volumes, or 55 parts.

The collection of the Mont Rousset and Rousset has been completed and brought down to the present day by the late George Frederic de Martens, professor of the Law of Nations and Nature at Gottingen, and a member of the international journals, in their work entitled 'Recueil des Traités d'Alliance, etc., des Puissances de l'Europe,' &c., the first volume of which, a 8vo., was published at Gottingen in 1750. The original work consists of seven volumes, of which the 1st (in the 2nd edition) contains 13 volumes, or 55 parts. The title page of the first volume is dated 1731, and the first edition was published in 1732, and a second, revised and augmented, by the Baron Charles de Martens, the nephew of the original compiler; those from 1719 to 1765, with indexes to the preceding volumes; the 6th (1800) contains a supplement to 1762, with a continuation to 1765, and the 7th (1801) contains a supplement to 1764, with a continuation to 1801, and indexes for the whole work. Then follow volumes 2 to 12, et seq.

Of this supplement, vol. 1 (published in 1802) contains the treaties from 1701 to 1749; vol. 2 (1802), those from 1751 to 1799, of which latter indexes are prefixed in the second volume, which is divided into two parts; vol. 3 (1807), those from 1731 to 1804; vol. 4 (1808), those from 1804 to 1807, with indexes for the whole 12 volumes. From this point the work proceeds in nine volumes (divided into 12 parts), under the title of ' Nouveau Recueil des Traitées d'Alliance,' &c., the former volume (vol. 1), 'Supplement, tome 5, 6,' &c., being also preserved. Of the 'Nouveau Recueil,' vol. 1 (published in 1817) contains the treaties from 1806 to 1814; vol. 2 (1818), those of 1815 and 1816; vol. 3 (1818) a supplement to 1808, with a continuation to 1818, and indexes for the whole 14 volumes; vol. 4 (1820), a supplement of 1818, with a continuation to 1819; vol. 5, 1st part (by the Baron Charles de Martens, 1820), a supplement to 1819; vol. 5, 2nd part (by Frederic Saalfeld, 1829), a supplement to 1815 to 1822; vol. 6, 1st part (by Saalfeld, 1828), the treaties of 1818 and 1822; vol. 6, 2nd part (1828), those of 1823 and 1825; vol. 7 (1828), a supplement from 1820, and a continuation to 1827; vol. 7, 2nd part (1830), a supplement from 1824, and a continuation to 1828; vol. 8 (1831), a supplement from 1829, and a continuation to 1830; vol. 9 (1830), a supplement from 1827, and a continuation to 1831. Then follows the fourth volume (vol. 4), which is dedicated to the 3rd and 4th volumes, to the ' Most Noble Sir Robert Walpole,' by the editor, who signs himself S. W., in a convenient book of reference for ordinary purposes, but cannot be quoted as an authority. De Martens, who was corrected an error in the 3rd edition of this work, in a supplement to 1826, of George Chalmers, states that he does not know if the first volumes are by the same editor as the last two; but the language used in the Introduction to the 3rd and 4th volumes seems to imply that they are. In 1727 was published...
The establishment of the government of the Latins was the signal for another insurrection in the eastern part of the empire. No sooner had Constantinople fallen, than Alexis and David Comnenus levied an army in Asia, and, by the charge of a considerable number of the Greek aristocracy, overran the country of Trebizond. Alexis, the elder of the two brothers, assumed the title of emperor of Anatolia, a fact which has been doubted or denied by himself, and evidently the fruit of long study and profound and well-digested learning. The editor himself, at the end of his preface, in which he has given some account of preceding collections, says, 'I have already exposed my ignorance to the eyes of those who have made the knowledge of the interests of powers a profession, whilst I have only looked for entertainment amidst other labours and other studies.' The collection however is a very useful one; the plan comprehensive, the arrangement of the whole; and, we believe, it may depend on it. This is the latest general collection of treaties which has appeared in this country: but the new treaties and other state papers are annually published by the Foreign Office, and there is a convenient arrangement of them in a Complete Collection of Treaties, &c., at present subsisting between Great Britain and Foreign Powers, so far as they relate to Commerce and Navigation, to the repression and abolition of the Slave Trade, and to the privileges and interests of the subjects of the two contracting parties, compiled from authentic documents by Lewis Hertele, Esq., librarian and keeper of the papers, Foreign Office, 5 vols. 8vo., London, 1840.

For an enumeration of the principal works on the subject of treaties, and references to the passages in the writers on public law in which the subject is considered, the reader may consult the Introduction to De Martens's 'Précis du Droit des Gens Moderne de l'Europe, fondé sur les Traités et l'Usage,' 2 vols. 8vo., Paris, 1821; vol. 1., pp. 132-166, 268-270, 316; and ii., 22-33, 63-69, 113, 216-234, 291-308. There is a very useful work by De Martens, entitled 'Cours Diplomatique,' 3 vols. 8vo., Berlin, 1801; of which the first volumes (entitled separately 'Gide Diplomatique') contain an account of the principal laws of the powers of Europe and of the United States of America, relating to commerce and the rights of foreigners in peace and war, and a list of the treaties and other public documents which are the subject of the diplomatic intercourse of the end of the eighteenth century; and the 3rd is entitled 'Tableau des Relations Extérieures des Puissances de l'Europe, tant entre des États, que d'Autsres États, dans des diverses parties du globe.' In the Companion to the Almanach for 1831, pp. 44-63, will be found 'A Chronological Table of the more important Treaties between the principal civilized Nations, with notices of the Wars and other events with which they are connected, from the beginning of the fourteenth century to 1830.'

TREBIA. [Po.]

TREBIZOND, Empire, a fragment of the empire of Constantine IV. It was founded under the following circumstances:—The last male of the Comnenian family who reigned at Constantinople was the emperor Andronicus the tyrant, who was deposed in 1185 by Isaac Angelus. Isaac not only instigated the mob of Constantine IV to inflict upon his captive rival those inhuman tortures under which he lost his life, but he also resolved to exterminate the whole Comnenian family. John and Manuel were put to death, but two infant sons of Manuel, Alexis and David, were brought by Thamar, the Comnenian princess, who fled with the two children to Trebizond. This happened in 1186. The history of Thamar and the two young princes during the following 18 years is full of detail and interest, but which may be proved by the critical investigations of Professor Falsimayer into the history of Trebizond. This historian found many important facts in two manuscripts which he discovered at Venice among the papers of Cardinal Beazzano, one of which is a transcript from Jenkinson's 'Diplomatique,' and the other a chronicle of the imperial palace at Trebizond, the author of which is Panaretus.

While Alexis remained in the city of Trebizond, his brothers, John and Manuel, were in the country of Trebizond Minor. His opponents were the emperor Baldwin and his successors, several French barons, and especially Theodor Lascaris, the new emperor of Nicæa. After a long struggle, in which he evinced the qualities of an accomplished diplomatist, David was obliged to capitulate to Nicæa all the conquests which he had made west of Cape Corambo. (1214.) David died soon afterwards without leaving any issue. During this time Alexis had sustained the attack of his friend George king of Bar-

Bia, who however was obliged to desist from his undertaking upon Trebizond, and to turn his arms against the Mongols. (GENGIS-KHAN.) A war with Ghayath-ed-din, sultan of the Mongols, proved fatal to Alexis, who was murdered, not only recovered his liberty after paying a considerable sum of money to his conqueror the town and the country of Sinope. Alexis I. died in 1222.

His successor was Andronicus II, who belonged to a branch of the Comnenian family, and who had married a daughter of Alexis I. Andronicus I. died in 1235 after a reign of 13 years, and his successor was John I. Alexuchos, the eldest son of Alexis I. John I. died in 1239, leaving an infant son, Ioannicus, who was deposed by his uncle, Manuel I., the younger brother of Alexis I. who reigned from 1234 to 1263. Andronicus II. was compelled by 'Ala-ed-din key-kobad, sultan of Koniah, to renounce his dignity of an independent sovereign; but Manuel I. was unable to conquer the Mongols, who had overrun Asia Minor. Being however unable to recover his independence, he paid homage to the Mongols, and managed their barbarous pride with such success that he succeeded in keeping his empire exempt from Mongol garrisons and government. Manuel I. sent ambassadors to St. Louis, king of France, in order to obtain one of his daughters for his wife, but St. Louis did not assent to this proposition. The successors of Andronicus II., who reigned from 1235 to 1336,

During the reign of Alexis II. the city of Trebizond was next to Tana or Alex, the centre of the commerce of the Genoese and the Venetians with the countries around the Black Sea.

The successor of Alexis II., Andronicus III., reigned only two years, and was succeeded by his son Manuel II., a boy of eight years of age, who was deposed by his uncle John II., the younger brother of Alexis II. The reign of Manuel II. and John II. was characterized by repeated insurrections, one party was composed of those Greek factions; one party was composed of those Greek families long settled in the country of Trebizond, and the other of the descendants of those nobles who had joined Alexis I.
after the conquest of Constantinople by the Latins in 1204. Basil II. died in 1340. His widow, Irene, succeeded in maintaining herself for a time at the head of the government with her son, the emperor Constantine IX. Anna, and the princess of the Comnenian house, who after a short reign ceded the throne to John III. This emperor died in 1344; and was succeeded by Michael I., who reigned till 1349.

One of the former ambassadors of the Turks was John of Trebizond, who held the Byzantine Empire in a short period from 1340 to 1349. Aristocratical as well as democratical factions were in a state of perpetual warfare with each other; the Genoese, in order to revenge the murder of some of their countrymen, conquered the town of Cerasus; the Seljuks, under their new sovereign, a great confederation destroyed the city of Trebizond; and the plague killed those who had escaped the flames or the sword of the Turk. The successor of Michael I. was Alexis III., a child eleven years old. During his minority, the regency was disputed between the aristocratical parties; but, supported by the clergy, the young emperor recovered his authority, and evinced the energy of a man who everywhere had to fight with his rebellious subjects. He attacked foreign enemies with no less courage, but he was abandoned by fortune, or forsaken by his coward countrymen. His armies were defeated by Turkish adventurers, and his pride was humbled by one Megolio Lecari, a Genoese, who besieged his capital, and ordered the imperial fleet to accompany the pestiferous imperial fleet with two of his own gallies, and by forcing the emperor to grant important privileges to the merchants of Genoa. Alexis III. gave his sisters and daughters in marriage to the Venetians; the daughters, the doughty would buy their friendship or to prevent their hostility. He died after a reign of 41 years, and was succeeded by his only son, Manuel III.

Manuel III. was conquered in 1402 to submit to Timur, who was anxious to get possession of the Trebizond fleet, in order to lead his army to the shores of Greece. (Timur.) But this fleet consisted only of twenty galleys, while the Bosphorus was defended by the united navies of the Venetians and the Greeks of Constantinople. For some years Manuel III. was a vassal of Khalil-Sultan, nephew of Timur, and under-khan of Armenia, Pontus, and some adjacent districts. After having recovered his independence immediately after the death of Timur (1403), Manuel died in 1412. His successor, Alexis IV., who reigned from 1412 to 1445, or perhaps to 1449, paid tribute to Kars-Yasuf, prince of the Turkomans of the Black Horde, who married a Trebizond princess. Other princes became the wives of several Mohametan and Christian princes in Servia, Greece, and Asia Minor. Alexis IV. was besieged in his capital by Amirad I., Sultan of the Turks-Osmanlis, but the strong fortifications of Trebizond saved his life, and, as he could not get through land, he hoped to get through sea. He sent for help to Kars; and, David. Calo-Jannes revolted against his father, put him to death, and succeeded him between 1445 and 1449, under the name of John IV. During the reign of this emperor Sultan Mohammed II. conquered Constantinople, and besieged Trebizond; but John IV. saved his throne by paying an annual tribute of 3000 pieces of gold, the first payment of which the emperor's youngest brother, David, brought to Constantinople in 1456. It was not the power of the petty empire of Trebizond, but the name of the Comnenes, and the moral influence of the emperors over the Greeks, which annoyed the Sultan of the Turks, and obliged him to put an end to the last remnant of Greek independence in Asia Minor. He never had the heart to lay the foundation of a province, and to add another to his empire. John died at Trebizond, and the two princes were hastened by the same situation. He secretly formed the plan of a league with Hasan-Uzun, the khan of Daybarbek, who was his brother-in-law, the Turkoman emir of Sinope, and several other princes of the same Turkmans; but a sudden death prevented him from carrying this plan into execution. (1458.) His son, Alexis V., a child of four years, was deposed by the youngest brother of John, David, who ascended the throne the same day.

The rumour of the intrigues of John IV. had reached Mohammed II.; and David I., knowing that he had to suffer for the crime of his brother, resolved to die or to recover his independence. He spent his treasures in equipping 20,000 splendid levies of the Trebizond; but his brother for holding a great alliance against Mohammed II. The warlike tribes of the Caucasus, from Armenia to the Kuban, the kings of Georgia and Iberia, Hasan-Uzun, and the Venetians, promised their assistance. Pope Pius II., sent an ambassador, Father Louis, to Trebizond, and excised Europe to a crusade. But the centre of the negotiations was the court of Philip, duke of Burgundy, who held the crown of Bohemia, and who was married to the sister of Edward the Black. Edward was flattered with the idea of saving the East from the infidels. David and Philip entered into a correspondence (Fallmerayer gives some of the letters, p. 266, &c.;) both of them independent of all their allies, but the khan and khans of Asia Minor appeared at Brussel; and some Burgundian ships sailed to the Mediterranean to announce the arrival of a fleet. But all these preparations were in vain. In 1461 Mohammed II. overran Asia-Minor. Hasan-Uzun besieged Trebizond, not by land or by sea. Mohammed arrived before the city some time after the beginning of the siege, and immediately summoned David to save his life and his treasures by surrendering his capital. Unlike the last emperor of Constantinople, who died in the defence of his liberty, David surrendered. David, his family, and his nephew Alexis were carried off to Constantinople, and thence to Serres, where they were watched by Turkish spies. A letter from David's niece, Catherine, the wife of Hasan-Uzun, to her relations at Serres, which had been intercepted, informed Mohammed that his captives had formed the plan of escaping to Asia Minor. In consequence of this Mohammed attacked the capital of the Comnenes, and put it to the sword. David, his nephew Alexis, and seven of his sons were executed; the eighth youngest saved his life by adopting the Mohammedan religion, and died in obscurity.

Hasan-Uzun, a prince of the former form of the Ottoman empire, was succeeded in the harem of Mohammed. Helena Cardiozez, the wife of David, was spared. The bodies of David and his sons became a prey to the wolves and ravens; and an order was given to kill any person who approached the place where they were exposed. Helena is said to have soon afterwards died of grief. (Fallmerayer, Geschichte des Kaiserthums von Trapezunt; Gibbon, Decline and Fall; Hammer, Geschichte des Osmanischen Reiches, vol. ii., p. 54; Fallmerayer, Trapezus; Le Beau, Histoire du Bas Empire; Chalcolymas, l. ix.; Ducis, l. xiv.-xvii.; Piranesi, l. iii.)

TREBIZOND. Trapezus, Tropæus, an antient town, situated on the Pontus Euxinus, in the eastern corner of the country of Pontus in Asia Minor. Trebizond was a colony of Sinope, a town founded by the Milesians. Xenophon with his 10,000 Greeks came to Trebizond in his retreat (Anabasis, iv. 8), and remained there thirty days, according to Diodorus Siculus (xiv. 30), sacrificing to Jupiter and Hercules, and celebrated games. Near Trebizond the troops of Xenophon ate a certain kind of honey, after which they felt very ill for some days, but no one died. According to Tourniort, this honey was gathered from the flowers of the Pontica maximas, melipoli, flore luteo; and 'Chamaerhododon Pontica maximus, flore caeruleo purpureo.' (Voyage du Levant, p. 221-231.) During the wars between the Romans and Mithridates, this town was the capital of the Romans, and henceforth belonged to the Roman empire. Hadrian ordered the port to be secured by a mole. Pliny (Hist. Nat. xi. 4.) calls it 'Trapezus liberum oppidum,' or a 'free town.' Mela (i. 98, 88) employs the words 'Maxima illustris;' and according to Tacitus Hist. iii. 47, Trapezus, a very antient Greek town, was taken by Aeneas, the son of Poleno, who was a Roman vassal king of Pontus. This Aeneas pretended to take the town because during the civil wars of the Romans he had received the fall of Vitellius and the accession of Vespasian. Trebizond had its own medals, from the time of Hadrian; on one of them there is on one side an anchor, and on the other the prow of a ship, two emblems which seem to prove the importance of the commerce of this town. During the reign of Valerian (253-259 A.D. Trebizond was a large and opulent town, but it was taken plundered, and plundered by the Galigales, barbarians, according to Zosimus (i. 33); but the barbarians were Goths. (Gibbon, Decline and Fall, c. x., p. 424, &c. ed. 1815.) During a long period Trebizond seems to have been only the shadow of its former splendour. Ammianus Marcellinus (xxii. 5) narrates that on the point of it on the Black Sea, and there was a great shroud (non obscurum); but it recovered during the wars with the Persians in the reign of Justinian. This emperor ordered the public buildings to be restored, a fact which is proved by an inscription discovered by Tournefort over;
the door of the castle of Trebizond, and which was copied by him (Ibid. p. 234). Trebizond afterwards became the capital of the theme of Chaldisia, a province which contained the country of Pontus, and sometimes also some adjacent tracts of Armenia. The history of this town during the middle ages is related under TEBIZOND, Empire; and we shall only mention here that the Genoese con-
structed a mole in the port of Trebizond, which is now almost entirely destroyed. A mole of it is not extant; it seems that this mole was only a restoration of that of Hadrian. At present Trebizond belongs to the Turkish empire; its Turkish name is Tarbozan or Trebizan. It is on the island of Kastel, the bay of which, which contains the sanjakas or districts of Trebizon, Gonia, and Batum, and is bounded on the west by the eyalet of Siwas; on the south by the eyalet of Erzurum; on the southwest by the eyalet of Karabulut; and on the east by the part of the eyalet of Childir: its length from east to west is about 310 miles, its breadth varies from between 35 to 45 miles, except the eastern part towards Childir, which is a little broader: it is inhabited by the Lazae, a nation of Georgian origin, some tribes of which are inde-
pendent, but there are also some Turks and a considerable
number of Greeks. The capital, Trebizond, is the seat of
the pasha of the province, and of a Greek archbishop. Its
population according to Balkheski is 10,000 inhabitants; Kinner gives it 15,000; Tencogne, 25,000; Saint
Martin, 40,000; Fontanier, 60,000; and Dupré, 250,000.
Each of these different statements may be true, although
for a certain period only, the towns in Turkey being the
subject of a great deal of the surrounding country, and
there in great numbers in time of war in order to escape
death or captivity. According to Brant, the British consul
at Erzurum, the population of Trebizond in 1835 was
between 35,000 and 36,000 inhabitants among whom were
3500 to 4000 Greeks, 1500 to 2000 Armenians, and 20,000
to 24,000 Mohammedans, all of whom live within the walled
part of the town, while the Christian part of the popula-
tion lives outside the walls. When Tournefort visited the
town, the population was scanty, and extensive gardens
and fields were contained within the walls. Among the
public buildings the most remarkable are, the castle or
citadel, partly of ancient, partly of modern construction,
situated in the middle of the town on a steep rock, the
summit of which is flat as a table (rpavxe, the name of the
town); the bazaar; public bath-houses of marble, of a
beautiful architecture; the ruins of a temple of Apollo,
part of which has been converted into a Greek chapel.
Brant says that in 1835 there were no buildings of a more
remote age than the Christian era. The commerce of
Trebizond has much increased since the navigation of the
Black Sea has been opened to all nations, and especially since the establishment of Constantinople as a capital.
It has a direct and regular communication with Constanti-
nople, Odessa, and the Danube. After Odessa, Trebizond
is the first commercial port on the Black Sea; however, the
vessels laid up in the road in 1835 were obliged to cast anchor
in the road. In 1830 5000 bales of European merchandise passed through Trebizond on their way to Persia, while in 1835 nearly 30,000 proceeded by the same track to the same destina-
tion.
Surrounded by a range of high and woody moun-
tains, the town presents a beautiful appearance from the
sea. Trebizond is the birth-place of Cardinal Bessarion,
who was born here in 1356. The family of George of
Trebizond amongst the magnates of the town, was of origi-
nally from Trebizond, but he was born in Candia. About
25 leagues south-east of Trebizond lies the famous convent
of St. John, surrounded by beautiful forests, and situated
in one of the finest solitudes in the world.


TREBUCHET. [Tombi, or TEBZOND.]

TREVIRI, or TREVIRI, or TREVIRIA, PROVINCE OF,

TREGDOLD, THOMAS. From a very meagre biogra-
phical notice of this able engineer, in the seventh edi-
tion of the Encyclopaedia Britannica, we learn that he
was born at Brandon, near Durham; but when is not
stated. He received such a common education as is usual
for youth brought up to mechanical employments, and
was apprenticed at the age of fourteen to a carpenter in
his native village. He afterwards went to Scotland, where he worked for five years as a journeyman carpenter. From Scotland he re-
moved to London, where he obtained employment in the
office of an architect, in which he remained for three years. During this period he devoted himself in the diffi-
gent study of chemistry, geology, and the mathematics; and thereby prepared himself for the subsequent production of the scientific treatises to which he owes his principal repu-
tation, and which, not having been deemed a work, as well
as in England, that several of them were translated into
French. The writer of the memoir above referred to states
that he does not know when Tredgold began to practice
as an engineer, but that he always held that he acquired all
that he employed in his scientific works. Of these the
following are the principal:—

1. Elementary Principles of Carpenter," a treatise on the pressure and equilibriums of beams and timber frames, the resistance of the construction of floors, roofs, &c., to which are appended many useful tables. This valuable
work was published in 1820, in a thin 4to. volume, illus-
trated by twenty-two plates. A Practical Essay on the
Strength of Cast-Iron, originally published by Tredgold,
was revised and extended, in 1834, in the same

2. Principles of Warming and Ventilating Public
Buildings, Dwelling-Houses, Manufactories, Hospitals,
Hothouses, Conservatories, &c., of which the second ed-
cution was published in 1825, while Tredgold was presi-
dent of the Society for the improvement of Productions
on Railroads and Carriages, a work still held in
repute, notwithstanding its early date in the history of rail-
way science, published in a thin 8vo. volume in 1825:

3. Remarks on Sanitation, Navigation, and Construc-
tion, or Proportion, Calculation, and Encouragement,
the first work published in 1827; and so highly
was it esteemed, that a posthumous edition, greatly ex-
tended by the contributions of several scientific men,
especially in the department of steam-navigation, was
published in 1836. This truly beautiful edition is 6vo., volume, with a num-

4. Remarks on Carpentry, which was published in
1836, and was a posthumous work. It is an improved
and enlarged edition of the first edition of Remarks
on Carpentry. The work has been improved and
enlarged by some additional articles, and the title
has been changed to Remarks on Carpentry, and the
introduction of a large number of new and valuable
180
getting a hundred lines of it by heart as a penalty upon those who infringed the rules established for her private parties in the Hermitage. Numerous as they were, his own poetical productions were but the smaller portion of his literary work. Amongst his works are "G Pricing," and amongst others Rollin's 'Antient History,' in 26 volumes, twice over, the manuscript of the first translation having been destroyed by fire, for which there is not preserved a single instance of literary industry and perseverance upon record.

The rapidity of the growth of trees varies, but this is frequently dependent on climate, soil, and situation; and this is often remarkably exemplified in plantations where, associated with them, some trees have grown with twice or three times the rapidity of others. Taking all circumstances together, there are some trees that grow much more rapidly than others. The following table, showing the comparative increase in circumference of trees of different species during two years' growth confirms this observation:

<table>
<thead>
<tr>
<th>Tree</th>
<th>First Year</th>
<th>Second Year</th>
<th>Third Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oak</td>
<td>10.36</td>
<td>11.54</td>
<td>12.94</td>
</tr>
<tr>
<td>Larch</td>
<td>7.98</td>
<td>8.26</td>
<td>8.56</td>
</tr>
<tr>
<td>Elm</td>
<td>1.87</td>
<td>2.06</td>
<td>2.21</td>
</tr>
<tr>
<td>Lombardy Poplar</td>
<td>8.20</td>
<td>8.50</td>
<td>8.80</td>
</tr>
<tr>
<td>Lime</td>
<td>8.30</td>
<td>11.00</td>
<td>13.20</td>
</tr>
</tbody>
</table>

Up to a certain point the larger a tree is, the more it will increase annually in size, on account of the larger number of leaves which are the organs which elaborate the sap from which the wood is formed. It is on this account that the practical of lopping the branches of trees is so injurious to their growth, as by taking away the leaves the sources of the formation of wood are destroyed. The influence of season on the growth of a tree is very remarkable. On looking at a section of the trunk of any large tree, it will be found that some zones are thick, whilst others are thin. From some observations made on an extensive trial it is believed the thick and thin zones of wood correspond with hot and cold seasons. The difference in the thickness of the same zone on the two sides of the tree is probably to be attributed to the influence of prevailing winds, the function of the leaves on the side of the tree exposed to the wind being thus interrupted. Thus a wind blowing frequently, say from the north, during the summer will cause a larger deposition of wood to take place on the south than on the north side of the trunk.

The duration of the existence of trees is very variable. The occurrence of decay by a species of slow combustion of the wood of the trunk seems to be the natural termination of their life. As long however as the decay spaces are not filled up with sap from the roots by the branches, so long will the tree live and form new wood; and provided new wood is formed as fast as the old is destroyed, the tree is capable of existing to an almost indefinite period. This is not often the case; but there are some instances recorded, as those of the Baobab and Taxodium before alluded to, of trees having existed for even thousands of years. The 'great chestnut' at Tottworth is mentioned, in writings still extant, in the year 1135, and many other trees, especially oaks and chestnuts [Quercus (C. Castanea)], might be mentioned, whose great size at present must lead to the inference that they have existed for a period considerably above a thousand years. As the extreme age of trees does not exceed 300 years from the centre of the tree, leaving frequently very large cavities, which have been used for various purposes. Thus the interior of the great oak at Allouville in Normandy has been converted into a place of worship. An oak at Kidlington has served as the village priory. The tree peak at Saikey is used as a cattle-fold; others have served as tanks, tombs, prisons, dwelling-houses, &c.

For further information on the subject of trees the reader should consult Loddiges 'A System of Practical Botany Britannicum,' and Selby's 'British Forest-Trees;' and the articles GRAFTING, PLANTING, EXOGENS, ENDGENS, and of particular trees under their generic names, in this work.

TREFOIL. [TRIFOLIUM.] TREGONY. [CORNWALL.] TREMANDRA/C/E, a natural order of plants belonging...
ing to the syncarpous group of polypteralous Exogens.
This order consists of slender shrubs very much resembling
heaths, usually covered with glandular hairs. The leaves
are without stipules, either alternate or whorled, entire
or toothed. The flowers are often large and handsome,
seated on solitary axillary pedicels. The calyx has four
or five sepals with a valvate cavitation; the petals equal
in number to the sepals and much larger; the stamens
hypogynous, double the number of the petals, with an-
thers 2- or 4-celled, opening by a pore at the apex; ovary
2-celled, with a simple style and stigma; seeds pendulous,
and furnished with a capsule at the apex; as Fr., abietus
fleshy, in the axis of which lies a straight cylindrical
embryo.
This is an order of New Holland plants, containing but
two genera, Tremella and Tremellina. B. an, who is
followed by De Candolle, points out a relation between
them and Polypodaceae in their synanulate seeds and
definite pendulous ovules. Lindley considers them as
having an affinity with Rhamnaceae, from which they differ
in the possession of hypogynous stamens. Accordingly he
places this order in his arrangement with Rhamnaceae,
Chailletiaceae, Nitrariaceae, and Bursaraceae. The proper-
ties of this order are not known. The genus Tremandra
was discovered by Brown, and the name given on account
of the peculiar perforation of the anthers.

TREMBECKI, STANISLAW, one of the best Polish
poets of the age of Stanislaus Augustus, was born about
the year 1724, in the district of Cracow. Notwithstanding
his eminence as a writer, and that during the greater part
of his long life he moved in the higher circles of
society, very few particulars have been preserved or
collected respecting him. In his youth he spent many
years in visiting various parts of Europe, and resided
for a considerable time at the court of Louis XV. After-
wards he was for a length of time at that of Stanislaus,
where he held the post of chamberlain. Later in life he
withdrew almost entirely from society, rarely seeing
strangers, although he resided in the family of Felix
Potocki at Tulcyn. At one time he had been remarkably
abstemious, never tasting either animal food or wine for
ten years, on which account Stanislaus used to call him
his Pythagoras. Latterly he abandoned that rigorous sys-
tem, which however does not seem to have had much
influence upon his temperament, for he is said to have been
engaged in no work for thirty days, all of them arising
out of some affair of gallantry, and in every one of which
he came off conqueror. He died December 12, 1812,
after very little previous indisposition, at nearly ninety
years of age. Among his poetical works, all of which ex-
hbit great mastery of style and beauty of language, that
entitled 'Zofijowka' is considered his chef-d'oeuvre. This
production has been regarded by several of his colleagues in
high esteem, being a description of the gardens at Zofijowka,
an estate in the Ukraine belonging to the Potocki family,
but though the subject itself is not of the highest order, it
is executed with great ability, and the whole abounds in
striking beauties; nor is the reader ever for a moment
left unanswered by its having been written when its author
was between the age of seventy and eighty. The work how-
ever which would probably have most of all contributed to
his reputation among his contemporaries, is 'History of
seeds' (1800), which was not seen the light. The manuscript, consisting of two hundred
sheets, was given in trust by him to a friend, that it should
not be published until after his death; but what became
of it is unknown. Trembecki prefixed to the two volumes of his poem
forming a part of Bobrowicz's 'Bibliotheca Klasygow Poli-
ch', from which work the account here given is derived.

TREMELLA. [TREMILLI.] TREN MILLI, the name of the last order of the cobweb
Hymenomycetes, in Fries's arrangement of the natural order
Fungi. The type of this order is the Tremella, a genus
constituted by Dillenius, and applied to a variety of forma-
tions of the Fungi. Fungi are conforming to this group
in considerable number.

The plants of this order are known by their amorphous
character, having a soft gelatinous appearance, and look-
ing like gummy mass. The plants are of a gelatinous
appearance, and are formed of a gelatinous mass. The
Tremella is covered by a brown, or black, or sometimes by a
white, or yellow, or red, or purple, or violet, or blue, or
green, or yellow, or black, or brown, or purple, or violet
colour when young. When boiled in water the plant
does not lose its shape or colour, but yields a deep
brown infusion, which might be made useful in dyery.
Bulliard obtained from it a pigment, which he used suc-
cessfully in painting.
growing to a human ear. The whole plant is sessile, con-
cave, and flexuous, of a leathery consistence, and a red-
dish-brown colour. It is found mostly on living trees, especially the elder. It is generally from one to three inches wide. The spores is a long-time held in much repute for its medicinal properties. It has an astringent character, and has been used in infusion as a lotion in ophtalmia, and also as a gargle in sore throat. It has also been supposed, the in state this it has been called Tremella fucosea. Its dried colour and form has caused it to have a great
number of synonyms.

The genus *Dactylyaeus* has a gelatinous homogenous receptacle filled with subcereb flocc, and interspersed sporidia. This genus, sometimes called tear-mould, yields species which attack wood and fruit, and produce what is called dry-root. The *D. moriformis*, mulberry tear-mould, is of a rich deep purple colour, and is found on wortwood in a clustered form resembling a mulberry. The fruit-body is a narrow cylinder, of a deep yellow colour, and is found on the trunks of pear and apple trees, resembling very much the crust of port wine.

*D. stillatus*, common Tear-mould, has a yellowish orange colour, and is found on the under side of the branches of trees, especially the ash. It is sometimes found on the under surface of a branch, having a bell-shaped form, and in this state it has been called Tremella fascicata. Its dried colour and form has caused it to have a great
number of synonyms.

TREMOLITE. [Avorite.] TRENCH, in military works, is an excavation in the ground from 12 to 18 feet wide, and 3 feet deep, and generally of considerable length, the earth being thrown up on one side in order to form a sort of parapet by which the soldiers in the trench may be covered from the view, or protected from the fire of the enemy. [SAP; SPER.]

TREND, in the reign of William II, was created in 1683, and was the second son of Thomas Trenchard, Esq., of Wol-
vertin in Dorsetshire, the then head of the ancient and wealthy family of the Trenchards. Anthony A Wood gives the following account of Sir John Trenchard's birth and education: William, the second son of John Trenchard, of Dorsetshire, became probationary fellow of New College in a civilian's place an. 1663, aged 15 years or more, entered in the public library as a student in the civil law, and was in December, 1669, a Master of Arts. He afterwards, having been in the recess of the University, in the degree, became barrister and counsellor. [Athenea
Oriovenses, vol. iv., p. 465, Blome's edition.] The account characteristically proceeds. 'busy to promote Oates his plot, busy against papists, the prerogative, and all that way. Trenchard was elected member for Trenchard in Charles II.'s third parliament, which met on the 6th March, 1679, and was dissolved on the 12th of July in the same year. Anthony A Wood erroneously states that he was of the first elected in the succeeding parliament, which, having been called on the 1st October, 1679, was not allowed to assemble until the same day and month in 1680. In this last-mentioned parliament Trenchard took a prominent part in the support of the Exclusion Bill, and was generally a zealous member of the opposition party. He was among those apprehended in 1683, on the suspicion of the Protestant plot, of which Lord Russell and Sydney were the victims. It was told against him that, he had engaged to raise a body of men from Trenchard, and his name on this examination, and Lord Russell also denied all knowledge of it; but he was committed to prison. One part of his guilt, says Burnet, was well known; he was arrested, and removed the evidence in the House of Commons; so he was reckoned a lost man. [History
Of His Own Time, vol. ii., p. 357, 8vo. ed. 1823.] He was afterwards however discharged from prison for want of a sufficient second witness against him. [Evelyn's Diary, vol. iii., p. 106.]

After the accession of James II, Trenchard engaged to support the duke of Monmouth in his foolish invasion, and on the almost immediate failure of the duke's attempt, he fled into France. [Daly's Memoirs of Great Britain and Ireland, vol. i., p. 173.] He is said to have been dining with his relative, Mr. W. Speke, at Limmer, when he received intelligence of the defeat of the duke of Mon-
mouth's army at Sedgemoor, he immediately rode off, and advised Mr. Speke to do the same; he succeeded in making his way to Weymouth, where he took ship for France; and the story goes on to say, that at the moment he was returning, his friend Mr. Speke was hanging before his own door at Limmer. [Burke's History of the
Commoners, vol. iv., p. 77.] He remained abroad till things had ripened for the Revolution of 1688.

Trenchard was member for Dorchester in the convention parliament which succeed the Revolution; the positions he occupied were those of Secretary of State and Lord Chancellor. The services to William were rewarded by his being made, first, secretary, then chief justice of Chester and a knight, and lastly, in the spring of 1693, secretary of state. He received this last appointment as a reward for the services of Somers, he was elevated from the attorney-generalship to be
lord keeper; and these two appointments were held of great importance, as being signs of William's desire to return to the Whigs, from whom he had for some alien-
acted himself. In the spring of the next year lord Shrewsbury returned to the other secretaries of state, and the government was made completely Whig. Sir John Trenchard died on the 20th of April, 1695.

Opposite characters have been drawn of him by Anthony A Wood and bishop Burnet. The former calls him "a man of a quiet spirit and a natural temper," and the latter is as follows: "He had been engaged far with the Duke of Monmouth, as was told formerly. He got out of England, and lived some years beyond sea, and had a right understanding of affairs abroad. He was a calm and sedate man, and was much more moderate than could have been expected, since he was a leading man in a party. He had too great a regard to the stars and too little to religion. The last feature is illustrated by a story of Wood's. An astrologer told him formerly that he should such a year be imprisoned, such a year like to be hanged, such a year be promoted to a great place in the law, such a year higher, and such a year die, which all came to pass, as he told Dr. Gibbons on his death-bed."

TRENCHARD, JOHN, a political writer of some celebrity in his day, was born in 1662. He was a member of a junior branch of the same family as the subject of the preceding article, and was the eldest son of William Trenchard, Esq., of Cuttridge in Dorsetshire, by Ellen, daughter of Sir George Norton of Abbots Leigh in Somersetshire. On Sir George Norton's death in 1715, Mr. Trenchard became an owner of the land.

The writer of the life of Trenchard, in the 'Biography Britannica,' has fallen into the error of making him the son of Sir John Trenchard, to whom he was but distant, and the actual degree of relationship which he can be seen in Burke's 'History of the Commons,' vol. iv., pp. 78, 79. This error has led to others. For instance, the writer represents him as having been born in 1693, instead of 1662. Sir John Trenchard himself having been born in 1650. These mistakes have been copied in Chalmers's 'Biographical Dictionary' and the 'Biographical Universe.'

Mr. Trenchard was educated for the law, and was called to the bar. But his fortune not requiring that he should follow a profession, he left the bar for what was to him the more congenial pursuits of politics. The author of the Life in the 'Biography Britannica' says, 'By the deceased of an uncle, and a marriage to a gentlewoman with a considerable fortune, he came into the possession of a good estate, and the prospect of a much better, which also fell into his hands on the demise of his father in 1695, whom he succeeded likewise in the House of Commons, being returned for Shaftesbury in 1695 and 1698, and for Ashburnham in 1695. The censure of the latter is just, and the deal of this is incorrect. Sir John Trenchard died in 1695, but Mr. Trenchard's father did not die till 1710. Mr. Trenchard was elected for the parliament that met in 1695, but he did not take his seat, nor was his name entered, and it is probable that the account of the fortune acquired by marriage, and by the death of an uncle, is a mistake arising out of Mr. Trenchard's inheriting, after his father's death, from his paternal grandfather, Sir George Norton.'

In 1698 Mr. Trenchard, in conjunction with Mr. Moyle, a pamphlet entitled 'An Argument showing that a Standing Army is inconsistent with a Freemen Government, and absolutely destructive to the Constitution of the English Monarchy.' The question of a standing army being at that time seriously agitated, this pamphlet is said to have produced a considerable effect. It was followed almost immediately by 'A Short History of Standing Armies in England.' In 1699 Mr. Trenchard was chosen by the House of Commons one of seven commissioners for taking an account of the forfeited estates in Ireland; and he was one of the four who signed the report including the private estate, or that which had belonged to James II. In 1702 he was appointed by William III., the protector, Charles II.'s brother, Governor of the Duchy of Cornet, and was created a baronet at his coronation.

In 1700 Mr. Trenchard published 'A Natural History of Superstition,' 'Considerations on the Public Debts,' and 'A Comparison of the Proposals of the Bank and South Sea Company.' These pamphlets, with two others added, 'Thoughts on the Peerage Bill,' and 'Reflections on the Old Whig.' In 1720 he began, in conjunction with Mr. Thomas Gordon, a Scot, on whose account he had taken some time before in his house, and employed as an amanuensis, a series of letters on political questions, under the signatures of Cato and Diogenes, which appeared first in the London, and then in the British Journal; and in the same year, in conjunction with the same Scot, a character called the 'Independent Whig,' which was devoted to the subjects of religion and church government. [GORDON, THOMAS.]

These two series of letters went on till 1723, on the 17th of December, there being a total of 125, which was the last. The communicative cause of his death was an ulcer in the kidneys; but he is said, in another account, 'to have thought too much, and with too much solicitude, to have done what was too ill thought of for a poor man to do; while his increasing charity would have exceeded the capacity of the head, which brought upon him many bodily disorders, and is supposed at last to have worn out the springs of life. (Biography Britannica.)

After Mr. Trenchard's death, Mr. Gordon collected Cato's letters, and published them in 4 vols. 12mo.

In the preface to the work, he has sketched the character of his friend and benefactor, justifying his eulogy by saying that he has set him no higher than his own great abilities and many virtues set him; that his failings were small, his talents extraordinary, his probity equal to his talents, and that he was one of the ablest and one of the most useful men that ever any country was blessed withal. Mr. Gordon also published, after Mr. Trenchard's death, the papers which formed the 'Independent Whig,' and at the end of the second volume is printed a long Latin inscription on Mr. Trenchard's tomb, which had proceeded from Mr. Gordon's pen. This inscription is printed also in a Latin translation in the postscript to the last volume. Mr. Gordon continued the 'Independent Whig' after the death of his coadjutor, and made two additional volumes. The four volumes of the 'Independent Whig,' and 'Cato's Letters,' have both passed into a second edition, and are both much read, having been useful in managing her affairs, she continued him in service, was much pleased with his company, and, having paid a decent tribute of tears to the memory of her deceased husband, entered some time after into a second marriage with this ingenious friend and companion, who had served children by her. (Biography Britannica.)

TRENCH, BARON FRANZ VON, was born at Rerg in Carinthia, on the 1st of January, 1711. His father was a success, for which reason the son now only eleven years old to serve in the war against Spain. At this tender age he was present and actually fought at the battle of Lézio. He was afterwards sent to the French school, and eventually to the Austrian. In a situation with great distinction, he was appointed cornet in the regiment, Paffy. His extraordinary physical strength united with an uncommon degree of ferocity manifested itself very early, and brought him into many difficulties. This affair was brushed off with great difficulty, and he was sent to Russia, where by his military talents and dauntless courage he soon gained the friendship of Marshal Münnich, and was made captain of hussars. A short time after he received this commission, he attacked a whole Turkish regiment near Bucharest, in the face of the express orders of his colonel, with his small troop, and gained a decided victory. Upon his return the colonel reprimanded him for his disobedience; he answered by a blow, which was followed by a discharge. The colonel was instantly shot, and he was sentenced by a court-martial to be whipped out of the regiment, a punishment at that period still inflicted in Russia upon commissioned officers. While he was awaiting the execution of this sentence, he informed the court that, beside the brusk engagement with the Turks was taking place, and Marshal Münnich being near, he called out to the marshall, and asked if he would pardon him, provided he brought back within an hour three Turks heads. The marshall assented, and Trench immediately leaped upon the first horse he saw, galloped to the very centre of the enemy, and
returned to the camp within half an hour with four Turks' heads suspended from the pomell of his saddle. But shortly after this he was convicted of still greater violation of discipline, and it was only through Münich's influence that his sentence was commuted first into banishment to Siberia, and at last to six months' hard labour. This punishment he served under Kiew, and immediately on his return to his estabished violent passion for the marriage of the princess Ulrike, the king's eldest sister, with the king of Sweden. The youngest sister, the princess Amalie, is said to have noticed him, to have invited him to see her at her private apartments, and to have cherished a mysterious affection for him. At that moment he is said to have boasted of the favours shown him by his royal mistress. This report was received by the king, who, although he did not think proper to punish his inordinate desire, disliking for every opportunity of visiting him most severely for trifling faults in military discipline. This story, embellished with many romantic incidents, originates principally with French writers, who are many instances of themselves as to dates and other matters. That an imprudent attachment between Trenck and the princess existed cannot be doubted; but that Frederic, violent and passionate as he was in all his private concerns, should have pretended blindness in so important a matter, and should even have continued to bestow favours upon the man who had dishonoured his sister's name, is difficult to credit.

During the war between Prussia and Austria he was placed on the king's staff, and distinguished himself on several occasions, particularly when his cousin, Franz Trenck, attempted to take the king prisoner by surprise at Collia. A short time afterwards his cousin addressed him a letter, returning his letter, in which he revealed that he alone had directed all the plans and measures of that expedition, and that his cousin had taken upon one of their foraging expeditions. This circumstance he mentioned in presence of a Colonel Jaschinsky, who owed him a considerable sum of money, and who at Berlin was known to be his secret enemy. This man artfully persuaded him to go to a close friend of his cousin, himself undertaking to forward the letters by means of his mistress, the wife of the Saxon resident, Madame de Bassert. Several letters passed in this way open through Jaschinsky's hands, until he got possession of one in which some highly imprudent expressions were found, which immediately caused him to be made known to the king. The result was, that Trenck was cashiered and sent prisoner to the castle of Glatz, where he had been committed to prison, from which he was soon commuted to the fortress Trenck, after a time to keep him there for ten year; evidence enough, it would seem, that he only meant to punish his correspondent with some public and no other or greater crime. At first he was treated with the greatest respect, and with all possible indulgence; but when it was discovered that he had several times, by letters, attempted and nearly effected his escape, he was placed in close confinement. On the 1st of December, he had succeeded in making his escape, by the assistance of and together with Major Schell. With great fatigue and at great expense he reached his mother's residence in Brandenburg, where he was received and adequately furnished with all the things necessary for his protection. A strict investigation was ordered by the king, for the purpose of finding out how he had effected his escape; the result of which was the discovery that large sums had been remitted to him by the princess Amalie. It is highly probable that this was the first time that Frederic knew of his sister's attachment; and from this period must be dated his intense and obdurate hatred of Trenck. In the mean time Trenck had got into fresh troubles at Vienna, which he himself principally attributes to the intrigues of his cousin Franz, notwithstanding he was in prison at the time on a criminal charge. He left Vienna in disguise, and went to Russia, where, through the recommendation of the English ambassador (to whom Frederic himself had written at Berlin, under the flattering title of Matador de las jeneuses), he was well received, and appointed captain of a troop of horse. Here he might have lived peaceably and content, being in high favour with the empress, and having acquired considerable wealth through a lady of a Russian princess; but the Russian ambassador, Count Goltz, left nothing undone to injure him, pretending that he acted thus in accordance with instructions from the King his master. His cousin at Vienna, who was dead, had made him his heir. Upon this he determined to leave Russia; and after having visited Sweden, Denmark, and Holland, he returned to Vienna to take possession of his estates. But his difficulties were multiplied, as his cousin's estates were under sequestration, and after various and expensive suits he agreed to a compromise, by
which he received 75,000 florins, and the appointment of a
capitaincy in a regiment of hussars. In 1748 he went to
Prussia to visit his family; and at Dantzig, when on the
point of embarking for Sweden, owing to some hints of
impropriety in his conduct of the office, he was arrested
by a party of hussars, and taken prisoner to Berlin. He
was at first treated well, but his intemperate language,
et even threats against the king, hurried on his fate. He
was sentenced to death, but of the scaffold, and found’in a cell under
ground, and almost without light. His sufferings, and his
bold, desperate, and almost successful attempts to escape,
may be read in his own Memoirs. After two soldiers had
suffered death for conviving at his escape, he was released
from hiberity, but as plots had been discovered, a
prison was last built on purpose for him, in which he
was chained to the walls with fetters of seventy-six pounds
weight. Here he remained above four years more, till at
last his relations succeeded in softening Frederic’s obdura-
cy; and on the 24th of December, 1763, he was released
upon condition of leaving the kingdom. He went first to
Vienna, where he was again arrested on account of his
violent language against Frederic. The emperor however
having convinced himself by a personal interview that the
words were the mere outbreak of unmeaning rage after his
dreadful sufferings, set him free, paid him the arrears of his
salary as a captain, and advised him to retire in order to
receive the health and his spirits. He settled at Aix-la-
Chapelle, married a daughter of the burgomaster De Broe,
and commenced business as a wine-merchant. He went
several times to England upon commercial affairs, but not
without the suspicion that he was not provident in his
spending, and he became a bankrupt. After this new misfortune
he wrote articles of rather a democratic tendency for several
periodical publications; and in 1787, after the death of
Frederic the Great, he published his Memoirs, from the
copyright of which he received a very large sum. From
that time he became for a time a distinguished person in the
world. His book was translated into almost all European
languages; the ladies at Paris, Berlin, and Vienna worked
prose pieces, ballads, songs, and verses, which were not
less than seven different theatrical pieces in which he
was the hero were brought out on the French stage. The
year following he once more visited Berlin; but although
he was kindly received by the king, it seems that he was
disappointed in his expectations, and he returned to Aix-la-
Chapelle, where he commenced the publication of a
weekly paper, under the title of ‘L‘Amis des Hommes,’ in
which he proclaimed himself a champion of the new
French doctrines. Meeting with little encouragement, he
went to Paris in 1792, joined a Jacobin club, and was
afterwards a zealous adherent to the Mountain party,
which he ardently supported, and accused him, brought to
him the salutatio on the 25th of July, 1793, on the
scaffold, and in his sixty-eighth year, he gave proofs of
his ungovernable passions. He harangued the surrounding
multitude, and when his head was on the block he once more
set up revolting utterances, and to the executioner had to hold by his silver locks to meet
the fatal stroke.

(Friedrich von Dreyß’s Merkurzeitung, Lebensgeschichte von
thun selbst beschrieben, 2 vols. Svo., Berlin, 1797; Meditati-
ons du Baron de Trenck dans sa Prison a Magdeburg, with
un précis historique de ses malheurs. 1 vol. Svo.,
Paris, 1788; Denkverdugleit von Freyherren von Dohn,
Berlin, 1812; D. Thibault, Friedhe de l’Eon, ou Souve-
Leben und Thaten der Trenck von Wattemann.
2 vols. Svo., Leipzig, 1837.)

TRENT. [Tyrol.]

THE FIRST COUNCIL OF, CONCILUM TRIDENTI-
NUM, the last ecumenical council of the Latin or
Western Church, was first convoked by a bull of Pope
Paul III., dated May, 1542, for the avowed purpose of
putting an end to the church defections, as it were,
by the schism of Luther and the other reformers. The
papal legates, one of whom was Cardinal Reginald Pole,
proceeded to the town of Trent, which was fixed upon for
the assembly, being the best kind of neutral ground
between Germany and Italy. The pope had also
invited all Christian princes, and especially
the king of France, and Charles V., emperor of Germany
and king of Spain, to send to Trent the bishops of their
respective dominions. But neither Francis nor Charles,
who were then at war with one another, appeared
willing to comply with the pope’s request; and the
legates, not finding a sufficient number of prelates assem-
dled, did not open the council. Meanwhile Charles V. was
compelled to admit certain of the emperor’s prelates,
who had already received three votes in the college of the
emperor, namely, those of the electors of Branden-burg and of Sax-
ony, and of the elector palatine, and now claimed a
fourth, to the consternation of the Pope; and his en-
thusiasm that of Hermann, archbishop of Cologne, who had seceded
from Catholicism. This claim however was overruled,
by the clergy of Cologne adhered to the antient faith;
the Pope supported the emperor, and rejected the pope.
The Pope communicated and deposed the bishop of the ob-
ject to make a new election, and the emperor sent
troops to expel Hermann and install the new arch-bis-
ept. Charles however still persevered in his hope of
effecting a union between the Protestants, and
lenticious: he devised conferences or consultations for the pur-
purpose, to which he invited theologians of both parties, to
all to no purpose. He also held forth the prospect of
a general council; but the Protestants insisted, that as
an assembly was to be composed of Roman Catholic
princes, they would not recognise its authority, which
is of necessity be hostile to them and their doctrines.
Charles commenced a council of the Protestant princes, in or-
order to be enabled to manage the war. and carry on his war against the Turks. He also knew
that the rival, Francis of France, who was persecuting the
inhabitants of his own dominions, was secretly intriguing to
get the Pope to take the side of the Turkish empire; and
voked a diet at Speyer in 1544, in which a point of con-
rection material interests of the people and
of communion was agreed upon, until a fate
ship should dissolve, permanently, in separation
points of contention. The Pope was angry at this, and
he considered a weak concordation on the part of Char-
he wrote to the emperor, in August, 1544, a strong
letter of censure. Meanwhile the peace of Crespy, betw
Francois and Charles, had been dissolved, and to the
opening of the council, Pope Paul sent against
legenates to Trent to proceed to insal the assembly, who
were present on that day; and
other prelates afterwards gradually joined the assem-
y. After hearing mass and a sermon in the cathedral,
presidents, being seated, were asked by Cardinal del
first papal legate and president of the council, whether
pleased them, for the glory of God, the extirpa-
tion heresy, the reformation of the clergy and people, and
enlightenment of the nation, it was determined, and declared that the Sacred General Trinidtute Con-
cil should begin and was begun? To which the council
replied singly ‘Place!‘ It was next resolved that the sacred council would be held
the 7th of the following January. To Deum va-
Tage; and the fathers, having taken off their pontifical
robes, returned to their respective dwellings. Committee
were appointed to regulate preliminary matters of
and proceeding. The French bishops instead of
the title of ‘Ecumencial Triniture Council’ should be all
the words ‘representing the Universal Church‘ has been
done at Constance and Basle. The legates however became
opposed to the council, and on several preludes, the
more the seceders from the church. It was also remem-
bered that the councils of Constance and of Basle had
added the declaration that ‘the council held its authority
immediately of Christ, and was above all other di-
orders, the papal dignity included. This would have been drea-
ing a delicate point, and the legates avoided it by obser-
vating that the council of Constance had assumed a right
of supremacy because at that time the church was in a state of
schism, and was assisted by several prelates; and as for the council of Basle, that assembly, after quarrel with Pope Eugenius, was no longer considered legitimate. The words suggested by the French bishops
were consequently rejected.

Another preliminary question was, whether the vote
should be given by nations, so that the prelates of
nation should have one vote all together, or by
dividuals. The legates insisted upon the latter mode being
dopted, and they carried their point, a matter of importance when it is considered that the Italian bishops were more numerous than the rest.

The council had been professedly convened for two great objects: one, the definition of the dogmas of faith, and the condemnation of heresies, and the other the reform of the abuses of the church, and afterwards the amelioration of the state of the clergy. The doctrines of the Church of Rome were defined and the only claim of reigning the seceders was to manifest an earnest will to reform abuses before proceeding to condemn them and their tenets; that if the council did not take in hand speedily the work of church reform, it should proceed against both. That was the only surety of the injury of the ecclesiastical authority. The bishop prince of Trent spoke at length on this side; as, being on the threshold of Germany, he was acquainted with the state of opinions in that country, and the majority of the prelates tended to incline to his opinion. The papal legates however, appointed by the Italian prelates, were of opinion that the council should begin with defining the dogmas, as that was the highest task, and ought to be first attended to, because faith is the foundation of all moral virtues; that he outcry about reform was well known to be mainly directed against the court of Rome and its jurisdiction, and as an indirect attack upon the authority of the sovereign pontiff, who refused it a free hand by the in the initiative in correcting the abuses of his own hurt, while the council was attending to the graver questions of religion, otherwise discussions would arise between the head and the other advantage and satisfaction of heretics. Would the bishops assume the functions of judges over their supreme pastor, and proclaim the superiority of the council above him, as those of Basi had done? The pope could not, either with respect of his dignity or his submission, submit to such an assumption, and would resist it strenuously, as it tended not only to overthrow the pontifical authority, but also to the whole spiritual hierarchy and the church itself into a monarchy. The Cardinal of Monte to the head legate, acknowledged the existence of many abuses; but, he said, the abuses were found not only in the Roman court, they existed in all orders of persons and in all ranks of ecclesiastical dignitaries; that he should therefore give the example of removing his pluralities and curtailing his establishment and reducing his expenses, and he hoped other fathers would do the same for the edification of the Christian world. His Holiness, the constant dominions of the pope, the bishop prince of Trent said that he was ready, if the council so pleased, to renounce the see of Brixen, retaining only that of Trent; but the proposal was not responded to by the emperor, and of the other prelates, it was resolved that the two departments of dogma and discipline should be proceeded with simultaneously, that for every sitting congregation engaged in discussions on dogma, there should be another concerning the reform of discipline; and this resolution was at last agreed to by the pope.

The council, at the beginning of its regular session, undertook to define first of all what were the sources of authority in matters of faith. It declared that the Catholic doctrines are contained in the authentic books of the Old and New Testaments, and also in the traditions concerning faith and morals which are preserved in the Catholic church. This was a condemnation of Luther's assertion that the doctrine of the Christian faith is contained in the Scriptures and that unwritten tradition is not to be held as authority.

The council next proceeded to define the dogmas of faith as original sin, predestination, grace, and free will, the definition of which may be seen in the catechism published by the name of Catholicism ad Parochos, or Catechism of the Council of Trent, which is translated into most languages.

While the council was thus occupied, Luther, the immediate originator of all this controversy, died at Eisleben in Saxony, in February, 1546. Shortly after war broke out between the emperor Charles V. on one side, and the king of France and the king of England on the other, and the fathers assembled at Trent were at one time alarmed for their own safety. The war however having rolled on towards the north, the council continued its labours, and proceeded with the definition of the dogmas, and the decision of the question of the sacraments, which they stated to be seven in number, namely, baptism, confirmation, the eucharist, confession or penitence, extreme unction, ordination, and matrimony; they then proceed to treat of the question of the Anabaptism, laying down the orthodox doctrine and anathematizing the discordant tenets of the Lutherans, Zwinglians, and other heretics. At the same time the council proceeded with discussions on subjects of church reform. The question of pluralities proved as most difficult one to settle. The Spanish bishops made a strong renunciation against the abuses of pluralities and non-residence, and wished the council to pass at once severe decrees against these abuses. The pope proposed to take into his own hands the task of reform, and they wrote to Rome accordingly, and the pope directed a bull to the council by which he referred the matter to himself. This bull met with great opposition and was a source of misunderstanding between Rome and the council. At last, in March, 1547, the legates suddenly closed the session, which was reckoned the seventh since the opening of the council, and in virtue of the authority they held from the pope they transferred the council to Bologna, under the plea that a contagious disorder had broken out in the city of Trent. The majority of the prelates assented, but there were eighteen bishops, chiefly of the dominions of the emperor, who refused to take part in this innovation. The pope therefore sent the legates to Bologna, where, after opening the session, the council was adjourned sine die. Charles V. protested against the meeting of Bologna, which he did not acknowledge as a council, and insisted upon the council being restored to Trent.

In 1550 Pope Paul III. died, and his successor Julius III. again convoked the Council at Trent, in May, 1551. Not many prelates attended. The French king, who was at the time on bad terms with the pope, on account of the disputed possession of Parma, forbade his bishops to repair to Trent, on the plea that they could not go there in safety; and he talked of convoking a national council in France. The Council, however, adhered to the doctrine of transubstantiation, the Lord's Supper, and the mass, and afterwards that of confession and the other sacraments. At the same time decrees were made concerning points of discipline, touching the episcopal jurisdiction, the appeals to Rome, and other such matters. This session of the Council is remarkable, inasmuch as there were present ambassadors of Maurice, elector of Saxony, of the elector of Brandenburg, and several princes of Germany. Maurice, having obtained a safe conduct from the Council, were requesting a conference on the controverted doctrines. But the news of the revolt of Maurice of Saxony against the pope, of the departure of his army, and of his flight to France, in 1552, scared away most of the prelates, and Pope Julius soon after prorogued the Council by a bull, and the legates returned to Italy. The president, Cardinal Crescenzo, who had been some time infirm, died on arriving at Verona.

This prorogation of the Council continued for ten years, during which period three popes died in succession, Julius III., Marcellus II., and Paul IV. At last Paul IV. being elected, began to think seriously of re-opening the general council, of which the church seemed to stand more in need than ever.

In 1561 Pope Paul IV. having issued a bull for the re-opening or resuming the sessions of the Council at Trent, the Fathers gathered together in that town, and on the 18th of January, 1562, the session was solemnly opened in the cathedral of Trent by the papal legates, one of whom, the Cardinal Gonsaga, was named president by the pope. One hundred and twelve, consisting of archbishops, bishops and priests, attended the council, which, having chosen and ordination of the various sultans were also present. The archbishop of Reggio, after delivering a sermon, asked the Fathers "if it was their pleasure that the holy, omnipotent, and general, sacred Council should continue according to the tenor of the letters of the Holy Father and Lord Paul IV., and that those matters be treated in due order which, on being proposed by the papal legates and the Council, shall appear to be most fitting and suitable to relieve the calamities of the times, to restrain the evil tongues of slanderers, to correct the
abuses of morals, to cure the church of its evils, and to bring about the peace of Christendom. To which all answers were in the affirmative. The delegates of Granada and the bishops of Leon, Orense, and Almeria in Spain, who objected to the words ‘on being proposed by the leagets’, as restricting and trammelling the deliberative faculty of the council, were answered by a question or a riposte, as the right of initiative, as it is called in our days. After some debate the words were approved. The next difficulty was started by one of the French envoys or orators, De Suctun, who, by the imperial envoy, who wished that the present council be called a new one, and not a continuation of the former. As the Protestants had refused to acknowledge the early acts of the Council, the declaring that the present Council to be a continuation of the former was like the adhesion of the French against resolution with the utmost extremity decreed by the court of France, where the Huguenots were powerful and threatening. The pope had purposely employed the word ‘resuming’ as a middle term, and he maintained his point.

The Council now proceeded to regular business. The leagets proposed several questions of discipline, the principal of which were—to render obligatory the residence of ordinaries in their sees and of incumbents in their parishes; 2. that no act of dispensation should be without a benefit; 3. to provide against vicious or ignorant incumbents; 4. to legislate upon the validity or nullity of clandestine marriages; 5. to remedy the abuse of quorums, or corporal presence. On this question, the residence, gave rise to warm discussions, and was at length adjourned to a later period. With regard to the question of ordination, it was decreed by the Council that no one should be ordained without being first examined, living, patrimony, or pension sufficient for his maintenance as a priest; such a living, patrimony, or pension not to be resigned, alienated, or taken away without leave from the bishop. Bishops were empowered at the same time to unite poor livings into one, and to oblige the parishioners to repair the parish churches. It was decreed also that the conferring of clerical orders, the testimonials, seal, &c., should be gratuitous on the part of the bishop and his correligionaries, as a very low form of order. With regard to those incumbents who proved unequal to their ministry, if through ignorance or infirmity, the bishop was to give them proper coadjutors; and if through misconduct, he was, after trying admonition first, to administer a confinable punishment. As many lay persons were possessed of benefices, the Council decreed that every holder of a benefice in a cathedral or collegiate church should be obliged to take the order corresponding to his ministry, and that the vestments in the church of the subdeacon, that no one should be ordained bishop unless he had been at least six months in holy orders, and was a doctor of divinity, or had testimonials from some university, or, in the absence of the superior of being qualified to expound theology and canon law.

Dispensations used frequently to be obtained from Rome on false pretences. It was decreed that all dispensations should be examined by the respective ordinaries, who were to ascertain the truth of the ground on which they were granted. Bishops were likewise enjoined to look to and watch strictly the proper administration of charitable funds and pious bequests; and in particular instances they were to act as executors. Notaries were subjected to examinations in all such matters. The pain of excommunication was pronounced ipso facto against every one, without any distinction of persons, who should usurp or detain any property, right, or emolument belonging to any church, benefice, Mont de Piété, or other pious and charitable establishment, until he should make full restoration and receive absolution from the pope. This gave rise to serious discussions, especially on the part of the French parliament, who wished that the Council should overlook its powers, and had encroached upon the rights of the civil authority.

The subject of the questions, or deputed distributors of interrogatories and receivers of the answers of the faithful to be applied to pious purposes, came next before the Council. It was owing to some of these men that the great schism of Germany and Switzerland had originated. The abuse was not only unremedied, but tyranny for the hierarchy and the very existence of the church. Many fathers of the Council were for abolishing altogether the office of quorist, as a source of unavoidable corruption; others were for circumscribing it by giving to each quorist a profit whatever from the sale. It was represented the former Councils, such as that of Vienne and Lyon, had acknowledged the abuses of the quoristship, and had rejected it as a profitable commerce. After a long debate, the bishop of Lanciano arrived at Trent from Rome, with communications to the leagets that it was the pope's wish that the office of quorist should be entirely suppressed. This opinion was agreed to, and was submitted to serving to the ordinaries or chapters the faculty of publishing at due seasons the indulgences of the church, with any remuneration, and to receive the voluntary oblations of the faithful and apply them to charitable purposes. On these two points the most effectual which were carried in the Council of Trent.

Meantime the Committee of the Council appointed to examine matters of dogma and ceremony, proposed several questions concerning the use of the communion and mass. The court of France and the emperor wished that the use of the cup to be granted to the laity, in order to remove at least one of the points of contention with the Protestant church, the envoy of the duke of Bavaria suggested more restrictions, and the imperial envoys, who were engaged in the dispensing of alms, wished the court of Germany as a point of distinction, the establishment, as it were, of an almoner to the clergy, which Cardinal Sforza Pallavicino, the orthodoxy bishop of the Council, explains in an expression of words that it appeared as if Catholic princes fancied that the Council of Trent was only to apply certain rules, rather than condemning heresies! After much discussion the Council decreed that laymen and non-officiating churchmen were not obliged to communicate under both forms, but were to be given the benefit of the strict rule. This was agreed to. It was decided that the question should be referred to the Roman pontiff, who would settle it for the best advantage of the Christian world.

On the subject of the Episcopal institution, a question arose which threatened a schism in the assembly. It was, whether the bishops held their ordination by divine institution, or whether they held their faculty from the pope as Vicar of Christ. The archbishop of Granada, the cardinal, wished to confine the question to what was canonical; and if, in the case of the pope, the bishops, the Council was to apply its own decisions. The pope, however, had taken steps against the council, and the cardinal, it was said, was expected at Trent. He arrived about the middle of November, accompanied by fourteen French bishops, the abbots, and eighteen doctors of divinity, mostly from the Sorbonne. He was received by the papal legates and other prelates with marks of the greatest respect. After the first introduction and congratulations, the cardinal narrated to the Council what his instructions were, from the queen-mother, Catherine de' Medici, were to be to the Council. He stated that the use of the cup in the communion should be granted to the laity all over the kingdom of France. 2. That the sacrament should be administered in the French language. 3. That in the parish church prayers should be said in French, and the catechism taught in the same language. 4. That the psalms should be sung in French upon a version approved by the bishops and the universities. 5. That the means should be found to prevent the licentious life of many churchmen, and that no other could be agreed upon, at least it was enacted that holy orders be conferred only upon persons of mature age. 6. That moreover if any proposals should be started in the Council, for the love of peace and the re-
The marriage of priests or the alienation of the church property which was already in the hands of the Protestants: in all such matters the ambassadors of the French king and French bishops were instructed always to exert themselves and of such concerns granted by the Council for the recovery of so many noble provinces which had been torn from the body of the church, the king and the queen-mother promised in their letters that the Cardinals having laid their hands on the royal blood, that they would accept the decrees of the Council and oblige all their subjects to conform to them. Beside these, the French ambassadors were also instructed to petition the Council against pluralities and non-residentiaries, and to demand upon the site of images, relics, and indulgences, and the practice of pilgrimage, and of pious foundations. All these discussions were in the upper thirty-four heads, were laid before the Council at the beginning of the year 1563, by Renaud Ferrer, president of the parliament of Paris, and orator to the Council, as petitions on the part of the French king. Both Ferrer and the cardinal of Lorraine supported them in eloquent but general terms, insisting upon the absolute necessity of a thorough reform, and of restoring the church to its ancient purity, depicting with vivid colours the fearful calamities, the civil and religious wars, the bloodshed, disorders, and anarchy which distracted a great part of the fair kingdom of France, owing to the protracted schism. The tone and the particulars of these remonstrances agreed in general with those of the envoys of the emperor: but they were opposed by the Italian prelates, who thought that most of the petitions were derogatory from the authority and dignity of the Roman see. Parties ran high, and reproaches and recriminations were exchanged with acrimony. The papal legates, especially the Cardinal Gonzaga of Mantua and Cardinal Scippani, endeavoured to smooth down contention and to conciliate hostility. On the question of residence being again agitated in the Council, it was urged by the Spanish prelates that no one should be permitted to reside save by divine law, and the Cardinal of Lorraine and the other French prelates seemed disposed to agree with them. This treading upon the old ground of dispute concerning the divine institution of bishops, and the papal legates with the marriage, should have been foreseen; but the discussions followed, projects and counterprojects of a decree were proposed, and it was not till July that the Council came to a resolution. During the debates the legates having said that the pope had authority to govern the universal church, the orators of the French king, Lannea and the president Ferrer, objected to this, as being contrary to the ir opinion and that of the church of France, that the Council was above the pope, an opinion which Ferrer and the cardinal of Lorraine supported before the Council by arguments. Upon this Cardinal Scippani observed to Ferrer that the case was not in point, as at the time of the Council of Constance there was schism among various pretenders to the papal throne, and the council had been convened in obedience to Christ on earth even with their lives. The Cardinal of Lorraine, alarmed at the progress of the Huguenots, as they were called, in France, and at the murder of his brother the duke of Guise, became anxious to bring to a conclusion the business of the Council and return to court, and be therefore drew nearer to the legates and separated himself from Ferrer and the other envoys of the Sorbonne or Gallican school.

In the month of March (1563) the two most distinguished of the Papal legates at the council, Cardinals Escude Gonzalez and Louvain, were not long interval from each other. Their loss was greatly felt. They were both learned, temperate, conscientious, and irrefragable. Pope Pius IV, substituted for them Cardinals Morone and Navagero, and appointed Morone to be president of the council.

In July of that year the Council issued its canon on the subject of residence. Without entering into the question of divine right, it enjoined all bishops, archbishops, and other prelates, who should be invested of the Roman church, to reside personally in their respective cathedrals through-out the year, and more especially during the Lent, Advent, Christmas, Easter, and other solemn festivals, except in cases of urgent necessity, through motives of Christian charity, or for the evident advantage of the church or of the commonwealth, and then not without the written approbation of the pope or of the metropolitan. The same decree was extended to incumbents of parishes.

The Council issued a canon concerning the doctrine of the institution of bishops. It stated that there is a hierarchy in the church, instituted by divine ordination, and consisting of bishops and presbyters and other ministers; that bishops are superior to presbyters, and have the power to ordain and depose, and other rights which presbyters do not possess; that the only legitimate bishops are those ordained by the pope or by other ecclesiastical and canonical authority, which last expression alluded to a custom that there should be some persons as the suffragans without an express commission from the pope. At the same time a decree of discipline was annexed to the canon of doctrine. After several provisions for the proper administration of the churches, it was decreed that in every episcopal church there should be at least one seminary for the education of candidates for holy orders, and regulations were laid down for the economy, discipline, method of instruction, and the choice of teachers of such establishments. This was another very beneficial enactment of the Council.

The Council next laid down the doctrine of the Catholic church concerning marriage, which it reckons as one of the sacraments. Among other articles on this subject, it condemned polygamy as contrary to divine law, it forbids persons in holy orders contracting marriage, and it states marriage to be indissoluble, even after the adultery of one or both of the parties.

On the important question of clandestine marriages, that is to say, marriages contracted before witnesses without the intervention of the parish priest, the Council decreed that in future no marriage should be considered valid which had been celebrated out of the presence of a bishop, or another clergyman duly deputed by the incumbent, or by the ordinary, and in presence of at least two witnesses beside, and that their names, as well as the names of the married parties, and the date of the celebration of the contract, should be entered into the church registers by every parish incumbent. The Council explained also what were the cases of relationship and other canonical impediments to the contracting of marriages, and although it did not condemn altogether the practice of dispensations being granted by the pope in particular instances, it recommended that such dispensations should be granted rarely, gratuitously, and on proper and sufficient grounds.

Hitherto the secular princes had insisted upon reforms of the church and clergy: now the pope and court of Rome urged the Council to make reforms affecting the princes and their courts. According to instructions received from other Roman sources, the pope to whom Cardinal de Rome, the legates laid before the assembly several motions, chiefly in support of the ecclesiastical immunities. The following were among the principal heads:—That churchmen should not have the lay courts, that the lay courts and magistrates should not intervene in causes of matrimony, heresy, titles, fiefs, patronage, matrimonial benefices, ecclesiastical fees, the temporal jurisdiction of churches, nor in any cause, civil, criminal, or mixed, pertaining to the ecclesiastical courts. That churchmen should not be liable to pay taxes, tenth, seigneur, or subsidies of any sort, either on the property of the church or on their own patrimonial property. That the property of the church, moveable and immovable, of every sort,
tithes and other rights, should be held as sacred from the hands of the lay powers. That all letters, citations, sentences, and excommunications, from the ecclesiastical courts, or from Rome, should be promulgated and executed without requiring any exequatur or permission from the civil po-

cers. That neither nor any other prince should interfere with the said courts or with the
tribunal of the Inquisition, but should, when required, give them the assistance of the secular arm.

Thus was put forth the legates raised a
storm on the head of the Council. The emperor Ferdinand
wrote, that he would never submit to have his jurisdiction
curtailed either by laymen or churchmen. The French
envoys went much further. Ferrer declared before the
Council, that on the 30th of September, in the name of
King Charles IX. solemnly protested against what he
called an attempt to infringe upon the usages and liberties
of the Gallican Church, and the ancient prerogatives of
the most Christian king. He added, that these liberties
and prerogatives had existed for ages previous to the first
publication of the canon law, that they were founded upon
holy writ, the antient councils, the laws of the early
Christian emperors, and the custom of the kingdom. He
then launched into a violent invective against the corrup-
tions and ambition of churchmen, exhorting the fathers to
begin by reforming themselves, and to imitate the ex-
ample of Ambrose, Augustin, and Chrysostom, who had
formed their character by prayer and holy arms, but by
prayer and exhortation, by sound preaching, and by the
good example of their own lives. Ferrer, having con-
cluded his speech, was desired by the president to retire, who
allegedly said strongly to the legates, under the auspices of
the French envoy. Ferrer printed his own speech, adding an apology to it; an anonymous divine wrote against
Ferrer, condemning, among other things, as heretical, his
saying that kings derived their power from God, and not
through his vicar on earth. The Cardinal of Lorraine,
who was absent, having gone to Rome, also disapproved
of Ferrer's language when he heard of it. The pope
however wrote to the legates, recommending moderation
and prudence in excommunicating the offenders, as
evidenced in the dispute with Ferrer. But Ferrer, having
taken offence at some strong expressions of the legates,
and of De Grasia, bishop of Montefiascone, had already
left Trent for Venice, where his colleagues had pre-
ceeded him, and he never after returned to Trent. King
Charles approved Ferrer's conduct both in protesting
and in withdrawing from the Council, and the Cardinal of
Lorraine was censured in France for having become, as
they said, too full of Italian and Romaniast since his visit to
Rome.

Pope Pius however directed his legates to withdraw the
obnoxious motions, and to content themselves with a gen-
eral adoration to all Christian princes, which was adopted by
them. They added enjoining them to respect the rights and immunities of the church, and the
constitutions of the pope and councils in favour of eccle-
siastical persons and ecclesiastical liberties. Thus another
view of the pope's conduct was setting the prudence
and moderation of Pius IV. But the obnoxious principles
started by his legates were revived by his successor Pius V.

The Council now drew to its conclusion. A number of
concerns concerning doctrine as well as discipline were passed:
other minor points were referred to the decision of the
pope. The doctrine of purgatory and indulgences, and of
the supremacy of the pope, and of the得promotion from the church of the living, was confirmed.
The invocation of the saints who intercede with God on behalf of men, and the venera-
tion for their relics, were likewise adopted: the images
of Christ and the saints were to be retained and venerated in
the churches for the sake of devotion, and as a sign of the
same time that no meretricious ornaments or other
sensual enticement was to be mixed with the devotional
practices. Severe penalties were decreed against church-
men taking part in pluralities, against the excommunication
of living with cues of souls, and against duelists. Several
regulations were made for the proper examination and
selection of candidates to vacant sees, or to livings with
every like condition. There were also made a recommen-
tion of their dioceses once every year with a modest train,
and retinue, and they, as well as the parish incumbent, to
preach every Sunday and other solemn festivals. No one
was to be appointed to a benefice with cue of souls under
twenty-five years of age. Criminal charges against
bishops were to be judged by the Roman pontiff. Provin-
cial synods to meet once every three years, and diocesan
synods every year. The council passed several constitutions for
the defense of monastic life, and for the reform of abuses which had risen in them. It
per-
mitted at the same time the mendicant orders to ac-
quire real property, although that was originally forbidden by
the rule of St. Francis. Only the Capuchins and the
Minori Osservanti were excepted, at their own request,
from this indulgence, as they declared that they would
continue to live in poverty according to their original
vows. An accusation was made of the pope, which had emanated from the Council concerning discipline,
and reform were to be understood 'have always the au-
thority of the apostolic see.'

These and other canons being passed, in the beginning
of December, 1563, the cardinal legate, president of
the Council, asked the fathers whether it was their will
that the Council should be closed, and that the legates, in
the name of the assembly, should ask of the pope the confirm-
ation of their decrees. The fathers, by the number of 255, namely, 4 legates as
2 other cardinals, 3 patriarchs, 25 archbishops, 168 bishops
present; 39 proxies, 7 abbots and 7 generals of monas-
ter orders. The acceptance of the ambassadors was the
requested and given, except the ambassador of Philip
II. to the king of France. The closing of the Council, and the ambassadors of France, who had left Trent
in dudgeon.

Pope Pius IV., in solemn consistory, on the 20th of
January, 1564, confirmed the acts of the Council by a
bull countersigned by the cardinals. All the Roman Catho-
lites accepted the Council, and promulgated it in the
states, with the exception of France, which persisted in
opposition, and in those assertions of jurisdictional
independence of its church and kings, which were after-
wards embodied in a regular form by the assembled French
clergy in 1562. Other princes opposed more or less
openly certain particular decrees which interfered with
their power. Several of them, however, agreeing, in the
form of a memorandum, which little did else than assert or confirm the
antient doctrines acknowledged by the Western church,
with regard to the correction of abuses and the reform
of morals, its effect much less than many former councils:
It may be justly affirmed that if the Council could not obtain
the strict discipline of its bishops, it was, at least, for the
Catholics, it pre-
ned to at least the Catholics from becoming Protestant.

(Botta, Storia d'Italia, b. xi.)

Two distinguished Roman Catholic writers have writ-
tened this work: the one, the famous Fr. Paolo Sarpi, during at
times a feeling hostile to the court of Rome; the other,
Cardinal Sforza Pallavicino, on the contrary, writes in a
tone of perfect submission to the Roman see. By com-
paring the works, readers are enabled to come to
something like a fair understanding of the labours and the
merits of that memorable assembly.
Among the numerous works relative to the proceedings of the Council of Trent, the following may be mentioned:


The Trent and Humber river system is commonly spoken of as distinct, they are exactly the same river. The Humber is simply the estuary named by the junction of several streams, and is therefore regarded as a part of the Trent basin. The limits of both length and importance stand first in the system.

*Basin.*—If we consider the mouth of the Humber as defined by Spurn Head in Yorkshire and Donna Nook in Lincolnshire, and all the waters flowing into those units as belonging to the system of which it is the outlet, the limits of its basin are as follows:—On the north-east it is bounded by the uplands, which, rising from the alluvial plain of Holderness, form the cliffs which skirt with some intervals the coast. Those uplands which run through Holderness and into the Humber. Between Holderness and Bridlington (populous Barton) Quay the basin extends to the coast, for the source of the river Hull is within a mile of the shore of Bridlington. From the banks of the river, when it enters the sea, turn inland and have a circuitous course into the Humber at the town of Hull. All this part of the basin is alluvial: but near Bridlington Quay the Yorkshire Wolds rise above the alluvium. These 'wolds' consist of an insulated range of chalk hills: they belong to the great chalk range which extends from the central chalk district of Wilts north-east into Staffordshire, and Lincolnshire, although the continuity of the range is broken, first by the Lincoln gravel, then by the Wolds of the Ferrars, and finally by the Fen district adjacent to it; and again by the Humber and the alluvial flats which line its banks. The Yorkshire Wolds encroach upon the basin of the Humber; extending southward in the form of a crescent more than 30 miles between its extremities, from Flamborough Head near Bridlington almost to the banks of the Humber, about 8 or 9 miles above Hull; and separating the sub-basin of the Hull from that of the Derwent. Many feeder streams of these range rise on the slope of the Wolds; those of the Hull in the concave, those of the Derwent on the convex side of the crescent: but the northern part of the Wolds is drained by a stream which flows through a valley in the chalk and rises into the sea at Bridlington Quay.

North-west of Flamborough Head the basin of the Hum- ber again extends to the coast, for the source of the Hartlepool, a feeder of the Derwent, is as near the shore at Filey as that of the Hull at Bridlington Bay, nor is the head of the Derwent in the Humber, which is the north-eastern extremity of the basin. The colif hills which extend from Robin Hood's Bay inland under the designation of the northern moorlands, form part of the northern boundary of the basin of the Humber, which they separate from those of Whitby Esk and the Tees. A branch of these moorlands, the Hambleton Hills and Howardian Hills, extend from an east-south direction on the western extremity of the basin, divides the sub-basin of the Derwent from that of the Swale and the Ouse, all belonging to the system of the Humber.

From the western end of the eastern moorlands, the basin is bounded still on the north side by a lateral branch of the great Pennine chain, which branch separates the basin of the Humber from those of the Tees and the Eden. The hills which constitute it rise above the Allendale and Darlington, and extend westward, increasing in height as they proceed, by Middleton Tyas, and Barningham, to their junction with the main (Pennine) crest near the Nine Standards Mountain at the north-western limit of the basin.

The northern part of the western boundary of the basin formed by the Pennine Mountains, which separate it from the basins of the Eden and of the Lune, the Ribble, and the Mersey. The branches which the Pennine chain throws off toward the east, and which constitute the western moorlands of Yorkshire, are separated from each other by long narrow valleys, in which the Swale, the Yore, the Wharfe, the Aire, and the Calder, all directly or indirectly tributaries of the Ouse, have their course. At the southern end of the Pennine chain the basin is continued by the hills of Derbyshire and the moorlands of Northern Staffordshire, by the ridge which runs along the western border of Staffordshire, and by the hills which extend from Wolverhampton by Dudley and Hales Owen to the head of the Rea, south-west of Birmingham, between Hales Owen and Broomgrove, where is the south-western limit of the basin. The western boundary from Staffordshire southward separates the basin of the Trent and Humber from that of the Severn.

The southern limit, commencing at the head of the Rea, runs eastward through Worcestershire and Warwickshire, past the head of the Blythe, five miles north-west of Henley-in-Arden, to Wroxhall, 4 miles north-west of Warwick; it then follows the irregular course of the high ground from Wroxhall by Meriden, Ridgeland (3 miles south of Atherstone), and Nuneaton, to Bulkingdon (4 miles north-east of Coventry); and turning north-east is defined by the Rivers Avon, which separate Dudley and Staffordshire past Lutterworth, Kibworth, Billesdon, to Burleigh (two miles north-east of Oakham), the south-eastern limit of the basin. This southern boundary separates the basin of the Trent from the Severn, and from that of the Welland, one of the rivers running into the Wash.

The eastern boundary is formed by the uplands on the border of Lincolnshire and Nottinghamshire, which separate the valleys of the Trent and the Trent, passing Newark and extending to Gainsborough. As we include the waters of northern Lincolnshire in the system of the Humber, the limit of the basin must be regarded as running eastward from the neighbourhood of Gainsborough, by Market Rasen and Gainsborough, to the sea at Donna Nook. This eastern boundary separates the basin of the Trent from those of the Ouse, the Witham, and the Steeping, all flowing into the Wash.

A glance at the map will show that these limits comprehend a considerable portion of the midland and northern counties of England, including some of the most important manufacturing districts: as the great seat of the woollen manufacture in Yorkshire; of the hosiery and lace manufacture in Nottinghamshire and Leicestershire; of the cotton and silk manufacture of Derbyshire, and of the iron manufacture of Staffordshire and Warwickshire. The following limits of the basin will be better understood from the following measurements:

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of the north-eastern boundary from Spurn Head to Robin Hood's Bay, measured in a straight line between its extremities</td>
<td>43</td>
</tr>
<tr>
<td>Length of the northern boundary from Robin Hood's Bay to the Nine Standards Mountain on Ardingly Forest</td>
<td>71</td>
</tr>
<tr>
<td>Length of the western boundary from the Nine Standards to the head of the Rea near Barmingham</td>
<td>143</td>
</tr>
<tr>
<td>Length of the southern boundary from the head of the Rea to Burleigh near Oakham</td>
<td>61</td>
</tr>
<tr>
<td>Length of the eastern boundary from Burleigh to the neighbourhood of Gainsborough</td>
<td>48</td>
</tr>
<tr>
<td>Length of the eastern boundary from the neighbourhood of Gainsborough to the sea at Donna Nook</td>
<td>42</td>
</tr>
<tr>
<td>Circumference of the basin, measured in straight lines between its salient points</td>
<td>428</td>
</tr>
</tbody>
</table>

The above measurements are from Greenough's Geological Map of England and Wales. We can only attempt to give an approximation to the area of the basin. It is as follows:

<table>
<thead>
<tr>
<th>Area</th>
<th>Square Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yorkshire, about seven-ninths of the country, the deductions being for those parts on the northern and western borders, which are drained by the Tees, the Lune, the Ribble, and the Mersey; and for the small basin of the Bridlington river in the chalk wolds</td>
<td>4500</td>
</tr>
</tbody>
</table>
Derbyshire, except about one-tenth part on the north-western border of the county, drained by the rivers
900
Staffordshire, except some small portions along the western border, drained by the Severn
1000
Warwickshire, about one-third of the county, being the north-western part
300
Leicestershire, a portion on the south-eastern border, drained by the Welland
600
Rutlandshire, a portion on the north-western side
50
Nottinghamshire, nearly the whole of the county chiefly
800
Lincolnshire, about one-third of the county chiefly in the northern part
50
Small portions of Lancashire and Worcestershire
50

Total extent of the basin
1920

It appears from this estimate that the basin of the Trent and Humber is by far the largest in Great Britain: that of the Severn and Wye [SEVERN AND WYE, vol. vii., 393] being only 5600 square miles; and that of the Thames and Medway [THAMES, vol. xxiv., p. 272] 6000 square miles, little more than two-thirds of that of the Trent and Humber.

The above estimate is founded on the statement of the areas of the several counties as given by Mr. Rickman, with short returns for each county.

Course and Affluents.—The Trent rises in the hills of North Staffordshire, near the Cheshire border. It is formed by the confluence of several streams in an extensive pond or small lake, now called by the name of Trentham, and then winds south, through the Potteries district, by Hanley and Stoke-on-Trent, to the junction of the little river Lymne (only about 5 or 6 miles long) from Newcastle-under-Lyme, and then thence through Trentham Park, where it expands into a noble pond about 800 acres. After passing through Trentham Park, the course of the river gradually bends towards the south-east, and it flows past Stone to the junction of the Soar (18 or 20 miles long), at the village of Great Haywood, close to the county of Staffordshire. The course of the Trent, from its source to the junction of the Soar, which falls into it on the right bank, may be estimated at 25 miles. The Soar rises on the western side of the county of Stafford near Broughton, between Eccleshall and Market Drayton, and passes Eccleshall and Stafford; it drains, with its tributaries the Mease and the Penk, the western part of the basin.

From the junction of the Soar the Trent flows 15 miles south-east, turning however gradually towards the east, and receiving the Blythe (24 miles long) on the left bank, to the junction of the Tame (42 miles long), which joins the Trent on the right bank a little below Airewash; and with its valley, the Derwent, the Kvernall, the Kvernall, the Brook, and finally, the waters of the Sandwell, in confluence with the river of the same name just mentioned, and the Rea, drains the south-western part of the basin, the seat of the great iron and hardware manufacture.

From the junction of the Tame the Trent turns north-westward, and flows 10 miles by Burton-on-Trent to the junction of the Dove (42 miles long), which rises in the moorlands on the northern part of Staffordshire, and separates, through nearly its whole course, Staffordshire from Derbyshire; draining with its feeders, the Manifold, the Cromford, the Peak brook, and others, the adjacent parts of both counties, and joining the Trent on the left bank.

From the junction of the Dove the Trent flows 15 or 16 miles north-eastward to the junction of the Derwent (60 to 65 miles long), which joins it on the left bank, and with its feeders, the Ashopto, the Nen or Now, the Wye, and the Amber, drains the northern and central parts of the county of Derby. From the junction of the Derwent the Trent flows north-eastward 2 miles to the junction of the Soar (36 to 38 miles long), on its right bank; and from thence 3 miles farther to the junction of the Erewash (about 20 miles long), on its left bank. The Soar, with its tributaries, the Wreak and others, drains a large portion of Leicestershire, a part of Rutlandshire, and the south part of Nottinghamshire; the Erewash drains the adjacent parts of Derbyshire and, Nottinghamshire, on the border of which two counties it has its course.

The course of the Trent gradually changes from an eastern to a north-eastern direction; the change commences above the junction of the Derwent, and becomes more decided near the junction of the Erewash.
The whole length of the Trent and Humber is as follows:

**Trent.**
- From its source to the junction of the Sow, S., and S.E.
- From the junction of the Sow to the junction of the Tame, E.S.
- From the junction of the Tame to the junction of the Dove, N., and N.E.
- From the junction of the Dove to the junction of the Derwent, E.
- From the junction of the Derwent to the junction of the Erewash, N.E.
- From the junction of the Erewash to the junction of the Derwent, N.E.
- From the junction of the Derwent to the junction of the Ouse, N.

**Humber.**
- From the junction of the Trent and Ouse to the sea, E. and S.E.

Total length of Trent and Humber: 190 miles.

The Trent and Humber yields in length to the Severn, which is estimated at 320 miles [Severn, vol. xxii., p. 304], and to the Thames, which is estimated at 230 miles [Tithings, vol. xxv., 280]. But with the exception of these two, no river in Great Britain can compare with it.

The feeder of the Trent and Humber are more particularly described elsewhere:—the Sow, the Byth, and the Tame, under Staffordshire; the Dove, the Derwent, and the Erewash, under Derbyshire; the Soar, under Leicestershire; the Deven, and the Idle, under Nottinghamsire; the Ouse, with its tributaries, and the Hull, under Yorkshire; and the Ancholm, under Lincolnshire. Different communications of the Trent or Humber are also described in the same articles.

**Navigation.**—The navigation of the Trent commences at Burton-on-Trent, in Staffordshire, where a cut from the Grand Trunk, or Trent and Mersey Canal, joins it, and opens a communication with the complicated canal system of the midland counties, and ultimately with the Mersey, the Severn, and the Thames. This canal follows the valley of the Trent from the junction of the little river Lyne in the Staffordshire Potteries, and it continues to follow the course of the valley below Burton, till it finally joins the Trent at Wilden Ferry, at the junction of the Derwent. Nearly midway between Burton and Wilden Ferry the Derby Canal opens into the Trent, and communicates with the town of Derby, and (by a railway) with the collieries near Belper. The river Derwent is also navigable up to Derby, but the navigation of it has been of great degree superseded by the Derby Canal. The Trent is navigable by means of the artificial cuts beyond Leicester, and is connected with the Leicester Union Canal and the Grand Junction Canal, and so with the metropolis. The river Wreak, or the Melton Mowbray Navigation, and the Oakham Canal, connect the eastern part of Leicestershire and the little county of Rutland with the navigation of the Soar and the Trent. Nearly opposite to the outfall of the Soar, the Erewash Canal opens into the Trent. This and the Nottingham Canal open into the Trent near Nottingham: convey to the Trent the produce of the coal and iron district of the valley of the Erewash, as well as the manufactures of the town of Nottingham. The Cromford Canal, which joins the Erewash and Nottingham Canals, and the Cromford and High-Peak Railway, open a communication between the Trent and the great manufacturing district of Southern Lancashire.

The Grantham Canal connects the town of Grantham and the adjacent agricultural district with the Trent, into which canal opens just opposite to the Nottingham Canal; and the antient Foss Dyke (which probably had its origin in the Roman times) connects the Trent with the Witham, and so with the agricultural districts of central Lincolnshire. The Idle is navigable to East Retford; it joins the Trent at West Stockwith, where also the Chesterfield Canal opens into the Trent, and brings down the produce of the coal and iron works of Chesterfield and its vicinity.

* These letters indicate the direction of this part of the course of the river.

mineral-springs and hot-baths. The population consists of about 210,000 Roman Catholics, 40,000 Lutherans and Calvinists; and...and Edward termi-

TRENTSCHIN, the capital of the county of the same name, is situated in 50° 9' N. lat. and 18° 1' 30" E. long., in a very fertile country on the left bank of the Waag. It is a very old town, probably not found in some history text. On the summit of a high rock there is a fortified castle belonging to Count Illeschay. The town consists of one street, closed by a gate at each end, and containing only 67 houses, with 3800 inhabitants. Besides the castle, which is well worth seeing, there are the following public buildings: the county-hall, the senate-house, the parish church (containing a fine monument of the Illeschay family), the Protestant church, and a theater, formerly belonging to the Jesuits, now dedicated to St. Francis Xavier. It was built in 1692, by Archbishop Lipsky, and, together with the college, presented to the order. It is one of the finest buildings in Drontheim. The internal fitting up cost the founder 120,000 floris. There are seven splendid altars. The walls inside are cased to the height of five feet with grey marble veined with gold. The ten Corinthian pillars of pale-red marble give the church a very striking appearance. The ceiling is of black, very richly gild and adorned with fine fresco-paintings. On the abolition of the order, this church was given to the Pianists, together with the college, to which Count Illeschay, a very valuable church for the natural history.

Two leagues from Trentschin is the little village of Teplitz, belonging to Count Stephen Illeschay, where there are celebrated hot-springs. There are seven springs, varying in temperature from 28° 5' to 32° Réaumur, one of which is used solely for drinking. The liberty of Count Illeschay, who has a palace here, deserves to be noticed; he not only gives the use of the baths gratis to both rich and poor, but keeps all the numerous buildings in good order, and pays a medical man to attend on the patients.

(Tennyson, Handbuch für Reisende in Oesterreich; Blumenbach, Gemälde der Oester, Monarchie; Thiele, Das Königreich Ungarn.)

TREPAN. [HOLOTHURIA.]

TREPHEINE is a kind of saw employed in surgery for the removal of a circular portion of bone. For this purpose it is used in various cases, such as diseases requiring perforation of the antrum, neoplasms with loose enclosed sequestra, abscesses in bone or under bones, &c.; but especially in injuries of the head and their various consequences, for which the removal of a portion of the skull is done. Necessary?

The trephine is now commonly employed in this country instead of a somewhat similar instrument, the trepan, which was formerly used by all surgeons, and is still frequently used on the Continent. The trepan is very like the tool called a trephine, but is used a much smaller instrument for large corks, and is worked in the same way, with a curved rotating lever under the handle; but instead of the share-like cutting edge of the wimble, the trepan has a circular saw, which being rotated with the lever, cuts its way through the bone.

The trephine is a smaller and more simple, but, in other respects, not more convenient instrument. Its handle is like that of a gimlet, but stronger. The shaft is terminated below by a sharp steel point, called the centre-pin, which may be fixed and removed at pleasure, and which stands in the centre of the circle formed by the saw. The purpose of the centre-pin, which projects a little below the edge of the saw, is to fix the trephine to the bone and to perforate the dura mater before the bone is cut through. After this the centre-pin should be removed, for it hinders the action of the saw, and (in trephining the skull) would prevent the dura mater before the bone is cut through. Around the handle of the trephine, at a short distance above the part to which the centre-pin is fixed, there is attached a hollow steel cylinder, the lower margin of which is a saw. This is called the crown of the trephine, and, for various purposes, is of different sizes.

In using the trephine, the saw is made to cut through the bone, not by a series of complete rotations, such as are made by the trepan, but by rapid half-rotations alternately to the right and to the left, as in boring with an awl. It

trephining the skull various cautions are necessary, according to the form of the bone to be cut through, and the degree of the opening to be formed. A comprehensive rule is to examine frequently what progress the saw makes, and, if it have cut through one part of the circle much sooner than the rest, to apply it somewhat more slowly to that part. The most dangerous part of the operation is when the bone is nearly cut through; for it is necessary to avoid wounds of the dura mater, injuries of which are often followed by severe disease. To escape these, it is advisable when a part of the circle is thoroughly cut through, to cease, and leave the bone remains in the extent of its area, to break through this by an elevator or proper forceps. And if, after using either of these instruments, sharp points of bone are left, the trephine may be used to cut out or break them off. The use of the trephine is now much more rarely required than in former times; and this, not only because the amputations, but ut, for surgeons have learned the beneficial in few injuries of the head beyond those in which there are distinct signs of compression of the brain, but also because, in many of the cases in which it is necessary to remove portions of bone, the instrument called Hey- ne's removal of portions of bone, the instrument called Heyne's instrument is much more simple and more convenient. This is a shaft, much like those of a common fork, of which the latter has fixed to its end a transverse broad plate of steel, one end of which is a straight, the other a convex saw. With this instrument the bone may be cut both more easily and more rapidly than possible with the trephine. It is especially useful in those cases of fracture of the skull in which angles of the broken bone are depressed, and for which the trephine used in the ordinary way is unsuitable. But the instrument is not for in these depressed portion itself may be cut off, and the elevators may, if necessary, be introduced at the aperture which is thus made.
TRE,

T E R E

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T R E

General of St. John'; and 'The Philosophical Testament, God, Good, Evil, and Revelation,' all of which were the productions of his numerous retirement after relinquishing public duties in 1826.

(Conversations Lexicon der Neuesten Zeit.)

TRESPASS is a strong directly done to the person, to the lands and chattels, or to the lands and tenements of any man.

To the person it may be by menace, assault, battery, or maiming. [Assault.] To either dead or live chattels, by taking them away during them. To land and tenements, by entering upon them with injuring them. Trespass is the action by which a person in the actual and exclusive possession of property is protected against the forcible interference with it by those who are not entitled to it. This interference or authorization of another to do an act to his property, the trespass does not relate back, but is confined to the mere act itself: as where parties enter a tavern, drink and pay for wine, and afterwards commit a trespass—that will not make their entry a trespass. In cases where a trust is reposed, trespass will lie for an act which is at variance with the trust, as where a lessee at will cuts down the timber.

TRESPASS, (Latin.)

TREVI'GI, [TREVIGI, THE PROVINCE OF], an administrative division of the Venetian States, forming part of the Lombarb-Adrio-Venetian banks of the Claro, or Brenta, is bounded on the north by the province of Belluno, on the east by the Friuli, west by the province of Vicenza, and south by the provinces of Padua and Venice. It is not so large as the former, province called 'il Trevisano,' under the republic of Venice, several other provinces have been annexed to the provinces of Belluno, Padua, and Venice. The actual province of Treviso is divided into 12 districts and 204 comunes, and reckons 133,000 inhabitants. Two-thirds of the province consist of a fine plain, which is one of the most fertile parts of the Venetian territory; the other third, which lies northward of the town of Treviso, is hilly. The river Piave, coming from Belluno, crosses the province of Treviso from north-west to south-east, and enters the Adriatic north of the lagoons. Farther north, in a direction nearly parallel to the Piave, flows the river Livenza. Both the Piave and the Livenza are navigable for large boats to the sea. The principal productions of the province of Treviso are corn, wine, cotton, wool, silk, cheese, and cattle. There are also manufactories of silks, woollens, and paper.

TREVIGNANO, a town of 12,000 inhabitants, situated on the banks of the Treviso, is hilly. The river Piave, coming from Belluno, crosses the province of Treviso from north-west to south-east, and enters the Adriatic north of the lagoons. Farther north, in a direction nearly parallel to the Piave, flows the river Livenza. Both the Piave and the Livenza are navigable for large boats to the sea. The principal productions of the province of Treviso are corn, wine, cotton, wool, silk, cheese, and cattle. There are also manufactories of silks, woollens, and paper. Twelve miles north of Treviso, where the hills begin to rise, is an extensive forest called Mentello, belonging to the crown; it supplies Venice with timber for ship-building. The principal towns of the province are—1, Treviso. 2, Bassano, a town of 12,000 inhabitants, including the suburbs, is situated on the river Piave, and manufactures cotton, wine, wool, silk, and wax, and the well-known printing establishment of Remondini, some fine churches with good paintings, a gymnasium, an hospital, and a theatre. Bassano has produced many distinguished artists, among others the celebrated painter, Jacobo da Ponte, and his sons, also painters, the engraver Volpato, and the engineer Ferrari.
biographical sketches 'Di Bassanesi Illustri.' 3. Atolo, a very old town, now decayed, contains 3000 inhabitants. It is 14 miles distant from Asolo that the queen of Cyprus, was kept in a kind of honourable confinement by the Venetian senate from 1489 till her death, which occurred in 1510. 4. Castelfranco has 6000 inhabitants, a handsome collegiate church and considerable church of the trefoil, in the native place of the painter Giorgione. 5. Conegliano has 6000 inhabitants. 6. Ceneda is a bishop's see, and has 5000 inhabitants. 7. Oderzo, an ancient but decayed town, 12 miles northeast of Treviso, has but few inhabitants. 8. Buffole, on the Livenza, where the river becomes navigable for large boats, about 22 miles from the sea, has 3000 inhabitants.

(Treviso, Consigliere della Comune, 1847.)

TREVIGI, or TREVISO, a bishop's see, and the head town of the province of the same name, is situated in a fertile plain on the banks of the river Sile, which is navigable by large boats, and communicates by means of canals with the lagoons of Venice. A small river called Botteniga flows through the town, and joins the Sile. The town is old, the streets are irregular, and mostly lined with arcades, and adorned with several fine buildings. The cathedral, built by the Longobards, and afterwards restored, but never finished, has some paintings by Veronese, Tiriano, and Bordone, the last native of the place, and the relics of several saints, among others of St. John the Baptist, St. Sebastian, of the patron of Treviso, and other churches worthy of notice, as well as the episcopal palace, the town-house, the palaces of Pola, Brescia, and others. Treviso is surrounded by walls and a ditch, and has a circumference of about three miles. It has a spacious hospital, a Monte di Piedad, a public library, a handsome theatre called Onigo, a celebrated academy or Athenæum of sciences and literature, and about 15,000 inhabitants, independently of the suburban parishes which form part of the commune of Treviso, and which contains about 6000 inhabitants. A great fair is held here in the month of October, and it lasts a fortnight.

Treviso was an important town under the Goths and the Lombards, when called the Treg, and last king of the Goths, was a native of Tarvisium. Rotaria, king of the Longobards, having destroyed the neighbouring town of Optergern, a.d. 641, the fugitive inhabitants went to swell the population of Treviso. Under Charlemagne and his successors Treviso was the capital of a march, or border province, extending from the Alps to the Adige, and known by the name of Marois Trevisana, which afterwards, during the middle ages, became restricted to the space of the Po, Treviso, the still vast Padus, and the lagoons of Venice. In the 11th century Treviso became an independent municipal community, like most other towns of North Italy. It afterwards fell successively under the dominion of Trevisano, the Carrara of Padua, and the Della Scala of Verona, till the fourteenth century, when it came into the possession of the republic of Venice, retaining however its municipal council and magistracies, and its own statutes, and its nobility retained their seats and jurisdictions in the country.

The political and military chief of Trevisio was a patrician sent from Venice with the titles of Podestà and Capitano. This form of administration lasted till the fall of Venice in 1797. During the war of the league of Cambrai in 1599 it was the only considerable town of the continental dominions which remained attached to Venice, sustaining a siege from the united French and Imperial armies.

The family of Ordelaffi, which ruled Forli and part of the Romagna for centuries, were originally from Treviso. Burchiellari, a citizen of Treviso, has written the history of his native town. Treviso is 18 miles north by west of Venice, and 80 miles north-northeast of Padua.

(Rampold, Corografia della Italia, Treviso, 1797; Rigamonti, Pitture di Tergic, Memorie delle Arti di Tergic, 1833.)

TREVISANI, FRANCESCO, CAVALIERE, an eminent Italian painter of the eighteenth century, was born at Capo d'Istria near Trieste, in 1656. He was called by the Venetians, Roman Tresvisani, to distinguish him from Angelo Trevisani of Venice. Francesco acquired the first principles of art from his father Antonio, a lawyer; and learnt painting of a Fleming, whose name is not mentioned, who was remarkable for his pictures of spectres, incantations, and such subjects; and young Trevisani executed a very good picture in the same style in his eleventh year. Upon the death of his father, Francesco, who had long been placed under the patronage of the scholar of Amiens, Zanchi at Venice, and painted in his style for some time, then studied the works of the great Venetian masters, and distinguished himself by several fine pictures in his youth. He was a man of striking personal appearance, and very accomplished in several polite arts, he went much into society, and he won the affections of a noble young Venetian lady, with whom he eloped and married, and he went with her to France, where he was received with the highest estimation of his lady. At Rome Trevisani was fortunate enough in finding a valuable patron in the cardinal Flavio Chigi, nephew of Pope Alexander VII., from whom he received several works of art, and the title of Cavalierie from the Pope. He was much employed also by the Duke of Modena, then Spanish ambassador at the court of Rome, for whom he made several pictures after celebrated pictures by Correggio, Parmigianino, and Paul Veronese. After the death of Cardinal Chigi, he was much patronized by Cardinal Ottobuoni, for whom he painted an excellent picture of the Slaughter of the Innocents. Trevisani's works are numerous in Rome; he painted the picture of the War of Succession at that period, which consisted chiefly in the imitation of Guido, Domenichino, and others of the Carracci school. But Trevisani painted in many styles, and in almost every line: history in large and small figures, portraits, animals, sea pieces, landscapes, architecture, and others; and he excelled well a picture by any master. His best pictures are a good deal in the style of Guido; his composition is grand, and his chiaroscuro forcible, his execution free and masterly, and his drawings and colouring are almost always perfect; but his chief excellence consisted in a purity and brilliancy of colouring. His best pictures are, a Crucifixion, in the Church of San Silvestro in Capite; a San Francesco, in the Church of the Scalzi; a large St. Jerome in the Chapels, in the Church of San Giovanni Lateran; and the cupola of the Church of Urbino, painted for Clement XI. The Albini family at Forli possessed in the time of the Albini various specimens of his different styles; and among them a Crucifixion in which the figures were very small but elaborately painted, which Trevisani is said to have considered his best picture, and to have offered a large sum of money for its possession.
The Twelfth Day of March, 1688, was made a privy councillor. After the Revolution Trevison obtained the confidence of William III., and was much consulted by him. There is a paper in the National Library of Scotland, entitled 'The Rt. Hon. Lord John Dering,' dated ‘Appendices, part ii., p. 80,’ in which he commended the dissolution of the Convention parliament. This parliament having been dissolved, and a new one assembled on the 28th of March, 1693, Sir John Trevison was a second time elected speaker and was chosen one of the commissioners of the great seal. ‘The speaker of the House of Commons, Sir John Trevison,’ says Burnet, ‘was a bold and dexterous man, and knew the most effectual ways of recommending himself to every legislature. He had been in great favour in king James's time, and was made master of the rolls by him; and if Lord Jeffreys had stuck at anything, he was looked on as the man likelyest to have, the great seal. He now got himself to be chosen speaker, and was made first commissioner of the great seal; but, as a Tory in principle, he undertook to manage that party, provided he was furnished with such sums of money as might purr-fax some votes; and by him began the practice of buying off men, in which afterwards King had kept to stiffer rules.’ (History of his Own Time, iv., p. 74, ed. 1823.)

In the session of 1693 the corrupter of others was discovered to have himself corrupted, and was expelled from the speakership. It is said from the manuscripts that he had received a bribe of a thousand guineas from the city of London for his support of a bill in which the city was greatly interested. (Burnet, iv., p. 254.) It was now his turn to put the question, and he asked the Speaker, ‘Has he sat above six hours?’ ‘He sat above six hours,’ says North, ‘as prolocutor in an assembly that passed that time with calling him all to nought to his face; and at length he was forced, on yielding, to put the question upon himself, as in the form, “As many as are of opinion that Sir John Trevison is guilty of corrupt bribery by receiving, &c.” and in declaring the sense of the house declared himself guilty. The house rose, and he went his way, and came there no more.’ Life of the Lord Keeper Guilford, ii., p. 28.

Sir John Trevison, though thus expelled from the House of Commons, retained the mastership of the rolls, ‘to the great encouragement, as North remarks, “of prudent bribery for ever after.”’ He had the character of being a man of great talents, though of no principle. There are some anecdotes of him in Noble's 'Continuation of Granger's Biographical History' (vol. i., p. 172), which show him to have been extremely mean and avaricious. He died on the 29th of May, 1717, in London, at his house in Clement’s Lane, and was buried in the Rolls’ chapel.

His only daughter married Michael Hill, Esq., a privy councillor and member of parliament, and had two sons. His eldest son was Sir John Trevison, second Viscount Hambleden, and son Marquis of Downshire. The second son, succeeding to his grandfather Sir John Trevison's estates, took the name and arms of Trevison, and was created, in 1706, Viscount Hambleden.

TREW, CHRISTOPHER JAMES, a celebrated anatomi-
Franconia, near Nürnberg, on the 26th of April, 1695. His father, who was an apothecary, took charge of his education and taught him the principles of botany and pharmacy. Trew went to Altdorf in order to attend the lectures of the faculty of medicine, and was admitted to the degree of doctor in 1716, after five years' study. On his return to his own country he immediately began to practise, and obtained sufficient support to encourage him to continue. He however soon formed the resolution of travelling; and accordingly he went through Germany, Switzerland, France, and Holland, and stayed for a year at Danzig. In 1730 he returned to Lauffen, and became a member of the College of Physicians at Nürnberg, and in the practice that he soon succeeded in obtaining made him so well known to the world, that the magistrates of Ansbach granted him the title of physician-in-ordinary and counsellor to the court (Hofrat). He was admitted in 1742 as a member of the 'Académie des Curieux de la Nature' and was raised in 1746 to the dignity of president, which at this time included the titles of count palatine, aulic counsellor, and physician to the emperor. He died on the 18th of June, 1769, at the age of seventy-four, without ever having been persuaded to leave Nürnberg, notwithstanding the attractive offers that were made to draw him to Altdorf and elsewhere. Assisted by the excellent painter Ehret, he published the beginning of his work on botany, which was continued after his death by Vogel. With regard to anatomy he conjectured that the mesenteric veins possessed the faculty of absorption; he proved that the pretended salivary ducts of Cocchswitz are simple veins; and he very well demonstrated organs which are often placed in the horse's body before and after birth with regard to the organs of circulation. Besides one hundred and thirty-three observations which are to be met with in the 'Commerium Litterarium' of Nürnberg, and one hundred and thirty-seven which have been inserted in the 'Acta Curiorum Naturae,' the following are his principal works in anatomy and botany. In the former science he published a dissertation Epistolica, de Differentiis omnium anim.- inter Hominem et Equum, in that which has been translated into Latin by Rambaud, 1736, 4to., with a great number of plates representing peculiarities of the foetus; 'Epistolae ad Alb. Hallerum de Vais Linguar savillarum alique sanguinariarum,' Nürnberg, 1734, 4to.; 'Tabulae Anatomicae Corporis Humani,' folio, max., fine coloured plates, Nürnberg, 1767. In botany his first publication was the description of a new American flower, in 1727, 4to., and in 1750 he began to publish one of the most splendid botanical works that has ever appeared, under the title of 'Planta selecta quantar Imagnes ad Exemplaria Naturalis.' Dianthus Ebert, Nominum Propris & Notis illustravit, C. J. Trew, folio. This work contained incomparable designs of Ehret, Trew added descriptions and remarks, and the work appeared in decades, of which seven were completed. In the same year he commenced a similar publication of garden-flowers, entitled 'Amoenissimae Florum Imagines,' which was carried on to six decades. In 1757 he published 'Cedrorum Libani Historia, et CHARACTER Botanicos, cum ito Laricis, Abietis, Pinaceae comparatis,' Nürnberg, 4to., with plates by Ehret; the second part appeared ten years afterwards. He also published a much improved edition of Blackwell's 'Herbal,' in English and German, with an appendix of new plants. Having made the acquisition of the wooden plates of the preceding edition, he gave an improved edition of two hundred and sixteen figures of plants from them, under the title of 'Icones posthumae Gesenianae,' 1748. (Biographie Medicale.)

TREWAG & C. are a natural order of plants belonging to the rectemplegrose group of incomplete Exogens. This order has for its type a single genus, Trewav, which was named after Christopher James Trew, a physician of Nürnberg, who was but low: they are trees with opposite and stipulate entire leaves and opposite flowers; the leaves are ovate-oblong and antheriferous flowers are arranged in long racemes, and the pistilliferous flowers are axillary and solitary. The calyx in both flowers is 3-4-cleft; the stamens are numerous; the ovary is superior; the fruit is a drupe, 4-celled, with one seed in each cell. The plants of this order are native of tropical India, and their properties are at present unknown, nor is their structure well understood. As far as has been at present examined, they resemble Urticaceae, but still differ sufficiently to justify their removal from that family. Here Lindley has constituted an order of the genus Trewia.

TRIAL, [Wiki Law]
court attended by eleven of his neighbours who were called om�ngorators. He then solemnly swore that he did not for the sum with which he was sought to be charged, or obtain the thing sought to be recovered, and the eleven om�ngorators swore that they believed him. The wager law had already fallen into disuse when it was wholly abolished by 3 & 4 W. IV, c. 42.

The mode of trial was the one most in use both in civil and criminal matters, was the trial by jury. [Jury.]

In criminal cases recourse was antiently had to the force of the particular guilt or innocence of a party [Ordinal], and also to the single combat [Appeal]. It appears doubtful whether the ordeal fell into cause, or was abolished by statute. Appeals in criminal cases were done away with by 59 Geo. III, c. 46.

A peer of Great Britain indicted capitally is entitled to the protection of parliament assembled in the court of the Lord High Steward of Great Britain, who is a peer nominated to that office by the crown for the occasion. The proceedings of the trial are carried on in the same way as on a trial by jury, and judgment is pronounced according to the opinion of the majority, which must consist at least twelve. Cases of impeachment by the Commons are also tried by the Lords.

Hence, if these the ordinary cases of trials by jury, except that instead of its being presided over by a judge, all the judges of the court in which the action brought are in attendance. It is granted on application to the court, but only in cases of great difficulty and importance, that an information be exhibited by the attorney-gener- al, as law-officer of the crown, he is entitled to a trial at bar. New Trial. After a trial has already been had, it is competent to the court in which the action is brought to retake a new trial on an application made, and grounds shown for supposing that justice has not been done between the parties; and that the case is of sufficient importance to warrant such a further expense. These grounds are various, such as a misdirection by the judge, a verdict against evidence, etc. [Comyns, Dig., tit. 'Trial'; Blackstone, Com.]

TRIANGLE, a figure having three angles, and consequently three sides; this consequence is usually made the definition; and the same thing occurs in much of which is πρὸς ἦλευθρα in the Elements, though it is πρὸς ἦλευθρα in the definitions prefixed.

A triangle may be drawn upon any surface, and having my sort of lines for its sides; but it is not usual to consider any except plane triangles drawn on a plane with right-lined sides, and spherical triangles drawn on a sphere with great circles for the sides. The spherical triangle has already been considered; and the formulariæ with which the triangle have been investigated, which is much more complex. There is much connected with this article in ANGLE, PARALLEL, SIMILAR, TRANSLATION, TRIGONEXKAL to the letter for the reference from Menelaus to his article). TRIGONOMETRY, &c., so that we have no need to use in this article of a length proportioned to the importance of its subject in geometry. In fact, triangles are a much the element of all figures as the letters are of words, being the figures of the smallest possible number of sides, and into which all figures can be divided.

The two most important properties of the triangle are that the sum of its angles is always two right angles, and that the area is half that of a rectangle of the same base and altitude. There is also an admitted of such practical verification as would make them perfectly intelligible to those who do not understand geometry. Take the greatest angle BAC of a triangle cut out in paper, and fold the paper so that A may rest on BC at F, the part ABD folding over BDE. Then it will be found that by further folding ECL can be brought over EFL, and BDK over FDK, so that the three angles of the triangle KFD, KFE, and EFL, are so placed that the first side of the first, and the last side of the last, KF and FL, are in the same straight line, and the three make up the two right angles KFA, ABL. Again, the triangle BAC is either the sum or difference of the two right-angled triangles FAC, FAB, which are the sides of the rectangle FAKH, FABC, the

d sum or difference of which is the rectangle BGHC, when the triangle is the half of the rectangle BGHC, of the same base and altitude as the triangle.

The three lines which bisect the angles of a triangle meet in one point, which is the centre of the inscribed circle; and the three perpendiculars which bisect the three sides also meet in one point, which is the centre of the circumscribed circle. Moreover, these three lines drawn from the vertices bisecting the sides meet in one point, which is the centre of gravity of the triangle; and also do the three perpendiculars drawn from the vertices to the sides. All these propositions, except the second, can be proved by the same process, namely, by showing that the segments of the sides satisfy the theorem given in TRANSVERSAL.

The number of isolated theorems which might be given on this subject is very large, but there is little, unconnected with the trigonometrical formulæ, which is of use in application.

TRIANGULA and TRIANGULUM AUSTRALE (constellations). The first (the Triangles) is a northern constellation, surrounded by Perscorus, Andromeda, Ariés, and Musca. It is one of the old constellations, but there is only one triangle in Aratus. Hevelius added the second. The second, or Southern Triangle, is a constellation of Bayer, lying between Ara, Centaurus, and the South Pole. The principal stars are as follows:

TRIANGULA.  

TRANGULUM AUSTRALE.

Further folding ECL can be brought over EFL, and BDK over FDK, so that the three angles of the triangle KFD, KFE, and EFL, are so placed that the first side of the first, and the last side of the last, KF and FL, are in the same straight line, and the three make up the two right angles KFA, ABL. Again, the triangle BAC is either the sum or difference of the two right-angled triangles FAC, FAB, which are the sides of the rectangle FAKH, FABC, the

sum or difference of which is the rectangle BGHC, whence the triangle is the half of the rectangle BGHC, of the same base and altitude as the triangle.

The three lines which bisect the angles of a triangle meet in one point, which is the centre of the inscribed circle; and the three perpendiculars which bisect the three sides also meet in one point, which is the centre of the circumscribed circle. Moreover, these three lines drawn from the vertices bisecting the sides meet in one point, which is the centre of gravity of the triangle; and also do the three perpendiculars drawn from the vertices to the sides. All these propositions, except the second, can be proved by the same process, namely, by showing that the segments of the sides satisfy the theorem given in TRANSVERSAL.

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TRIANGULA.

TRANGULUM AUSTRALE.

TRIANGULAR COMPASSES. [COMPASSES.]  

TRIANGULAR NUMBERS. [NUMBERS, APPELLA- TIONS OF.]

TRIANGULATION, a name given to the net-work of triangles with which the face of a country is covered in a TRIGONOMETRICAL SURVEY.

TRIA/THHEMA, a genus of plants of the natural family of Portulaceae, so named from πτιθα, three, and δινθα, a flower, in consequence of the flowers growing in threes, in the axis of the leaves. Its stamens vary in number from 5 to 10 or 12, and hence cause this genus to be placed in different classes by Linnaean botanists. The ovary is half superior; style 1 or 2, filiform; capsule oblong, truncate, cut round. The species are found in the tropical parts of the old and new world, and in the subtropical parts of Africa. They occur as weeds in every part of the plains of India. Trianthema obcordata, like the plants of the family to which it belongs, is employed by the natives of India as a pot- herb; but the nauseous and bitter roots of T. monoga are said by Dr. Ainslie to be employed as a purgative by the inhabitants of the peninsula of India.

TRIBS (tribus, ðol). All the states of antiquity of which we have any records were divided into a certain number of tribes, consisting of the great bodies of citizens of which the state was composed. These tribes however were of two different kinds, either genealogical ( Tribes, or local (vries), (Bryand, Histo, iv. 14). The former, which

* Bayer put no letters except to constellations he had seen. 

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must be considered as the more antient of the two, were the
different national elements of which a state was made up,
that is, the distinct races or people, thought to be
otherwise, and each traced its origin to a mythical ancestor;
whence Dionysius calls such tribes genealogical. The
other, or local tribes, to which a later origin must be assi-
scribed, and which in most cases superseded the old gene-
alogical one, and formed artificial local states, were made for
different and other purposes, and any one of them might
contain people who, according to the genealogical division,
would belong to different tribes. Thus we fin in the
history of Rome that the four original tribes were done
away with after the establishment of the ten local tribes by
Cleisthenes; and at Rome the three antient Romulan
tribes gradually died away after the establishment of the
thirty local tribes by Servius Tullius. At Sparta alone the
three, the Doric tribes, the Hylians, the Pamphylians, and
the Dymanians, were retained without any change. Gene-
alogical tribes may in many instances, as was originally the
case at Rome, have inhabited different districts, so that they
were at the same time local tribes; but this is merely an
accidental circumstance.

The number of the genealogical tribes was different in
the different states of antiquity, and depended upon various
circumstances, such as the number of national elements
brought together to form a state, or the partiality of a race
of men for particular numbers which were used as typical.
Thus we find that the Doric states in most cases divided
into three, the Ionie into four, and the Romans into six, a
multiple of three. The other tribes, and a multitude of the
these tribes only contained freemen, they were not always
on a footing of equality, but the most antient one, to which
the others had only been added at some time by treaty or
contract, always retained, at least for a time, a superiority
over the others, and reserved for itself rights and privileges
which were denied to the others. Such was the case with
the Hylians at Sparta, the Eupatriads at Athens, and the
Rames at Rome. Each tribe was usually subdivided into
smaller bodies, as at Athens into phoropon and isye, and at
Rome into curiae and gentes. The number of senators and
of the great officers of a state likewise bore a certain rela-
tion to the number of tribes or their subdivisions. The bond
of union between such tribes was more or less loose ac-
gording to circumstances; and the history of Attica gives
us an instance of their being at war with one another.
Each tribe had usually its separate religious observances
and festivals, and the same was the case with its sub-
divisions.

All the tribes of which a state consisted formed the
sovereign people (as at Rome the populus), which in many
cases included subject populations (epoises, plebeians).
When a Greek state sent out a colony to a foreign country, it appears to have been customary to
divide the new state into the same number of tribes as that
which existed in the mother-city, and the names also were
repeated, at least in certain cases, as at Cyzicus and Halicarnassus,
and the name of both were Doric colonies, we only find mention
of one tribe, which may have arisen from the fact that
only members of one tribe of the mother-state took part in
the establishment of the colony. (Wachsmuth, Helustische
Afterthunen, ii. 1. 15, &ec.)

In regard to the later or local tribes, it is clear from the
name itself that each inhabited a distinct district, contain-
ing either one or more townships, which were called in
Africa tugia, and at Rome tic or pagi. Every citizen
belonging to a tribe was obliged to have his name regis-
tered in a township of his tribe, though he was not bound
to reside in the same in which he was registered and to
which he belonged. Each tribe, whether genealogical or local, managed its
own affairs and was headed by a tribune (phoropon). The
same was the case with the subdivisions of a tribe.

We have here only given a brief outline of the subject
in general, as a more detailed account of the tribes in the
different states of antiquity is given in the articles Athens,
Cleisthenes, Rome, Servius Tullius, Dionysius,
Ionians, and others. Compare also Warsch, Helustische
Afterthunen, ii. 1. 15, &ec.; Hermann, Political Anti-
quiti: Schöm, De Jure Publico Graecorum, p. 165, &ec.;
Niebuhr, Hist. of Rome, i. p. 306, &ec.; Dictionary of
Graeco-Latin antiquities, art. tribe.

TRIBOLO, NICOLò DI, an able sculptor, born at Flo-
rence in 1600, was originally brought up to the trade
of carpenter, but becoming acquainted with Sansovino;
he was afterwards employed on the great statue of S.
Peter and, though his skill was not sufficient to do the
work himself, he was employed after quitting that master
as a director of the whole. As the work proceeded, he
incurred the displeasure of the patron, for which he
was dismissed. He returned to Florence, and there,
while he was employed on a statue of Orazio
Santini at Bologna, he was again engaged in another
work at the Camera of the Institute, when he
was dismissed in consequence of his having employed
his talents less honourably than when, on
Florence being besieged by Clement VII., in 1529, he
rendered. He then went to Pisa, where he was
employed on the statue of Cosimo de' Medici, and
thereafter to Madrid, and was there engaged in another
work, the whole being a great monument of his
art. He returned to Italy in 1550, and was
employed in various works, as a sculptor, architect,
and engraver. He returned to Florence in 1550, and
was there engaged in various works, as a sculptor,
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architect, and engraver. He returned to Italy in 1550,
2. **Triarius Celerus** is an officer who only occurs in the history of Rome during the period when it was governed by the Tribuni Curiāriī. He was the commander of the 300 equites celeres who figured in the tribunician tribune from each of the three tribes. He was, next to the king, the first person in the state. (Dionys. Hal., iv. p. 219.) As the troops of the army and the aediles were conscripted, a tribune was appointed to preside over the elections of the decemvirs, are the same as the tribune of the Servian tribus. (Niebuhr, Hist. of Rome, i., p. 421.) The tribunes were to have the authority of the patricians to send the tribunes outside the city. (Dion. Halii, vii. 10.) After the institution of the second quaestor, the tribunes were not only to levy the tribune, but to be, to the quaestor, who directed all the number of the citizens. The Lex Anicia, n. 70, gave to the tribunes the right to pass judgment over the senators and the equites; but they were deprived of it by J. Caesar. (Sueton., Cæs., 41.)

3. **Triputus Plebris.**—These were the most important among the officers bearing the name of tribune, and whenever tribunes are mentioned without any further qualification, the Tribunus plebis are meant. In the year 467 B.C. the aediles were appointed in Rome, and were elected by the people, and not by the senators. (Dionys. Hal., vii., pp. 410, 435.) These agreements were made for the purpose of protecting the tribunes against various accusations of the patricians; hence it was found necessary, soon after the election of the tribunate, to give the tribune still more security to the exercise of their power. The law was accordingly passed, by which any one to interrupt or disturb the tribunes in their transactions with the plebs, and to promise to the senators, or other magistrates, that he would give bail to the tribunes for any fine they might propose to the Senate or upon the first proposal for their delivery. (Niebuhr, Hist. of Rome, p. 96.) The inviolability of the tribunes was finally established after the time of the celebration of a law of M. Horatius.

As regards the number of the tribunes, who were called tribuni plebei because of their authority, the statements are different. Some state that two were elected in the Sacred Mount, and that these two afterwards chose three more collegues; others say that five were elected at once; and others again that two were elected in the Sacred Mount, and that after the tribunate was in favour of five tribunes, so that one was taken from each of the five Servian classes. Thus much only is certain, that in the year n.c. 457 the number of tribunes was increased to ten; so that if they really bore any relation to the classes, each furnished two. This number remained unaltered till the time when the business of legislation was completed, when the tribunes were again appointed, and was on their proposition that the consuls system was restored. (Livy, viii. 8.)

The position of the tribunes after the introduction of the curia is different from that of the city, and the tribunes were attended by public servants, called viarares, who carried their commands into effect.

The accounts of the manner in which the tribunes were originally selected, and the different procedure of the Senate and the plebs in the election and the sanction of the election; for the latter was a right which the curiae unquestionably possessed for a time. If, as Niebuhr thinks, they were intended to represent the classes, they were elected by the centuries; but it is much more likely that the tribunes, at the expiration of the year of office, appointed their successors, after a previous consultation with the plebs. The election of the curiae ceased to be necessary shortly before the time of the Punic war; and after that time we have express testimonies that the curiae were elected by the plebs, and that the tribunes were elected by the plebeians, who were elected by the centuries, and that the number of the plebes was very large. If, as Niebuhr thinks, they were intended to represent the classes, they were elected by the centuries; but it is much more likely that the tribunes, at the expiration of the year of office, appointed their successors, after a previous consultation with the plebs. The election of the curiae ceased to be necessary shortly before the time of the Punic war; and after that time we have express testimonies that the curiae were elected by the plebeians, and that the tribunes were elected by the centuries, and that the number of the plebes was very large.
in the tribes, and the tribunes now stand in the same relation to the whole nation as they had before stoo to the commonly only: they are now the protectors of the whole nation as assembled in the comitia of the tribes, and in the comitia centuriata receive and declare the mandates of the representatives of the democratical element in the state, in opposition to the aristocratical. This explains how it happened that their protection was sought by patriots, like C. Licinius that of the last century, Tac. iv. 36, 37. They henceforth also appear in the possession of the right of being present at all the deliberations of the senate; but their place was outside the opened doors, where they sat upon benches. They had at all times the right to propose any measure, and to suspend the majority of the senate, or any further sanction. (Dictionary of Greek and Roman Ant., under 'Plebsicium.') This gave to the tribunes an extraordinary influence in all the affairs of the state, and the democratical element had now gained the superiority. But while the power of the tribunale was thus outwardly increasing, a change took place within the body, or collegium, as it was called, which, to some extent, paralysed its power. In the year 394 b.c. matters had been decided in the college of the tribunes by a majority of the members, but in this year we meet with the first instance of the interjection (veto) of one tribune rendering the resolution of his colleagues void. (Liv. iv. 23, 24.) It is usually supposed to have begun in this case, the power of the college, insomuch as the aristocratical party might easily gain over one of its members, and thus thwart the plans of the state. In such a case nothing could be done, and the matter was dropped. C. Tribonian Grecinus was the first who pointed out the manner in which the college might get rid of an obstinate member: he proposed to the people to deprive such a tribune of his office and pension, which was afterwards continually made use of. The same power however in which a tribune had over the resolutions of his colleagues he also had upon the proceedings of a magistrate, whether a consul, a censor, or a praetor, and even over an ordinance of the senate. The right of the tribunes of merely appearing in the senate was gradually increased by the power of convoking the senate, and laying before it any measures relating to government or administration; and the senate had often recourse to the tribunes for the purpose of compelling magistrates to comply with its wishes. (Liv. iv. 26; v. 9; xxvii. 45.) At last it was established by the Plebeian Atiuminum that a tribune should be a member of the senate's office. This was done when this plebeianism was passed, certain, though it is improbable that it originated with C. Atinus, who was tribune in B.C. 130.

In regard to other magistrates the tribunes had not only the right to stop any of their proceedings, but in case of need they might seize the highest magistrates, and put them into prison, or inflict capital punishment upon them by throwing them from the Tarpeian rock. There was no power in the Roman republic that could be compared to that of the tribunes, and during the latter period of the republic they formed a real democratical senate. But whatever may have been the abuse that some tribunes made of their power, and how much evil they may have produced, yet it is a point acknowledged on all hands that Rome owed her greatness, in no small degree, to the institution of the tribunate.

Sulla, in his attempt to remodel the constitution upon aristocratical principles, reduced the powers of the tribunes to what they had been originally. But this innovation, like all his constitutional changes, was a complete failure, and the full power of the tribunes was restored to them by Pompey. (Suet. Aug. 40; Vell. Pat. i. 111.)

During the empire the college of tribunes of the people continued to exist; and in the reign of Augustus, comitia for the election of tribunes were still held, although the elections gradually disappeared. (Sueton., Aug., 40; Vell. Pat. i. 111.) The political influence of the tribunes also sank rapidly, and even at an early period of the empire we find it almost confined to intercession in decrees of the senate and to protecting oppressed or injured individuals. (Tac. Ann. xvi. 20; Histor. ii. 91; iv. 9; Plin. Epist. i. 23; v. 13.) Tribunes however continued to exist down to the fifth century of our era; and though their power was much limited, they still continued to be looked upon as the protectors of the common people, and preserved the old republican spirit and moral importance. For this reason, as well as for the purpose of having a check upon the college, the emperors, although patronised, found it necessary to be tribunes. It was a title which even Diffusus Augustus, who had united in one person, was the only thing that was wanting to complete the sovereign power of an emperor. In A.D. 731 Augustus received the office of tribune for life and the intervals of five years he himself appointed his friends as tribunes, and in this manner continued the influence of the tribunes. (Sueton., Aug., 27, 40; Tiber., 9.) This tribunical power of an emperor was conferred upon him by the senate, and was justly deemed equivalent to regal or dictatorial power. The example of Augustus was followed by his successors, and the tribunical power became an essential part of the imperial dignity, and was finally established as such by the Le X of Imperio Vespasian. (Suet., Tiber., 23; Festus, 12; Titus, 8.)

5. Tribuni Militarii cum Consulari Potestate.—In the year B.C. 446 the tribune C. Canuleius earned seven rogations, one of which was, that the people should be under the protection of the consular power, and that the plebeians indiscriminately. In order to avoid the consequences of this law, the senate decreed that instead of consuls, tribuni militarii with consular power should be elected proceeding. Of course, it was not the consular power of which the plebeians might not gain too much at once, the consular power, which had hitherto been a part of the consular power, was separated from it and given to two new patrician officers, the censors. According to the year 444 B.C. three tribunes were elected instead of consuls, and only as a plebeian. The people however were allowed for the following years to elect either tribunes or consuls as they might think proper. The consequence was, that a large number of consuls were elected according to the old custom, and sometimes tribunes. From the year B.C. 426 the number of tribunes varied between three and four, until in B.C. 405 it was increased to six, which remained untouched down to the year B.C. 366, when the office of the military tribunes with consular power was abolished, and the consulship restored. These consular tribunes, as they are briefly called, had the same power as the consuls, with the exception of that part of it which had been detached from it and given to the consuls. For and other reasons the patricians did not so much object to its being shared with the plebeians, as they did in respect to the consulship, which was sanctioned by a solemn usurp. No power was greater than that of the consular power, according to Cicero, (De Leg, vii. 47; De Rerum Natura, xvi. 100; De Orator, xvi. 54.) Diocletian, (Diocletian, xvi. 100; compare Niebuhr, Hist, of Rome, ii. p. 355, 369, 389, &c.)

6. Tribuni Militares, or Militum, or tribunes of the soldiers, were the protectors of the military offices and troops, whom at first there were four in a legion. They were originally to have been appointed by the consuls, but in the year B.C. 368 it was decreed that henceforth half of them should be elected by the people in the comitia of the centuries, while the appointment of the other half was left to the command of the legions as before (Liv. vii. 6), and as there were six in a consular army, there were elected by the people and three by the consul. The latter were known as the junior consuls, and the senior consuls were the former consuls. (Liv. vii. 6; Festus, s. v. Ruffus.) In later times the number of tribunes for each legion was increased to six, and their appointment was sometimes left altogether to the consuls. (Liv. xiii. 21.) But this seems to have been an exception to the rule, for subsequent to that time we again find that the people had the election of a part of the tribunes. (Liv. xiii. 14; xiv. 21.) The functions of these tribunes of the soldiers consisted in maintaining the discipline among the soldiers, their exercises and their state of health, in inspecting the sentinels, settling disputes among the soldiers, in taking care that they received their necessary provisions, and the

(For further particulars see Dictionary of Greek and Roman Antiquities, under 'Tribuni.')
Christ. He is said by Procopus (De Belo Goth, lib. iv., cap. 10) and Suidas (in toto Theophis) to have been one of the most skilful of his profession, and is also described as being wise, temperate, and pious. Chosroes, king of Persia, held him in such estimation, that when he was treating about a peace with the emperor Justinian, A.D. 561, he would not so much as make a truce with him, except on the condition that Tribinus, whose skill in phytotherapy was acknowledged, should be sent to him for one year to administer his health, and as soon as this was done, a truce was concluded for five years.

(De Bello Pers., lib. ii., cap. 28.) Tribinus had formerly cured Chosroes of an illness, for which he was rewarded with the island of Khoreis, and was permitted to return to his own country. After the truce just mentioned he stayed a whole year with Chosroes, who offered to give him whatever he demanded; instead however of asking for money, he declared that some of the Romans who were captives in Persia might be set at liberty. The king at his request not only released those whom he had particularly named, but three thousand others besides, which made the name of Tribinus famous throughout the whole extent of the empire.

(Feudal. Hist. of Physics.)

TRICELLARIA, a genus of celluliferous corallines.

(Polythoria; Membranacea; Cellaria.)

TRICHAS. [Stylidium, vol. xxiii., p. 441; Trinice.] Mr. Swainson considers its subgenus Seluris to be connectent with Trichas.

TRICHCHUS. [Steele, vol. xl., p. 168.]

TRICHIAS. [Trichospermum].

TRICHIASIA, or narrowing of the eyelids, is a disease in which one or more of the eyelashes are turned inward, so as to be in contact with the front of the eyeball. The irritation thus excited produces all the pain and other symptoms of inflammation of the conjunctiva, and if long continued may terminate in opacity of the cornea and complete blindness.

The wrong direction of the eyelashes may depend on various causes. Sometimes it appears to be their natural mode of growth; one or more growing differently from the rest, and being reproduced with the same fault as often as they are extirpated. More frequently it is due to some disease of the eyelid, producing a cicatricial or induration of its conjunctiva, drawing down the margin of the lid, and with it the lashes. By a similar process, trichiasis is the constant accompaniment of the cases of entropium, or inversion of the eyelids, which depend on induration of the conjunctiva.

A temporary remedy for trichiasis is the extraction of the offending eyelashes, which may be effectuated by plucking them with broad-pointed forceps; but they are generally quickly reproduced, and, growing in the same direction, renew the patient's suffering. For a permanent remedy, some of the operations for entropium must be performed, or the portion of the inner margin of the eyelid from which the inverted lashes grow must be removed with the aid of forceps.

TRICHIILLIA, a genus of plants of the natural family of Millicaeae, so called from the Greek triksi, 'ternary,' many parts of the plant being produced in threes. The genus is characterised by having the calyx 4-5 divided into petals 4 to 5, connected at the base. Stamens 8 or 10; filaments flat, sometimes distinct, sometimes closely joined into a tube, bearing the anthers with the teeth of the tube. Styles often joined, of the last under each carpel. Capsules 3-valved, 3-celled, cells 1-2-seeded. Seeds baccate with an axil. Embryo inserted with very thick cotyledons. The species form trees or shrubs, with alternate unequally pinnate or trifoliate leaves, with axillary panicles of white flowers about 150 yards across. They are found in the tropical parts of America, and a few in Africa and in New Holland. An Indian species, T. spinosa, is not well known, but the oil of its seeds is said to be a useful remedy in chronic rheumatic and paralytic affections. Several are possessed of active properties. Forskohl found the fruit of one species in the mountains of Yemen used as an emetic, and called jouz-al-ala, or the emetic nut, whence it is called Trichilia emelica. The seeds, which are crushed, are used in the same way as in the previous instance. T. triolista, a native of Ceylon, has an unpleasant smell in all parts, and is said to possess active properties. T. cathartica is described by Martius as having great bitterness, and as employed in Brazil as a cure for bilious troubles. Sec. T. marginata, a remarkable shrub, is said to be of musk-like musk which it diffuses all around, on which account it is called musk-wood.

TRICHINGPOULI, a fortified city of Hindustan, formerly the capital of a branch of the Chosroes dynasty, and, now situated in the presidency of Madras and the province of the Southern Carnatic, is situated about half a mile from the south bank of the river Caveny, in 10° 50' N. lat. and 78° 49'E. long. The principality of Trichinopoly, a roile or the capital of Madurah, of which it originally formed a part, retained its independence till 1736. On the death of the last Raja the government passed into the hands of his widow, as reft for his adopted son, and from her it was treacherously wrested by Chanda Sahib, a son-in-law of Dost Ali, nabob of the Carnatic, and which was then made tributary to the Mohammedan government. In 1741 it was taken by the Maharrats, and Chanda Sahib was carried as a prisoner to Sattarah; it was however retaken by the Nizam of the Deccan in 1749 it devolved by inheritance to Mohammed Ali as nabob of the Carnatic. Duplex, the French general, in 1748 had advanced the sum required by the Maharrats as ransom for the Maharrat and family of Chanda Sahib, which was accepted by the French at Pondicherry during his imprisonment.

In 1751 Mohammed Ali, who was assisted by the British, was besieged in Trichinopoly by Chanda Sahib, assisted by the French. The defence was conducted by Colonel Lawrence, Clive, and other British officers, with extraordinary military skill, and the siege was continued till 1755, when the French and their allies were compelled to retire. The foundations of this contest are stated in the article Carnatic. The district and city of Trichinopoly were ceded to the British in 1801.

The city of Trichinopoly is situated on a rocky eminence; it is very large, and is said to contain, including the suburbs, 50,000 habitations. The houses generally are inferior to those of the neighbouring city of Tanjore. The chief public buildings are, a palace, a mosque, and two Hindu temples. The fortress is strong, and the British government generally keeps five or six regiments there, partly on account of the salubrity of the situation, and partly as a convenient point of communication with other parts of southern Hindustan. A mission-church was built here by the French in 1767, which still retains a congregation of about 600. The French mission-church and mission-house of Schwarz are within the fortress. Bishop Heber died suddenly at Trichinopoly in 1826, when taking a cold bath, and was buried in the church.

Trichinopoly is 107 miles S.W. from Pondicherry, 38 W. from Tanjore, and about 90 from the Bay of Bengal, traveling distances. The surrounding country is fertile, from the means of irrigation afforded by the Caverly and Coleroon, though not equal in fertility to that of Tanjore.

The peninsula called the island of Seringham, near Trichinopoly, is formed by the Caverly, which about five miles above Trichinopoly, divides into two branches. The southern branch is termed the Caverly, while the northern branch is called the Coleroon; and the name of Seringham is derived from the latter, which is derived from the name of the Caverly. The two rivers again approach each other about fifteen miles below Trichinopoly, where the Caverly is prevented from flowing into the Coleroon, which is there lower than the Caverly, by a large mound. [Tanjore.] The peninsula thus formed is called the island of Seringham. In this island, five miles from Trichinopoly and near the south bank of the Coleroon, is situated a town the most ancient and most boasted of southern Hindustan. The central sacred building is not large, but is splendidly ornamented with sculptures, gilding, and valuable stones. It is enclosed within seven square walls, each twenty-five feet high and very thick; these walls are about 150 yards across. In the further corners, there are about twelve very large and lofty triangular towers over as many gateways, each forming a highly ornamented pagoda. The circumference of the outer wall is about four miles, so that the enclosure covers about 2 D 2
TRICHODERMACEAE. A tribe of plants belonging to the suborder Gasteromyceetes, of the natural order Fungi. It is known by its peridium being single or double, buried when full grown, and pouring forth abundant naked spore-like sporidia. The sporidia are subglobose and rather large, and are collected more or less in the centre of the peridium, and are loose or interwoven with the flocculi. Genera belonging to this order are rather numerous. They are divided into Trichogastres, those having a flasky consistence; and Myxogastres, those having a soft and magilaginous consistence.

The latter principle belonag all those forms of lace, which are popularly known as puff-balls, blind-man's-blew, devil's muff-boxes, &c. They have obtained these names on account of the property they possess of giving out, when well matured, a sort of a puff or blast, so that the sporidia are scattered. The sporidia are exceedingly small and light, that on the peridium, or external covering of the plant, being broken, they rise into the air like smoke. Many of these sporidia do not measure more than five microns in diameter. They possess a curious property of repelling the particles of water, so that if the surface of a basin of water is covered with them, the hands may be plunged to the bottom of it without being wetted. The fruits of these plants are always round or oblong, and are arranged by the older botanists under the genus Lycorepora, but they are now arranged under several distinct genera. The genus Geaster embraces those puff-balls whose peridium is double, the outer layer of which splits up into star-like expanding rays. On account of this the like appearance they have been called ground-stars, and to distinguish them from other puff-balls, starry puff-balls, &c. They are found frequently in great abundance in meadows, and other hedge banks, and occasionally in the woods, on the ground in woods, plantations, and shrubberies. Nine species of this genus are found in Great Britain. The genus Bovista, bull puff-ball, has a thin paper-like peridium. The fruit, when in the process of being furnished with spores, or puff-balls, begins to peel off as the plant grows old. There are two species of this genus common in England, where they are found on the ground on heaths and dry pastures. The genus Lycorepora, sometimes called puff-balls, is often allied to Bovista in its peridium being membraneous, and its external bark not being entirely deciduous.

The most remarkable species of this genus is the _L. gigantea_ giant puff-ball, which is sometimes met with in fields and plantations in Great Britain. It may be known directly by its large size, specimens frequently measuring seven feet in circumference. The peridium of this plant is very brittle, and contains inside a dark pulpy mass, having a peculiar stench, which is given off with the dark olive-brown sporidia. When dry, the inner part of this and other puff-balls have been used for the purpose of restraining hemorrhage by direct application to a wounded part. For this purpose, at one time formed an essential article in the case of every surgeon. It is seldom used among medical men, but it has still a good popular reputation. The application of this remedy stops the bleeding of a wound sooner than a piece of lint; and its introduction into the operation of phlebotomy may be attended with unpleasant if not dangerous symptoms.

Another species of puff-ball common in our pastures is the dwarf _L. patula_. It may be called dwarf puff-ball. The most common of all the species of Leucozeroon is the _L. germinatum_, the stunted puff-ball. This and the preceding species, and the _L. pyriforme_ of Schaffner, were
placed at one time together, under the name L. Proteus. This name was given them on account of their exceedingly varying character. The L. gemmatum is known from the other species by its being studded over with close, dense warts. These warts are very much in size and form, and this circumstance has given raise to a number of varieties of this plant being named as species by different writers on fungi.

The genera Stereocaulus, Elaphomyces, and Cenococcus are distinguished by the hard, corky character of their peridium, which sometimes approaches the consistence of horn. They are common on dry ground, on heaths, in gardens, woods, &c. Elaphomyces is used by some German physicians as a medicine.

The second division of the Trichospermi, the Myxogastres, contains a larger number of genera than the first, but the plants are much smaller and less obvious. They are mostly of very minute size, and are found on the trunks of old trees and on decaying wood. Their forms and colours are exceedingly various, and sometimes very beautiful. Their structure is more delicate than the plants of the last division, and as their consistence is soft and gelatinous, their character is with difficulty retained after they have been gathered.

One of the best-known genera of this division is the Lycogala, or wolf-milk, so called on account of its containing a milky liquid. The genus Thistlea is used by German physicians as a medicine.

The only British species is the L. Epidendrum, which is found on rotten stumps and stiles in the spring and autumn of the year. The plant varies in size and colour. Its covering is frequently of a blood-red colour, as also the juice which oozes out from the interior. The colour of the pulp of these fungi depends on their spores, and as these are so excessively minute, they can be employed when mixed with gum-water to form various coloured pigments.

The genus Spumaria is found attached to the stems of grasses, and looks like a thick white froth upon them. On this account it is frequently spurious, but is quite originated. The genera Trichia, Physarum Stemonitis, Didymium, Cranium, Cribria, Arcuria, &c., are named from the peculiar forms the species assume. They are mostly found on rotting wood in the spring and autumn of the year. The best account of the British species of these plants will be found in the 5th volume of Smith's 'English Flora,' executed by the Rev. M. J. Berkeley.

TRICHOTROPIS (from the root τρίχα, 'hair,' and τροπή, 'a change'). The name given by Mr. Broderip and Mr. Sowerby to a genus of turbinate testaceous mollusks whose shells have somewhat of the shape of Turbo, but are distinguished from that genus by their thinness, from Buccinum by the want of a notch at the base of the aperture, and by the very indistinct canal. From Turbo it may be easily known also by its elliptical and not spiral operculum, and by the absence of the dilated lateral membranes which belong to the Turboines, and it is distinguished from the species of Turboineae by the absence of the soft parts. From Cancillaea it differs in being destitute of the oblique folds near the base of the columella; but it seems to be the type connecting the true Buccinum (Buccinum undatum and its congenere) with the Cancillaea.

Generic Character.—Shell turbinate and carinated externally; the aperture wide, but still longitudinal and not circular without any notch, although immediately below the obliquely truncated base of the columella there is an indistinct canal. The whole shell thin and delicate, the outer lip especially. Epitome hornv, forming numerous sharp-pointed bristle-like processes on the edges of the canal outside the shell, very strong, and by its contraction in drying frequently breaking the edge of the lip.

Operculum hornv, much smaller than the aperture, consisting of elliptical laminae of opposite nuclei and notched at both ends, although immediately below the obliquely truncated base of the columella there is an indistinct canal. The whole shell thin and delicate, the outer lip especially. Epitome hornv, forming numerous sharp-pointed bristle-like processes on the edges of the canal outside the shell, very strong, and by its contraction in drying frequently breaking the edge of the lip.

Animal resembling in most particulars a Buccinum as to its external form and characters, differing from it principally in having only a very small fold of the mantle to which the shell is attached. There is no separate fold external to the mantle; the inner edge of the mantle corresponding in position to the keel on the outside of the shell, constituting the whole of the differences observable between the soft parts of the animals.

But two or three species of this genus are known; the

authors name two, Trichotropis bicarina and Trichotropis borealis; whether the Fucus 4-costatus of Say might not with propriety constitute a third species of this genus, must in their opinion remain undecided. This last shell is a fossil which attains a considerable size, and differs materially from both the species described by Mr. Broderip and Mr. Sowerby in having an enormous umbilicus. We select Trichotropis bicarina as our example. Several specimens of Trichotropis borealis, which is found in the Northern Ocean near Malviye Island, were brought to England by Captain (now Sir W. E.) Parry and Lieutenant Griffiths, and a single specimen was found at Oban in Argyllshire by the Rev. T. Love. Lieutenant (now Capt.) Belcher procured one specimen at Icy Cape.

Description of Trichotropis bicarina.—Shell with four or five volutions, the last of which is much larger than the others, and ventricose; smooth on the outside, with two prominent keels, which are ornamented with the numerous strong, sharp-pointed, bristle-like processes formed by the epiphragma. The aperture is large and rather triangular, being however rounded externally, with two obtuse angles, and pointed at the base. The shell has a very narrow, linear umbilicus, which is carinated on the outer edge, and its carina is slightly inclined to the back; its inner edge is formed by the elevation of the edge of the inner lip. The columella is rather flattened. Shell white, translucent; epiphragma pale horn colour.


Habitat.—The Arctic Ocean.

Near the apex of the shell which was in the Tankerville collection, and afterwards passed into the cabinet of the late Dr. Goodall, two Terebratulae were attached. Some small Balatai had fixed their abode on the body-whorl of one of the specimens brought home by Lieutenant Belcher, and two of them were near the lip. Dr. Goodall's specimen was said to have been brought from Newfoundland; those from which this description was taken were dredged up in ten to fifteen fathoms water, in the bay between Icy Cape and Cape Lisbon.

TRICHILASITE. [Faulkner.]

TRICOCCE. The name of a natural order in the Fragments of a Natural System of Linnaeus. Euphorbia was selected by Linnaeus as the type of this order. In the system of Jussieu it was adopted and amended by De Candolle and Lindley, this order is called Euphorbiaceae. The original name Tricocca is however still used by Bartling to express a group of families, amongst which is Euphorbiaceae, with Rhamnaceae, Staphyleaceae, Celastraceae, Brunoniaceae, and other small orders.

TRICOCCEAE. [TRICOCCEA.]

TRIDA'CNA. The Tridacnnae of Lamark form a family belonging to the first section of his monogynian Cucchiens, or mollusks furnished with bivalve shells which have a single muscular impression. This family comprises the genera Tridacna and Hippopus.

Cuvier makes the Conchiæ the third family of the testaceous Acropleuræ. For the genera which he arranges under that family, and for the views of Linnaeus, Brunoni, De Blainville, Rang, and others, see the article CHAMACEÆ.

The Chamææ of Mr. Swainson are placed between the Telluroids and the Sixteauræ, and contain the following genera and species:

1. Hippopus, Lam., with the subgenus Pleurorhynchus, Phillips.
2. Chama, Lam., with the subgenus Isocerus, Lam.
3. Tridacna, Lam., with the subgenus Cleothoracma, Stuchbury, Dioceres, Lam., and Mylochus, Sowerby.
Mr. J. E. Gray makes the *Chamædia* the first family of his *Goniodonta*, the third order of the *Conchifera* in his arrangement. This family, which is immediately followed by those of the *Chama*, *Arca, Tellina, Diceras*, and *Caprina?* The Tridacnidae are placed by him as the first family of his *Pogonopoda*, the fourth order of the *Conchifera*, and comprise the genera *Tridacna, and Pachylium*. These two genera are distinguished diastoly by the *Dreissenidae*. (Sphyrisites, Mus. Brit.)

M. Deshayes observes, in the last edition of Lamarck, that the character fixed on by him for the latter for his section, namely *Ligament marginalis, elongated on the border, sublinear,* is not applicable to the three families, the *Tridacnae, the Mytilidae*, and the *Mallacidae*, which he arranges under it. The *Mollusca*, in fact, remarks M. Deshayes, have no external convex ligament similar to that of the dimyarian conchifers, whilst the ligament is found precisely so constructed in the two families which, in conformity with their nervous system, he proposes to place under the *Cephalopoda*. The character, he says, confirms this view; and he notices the judicious observations of Lamarck, that the *Tridacnidae* have no analogy with the other *Mollusca*, and that the animal molluscs are very nearly approximated the *Chamaeceras and the Cardioceras* than any other. Thus, M. Deshayes remarks, it will be advisable to return to the opinion of Couvier, who places the *Tridacnae* in the neighborhood of the *Chambare*, as indeed Linnaeus had done before him; for the Swiss naturalist arranges under his genus *Chama* both the *Chamædia*, properly so called, and the *Tridacnae*. The observations made by M. de Blainville with respect to *Hippopus* appear to M. Deshayes to be well founded; and he is of opinion that it will be the more necessary to suppress that genus, the principal character of which (the closed lumen) is valueless, inasmuch as it does not coincide with the animal, which is similar to that of *Tridacna*. He remarks that Lamark had certainly not have separated the generic, if the latter had known that some *Tridacnae* as they advance in age have the lumen much narrower than it is in youth, and that he had been acquainted with the animal of *Hippopus* which is figured by M. Quoy in the *Voyage of the Astrolabe* (p. 80), and differs in nothing from that of *Tridacna*, excepting that the foot is rather smaller and without byssus. For figures of the animals of several *Tridacnae*, see the *Voyage of the Astrolabe.*


Animal oval, conoidonic, having the lobes of the mantle united nearly throughout the circumference: three apertures: two posterior and inferior for the anus and for respiration, the third anterior, corresponding with the gape of the lumen, and giving passage to a thick, cylindrical, and byssiferous foot in nearly all the species. *Mouth oval*, with great lips, at the extremity of which are two pairs of pointed labial palps. (Deshayes.)

Generic Character.—*Shell* regular, equable, inequilateral, transverse; with a gaping lumen. *Hinge* with two compressed, unequal, anterior, and inract. *Ligament marginal, external.* (Deshayes.)

M. de Blainville divides the genus *Tridacna* into the two following sections:—

1. *Species* whose shell is more elongated, and more inequilateral, the anterior side being longer than the posterior; the lumen widely open in youth for the passage of a byssus.

Example, *Tridacna gigas.*

B. *Species* more equilateral; the anterior side shorter than the posterior, and forming a vast lumen entirely filled up; *umbones curved forwards; a single postcardinal tooth on each valve.* (Genus *Hippopus, Lam.*)

The genus *Hippopus.*

Habit of the genus: The East Indian Seas principally. The species have been found moored to rocks and on coral reefs, from the surface of the sea to the depth of seven fathoms.

Description of *Tridacna gigas.*—Shell very large, transversely oval, with great imbricate-squamous ribs, the scutum short, arched, and lying near together; the interstices of the ribs not striated.

Lamarck, who describes this as, inquires whether it species is the same as *Chama gigas* of Linnaeus; and M. Deshayes in the last edition of the *Animaux vertébrés* observes that it is very difficult now to establish its synonym, because all authors, instead of giving a reduced description of this species, have depicted them by thinselves with representing what they have taken for young shells of the species. Among these descriptions, many, remarks, evidently belong to other species; but as a general rule, if they are clearly juvenile, it is nearly impossible to refer them to the shells they represent.

The rude figure given by Aldrovandus is large, nearly filling his folio page, but in the external view the interstices of the ribs are represented as striated.

M. Deshayes remarks that Linnaeus confounded and *Chama gigas* the whole of the common and figured species, and that nearly all the writers on the subject have made the same mistake. He follows his example, so that their synonoms are not to be adopted without correction; and, for that reason, he abstains from citing Schroetter, Gmelin, and others. Chevreux, he acknowledges, has rendered the synonymy between the families more correct; but Dr. Cuvier has, he thinks, made the mistakes in the works of his predecessors the figures of small species for those of young individuals of *Chama gigas*. D'Ulyon, he adds, in his catalogue, has preserved in a single species all that Linnaeus comprised; but that there are establishments which represent the deficient *Tridacnae* in a manner so perfect that he has lost the opportunity of judging of the species. It is probable that the plates of Linnaeus have been unjustly confounded with the shells of Tridacna, by writers, who, in his Natural History of Lower Hesse, states the occurrence of two valves of a gigantic shell not far from Cassel (p. 33, pl. 10, fig. 1 et 2). The largest of these measurements brought, uncoupled, to the lower border one foot eight inches, and its width from the anterior to the posterior end was two feet and a half. This shell, M. Deshayes observes, judging from the figure, bore the greatest resemblance to *Tridacna gigas*, and therefore he adds that it can hardly be fasted forestathing the passionate fervour of the author, who uses the fact a weapon combat imaginative atheists and prove an universal delusion which brought this shell all the way from the Indian seas, to the shores of Lower Hesse. The Linnaean and the Cuvierian knowledge of the naturalists have been so well improved that the size and weight of this immense bivalve, the largest and heaviest known, combined with the beautiful marbl-like appearance and whiteness of the inside of the valves, would have caused it to be supposed as an ornament of state for the grotto-work or for garden-fountains; and, indeed, the valve of a large individual forms a very picturesque base for catching the clear falling water and transmitting it through the deep interstices of its indented edge to the reservoir below. Whale's fossils were not improbably the relics of some ancient and long-extended pleasure-ground. The specimen whose valves serve for holy-water vessels (Bénilvres) in the church of Saint Sulpice was presented to Francis I. by the republic of Venice; and Linnaeus observes that, large as these are, still larger have been known.

This species can hardly have been the *Tridacna gigas* figured in the Zoology of the *Astrolabe* designed at Charleret Harbour, New Ireland. The natives brought more massive individuals, whose flesh was abstracted to them, and which are raw. The naturalists of the expedition found the specimen again at Tongataboo, at the Molucas, at Timor, and Wajigu. It appeared always to inhabit rather shallow water.

* Five hundred pounds have been recorded as its weight.
M. Deshayes in his tables makes the number of species of *Tridacna* seven recent, and two fossil (tertiary); and of *Hippopus* one only, recent. In the last edition of Lamark, the number of recent species of *Tridacna* recorded are six; of *Hippopus*, one.

**Fossil Tridacna?**

Although M. Deshayes notices two fossil species of *Tridacna* in his tables, but one is recorded in his last edition of Lamark, published some time afterwards. The volume of Lyell's *Principles* in which the tables appear bears the date of 1833, and the volume of the last edition of Lamark bears that of 1836. Of the single fossil there noticed, *Tridacna putulosa*, Lam., to which the environs of Dives in Normandy is assigned a locality. M. Deshayes observes, that it does not belong to the genus *Tridacna*, and that the figures of List, whom Lamark quotes, represent very large individuals of *Productus giganteus*, Sow. M. Deshayes moreover remarks, that it is to be presumed that this species was not found at Dives, for it is peculiar to the transition bed of Belgium and England. Mr. G. B. Sowerby ("Genera") states that *Tridacna* is only found recent, and in tropical seas, adding his belief that the East Indian and Australian seas alone supply speciments of it.

In the article *Hippopus*, the last-mentioned author figures (t. 2) a bivalve fossil shell, and after giving the characters of the true *Hippopus*, proceeds as follows:—

"There is certainly no genus with whose characters and habits the shells we have here reproduced at fig. 2 agree so well as with this: they have been placed in different genera, by Lamark, who has entertained some doubts about their proper situation; he has at length united them with several others of similar general characters in *Cardius*; with which however they do not at all accord: formerly he had placed them with *Cardita*, to which indeed they are more nearly related, and, in our view, they prove a manifest affinity between *Cardita* and *Hippopus*. There are only two circumstances in which our fig. 2 differs from Lamark's *Hippopus*: the first is, that it is rather a longitudinal than a transverse shell; the other is in the muscular impressions, of which it has one, very distinctly marked, but small, and placed close to the umbo behind it: this we cannot trace in *Hippopus muculatus*, but it should be remarked that in many specimens of this shell that we have examined, it has been extremely difficult to trace the muscular impressions, as well as the impression of the muscle of attachment of the mantle; in fact the whole forms but one impression, surrounding the edge at a distance, and becoming larger towards the centre; and in one specimen we think we can discover the corresponding impression to the one mentioned in fig. 2. The only recent species known is the *Hippopus muculatus*. For the reasons given above, we do not hesitate at naming the fossil shell fig. 2, *Hippopus avicularis*: there are two or three other fossil species resembling this in general form; such is the *H. cymbulata*, *Cardita cymbulata*, Lam. All these fossils are found near Paris."

In the last edition of Lamark, by M. Deshayes, no fossil *Hippopus* is recorded.

**Tridacophyllia**, a genus of lamelliferous corals, separated from Madrepora, Linna. [MADREPHYLL.]

**Trident** (*tridens*, *tpiana*) is any instrument of the form of a fork, with three prongs; instruments of this kind were used by the ancients as among ourselves, for various purposes. In mythology the trident is the attribute of several marine divinities, such as Neptune, *Virg.*, *Aen.*, i. 418 and the Tritons (Cicero, *De Nat. Deor.*, ii. 56), but above all of Neptune (Poseidon). The trident in these cases is the same as the sceptre with other gods, the emblem of the power of these gods of the waters. The ancients regarded earthquakes as arising from the sea, or, as they expressed it, as the work of Neptune, who effected them by his mighty trident, whence Homer frequently calls the "shaker of the earth," and whenever the god is represented as producing any convulsion of the earth or the sea, the trident is always mentioned. (Hom., *Odys.*, iv. 366; Claudian, *De Rapt. Proser.*, i. 171)

**Tridentalis**, the name of a genus of plants belonging to the natural order Primulaceae. In British botany this genus is somewhat conspicuous, as it is the only one which belongs to the Linncean class Heptapod. The parts of the fowculation are remarkable for being arranged..."
TRIESTE. The government of Trieste, commonly called the Illyrian Littoral, is the southern half of the Austrian kingdom, consisting of Austrian Istria, a portion of the Venetian territory, the district of Trieste, the whole of the peninsula of Istria, the southern part of Carniolia, and the Quarnaro islands. It lies between 44° 20' and 44° 40' N. lat., and 13° 10' and 14° 6' E. long.; and is bounded on the north by Carniola and Istria, on the east by Carniola and Croatia, on the south by the Adriatic, and on the west by the Venetian territory. The area is 4055 square miles, and the population (423,357 inhabitants) consists of 123,800 Italians, 22,500 Jews, 2300 Greeks, and 40 Armenians.

The greater part of the country is traversed by mountains, which, on the west side of the Isonzo, belong to the Carniolan Alps. The principal school of the district is the Liceo, situated on the site of a former Roman edifice, of which one fragment now remains, the walls of which are 90 feet high and 10 feet thick; it is said to have been the residence of the Roman Emperor and the seat of the Roman Senate. The church of St. Stephen (St. Stephanskirche), built between 1227 and 1332, is one of the finest specimens of the light and elegant style of pointed architecture. The church of St. Simeon is the most important Roman monument in Germany; it was probably built by the Romans, between 500 and 700, and is 322 feet long. The double gateway, or portal, formed the entrance to the city, and was called Porta Martis, and also Porta Nux, and is now called the Roman Gate. In the eleventh century it was consecrated and dedicated to St. Simeon, whose remains were brought from Paphos. Since Trieste has been in the possession of Prussia, all the additions by which it was deformed have been cleared away, and it is restored as far as possible to its original form, and was opened for the first time out of 23rd of July, 1817, on the occasion of the crowning of the Crown-prince of Prussia (now King Frederick William IV.).

The city is not a manufacturing town, properly speaking, but is largely engaged in the manufacture of silk, woolens, porcelain, tobacco, paper-handings, soap, several kinds of distilleries, and a very considerable trade in wine, timbers, and corn.

The area of the antient archbishopric and electorale was 2200 square miles, with nearly 700,000 people. Several cities, lordships, abbey, and convents, recognised the archbishop as their feudal lord. The archbishop of Treves was archchancellor of the holy Roman empire, and had the power of electing the archbishops of Metz, Toul, and Verdun; his suffragans. He was the second in rank among the electors, and gave the first vote at the election of the emperor. His revenue was estimated at 300,000 florins or money, and 300,000 florins in kind, in all above 50,000 sterling. From Euchelius to the last archbishop there were 114 bishops and archbishops. When the town of Luneville obtained the greater part of the country, it was incorporated with the departments of the Saar, the Moselle, and the Rhine. The city of Treves, on the left bank of the Rhine, was allotted to the prince of Nassau-Weilburg, and the archbishopric, with the electorate, was annexed to the house of Saxony, the last elector, received as an indemnity an annuity of 300,000 florins, and the episcopal palace at Augsburg, where it died in 1812.

(Müller, Geogr. Wörterbuch der Prussischen Monarchie; Brockhaus, Conversations Lexicon; Stier, Geographisches Lexicon; Murray, Handbook for Travellers in Northern Germany.)

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e kingdom is composed. In the latter part of its course, the Gradačiska, where it becomes navigable, it changes its course, and Skobra unhealthily. In the southern part its short dis- ance above its mouth, and empties itself by three branches, the one into the Adriatic, and the others into the Saddle (Albans). The rivers are the Idria, the Timavo, and the Quieto, but the course is short, and they are nearly dry in the summer. 

The coast is covered with woods, tobacco, and grapevine, of which the celebrated fall at Podmenz is the best worthy of notice. In some parts of the sea-coast are many marshes, the exhalations from which render it unhealthy.

The northern part of the island of Göritz the climate is nearly the same as in the inner regions of Germany, whereas on the sea-coast and in the island it is mild and quite Italian. The spring sets in early, and extends itself to the middle of May, and for a few days only, the heat soon becoming very great. We winds often rage with great fury in this province; they are the Sirocco, which blows from Africa at the end of autumn, and is always attended with torrents of rain; and the Bora, a cold north-east wind, which frequently turns laden waggons on the high road, and compels seafarers to use ships on the coast to stand out to sea: it brings cold weather. Some parts of the country are sterile, but here and there are fertile fields, and produce vines, olives, and in general the fruits of southern Europe; but the quantity of wine grown is not considerable. There is a good breed of sheep.

The minerals are limestone, numerous varieties of marble (including blue marbles), beautiful slate, salt, sandstone, and coals. There are silver and iron ores in some places, but they are not worked, for want of funds. Salt is obtained from the sea-water by evaporation, and is one of the staple products of the sea-coast are very productive. The government is divided into the four circles of Trieste, Fiume, Göritz, and Carinbath. [Illyria; Istria; Goritz.]

TRIESTE (Triest), once a Roman colony called by Pliny and Pomponius Mela, now a thriving commercial city and seaport, the capital of the government of the same name in the kingdom of Illyria. It is situated in 45° 48' N. lat., and 13° 38' E. long., at the north-western extremity of the Corso, at the mouth of several rivers, and in front of the city is a large headland stretching many miles into the sea. The old town, standing on a hill with a castle on the summit, and the new town called Theresienstadt, is built on a level ground extending to the sea-side. The old town is narrow, crooked, dirty streets, capriciously in the old Jews' quarter. The new town however forms a regular square with broad streets crossing each other at right angles, and some canals, one of which, called the Great Canal, presents every animated appearance. There are 21 squares or market- places, and 40 churches for which is celebrated by the large number of inhabitants; the privileges of the place were extended by the empress Maria Theresa, so that all goods, with very few exceptions, can be imported duty free. The consequence has been that the population is now above 90,000, and is constantly annually increased, and Trieste is now the most important and wealthy commercial city in the Austrian dominions. Consuls of almost every nation in Europe reside there: it has 10 banks and insurance companies, 1000 merchants, and 700 brokers. The commerce of Trieste was much increased by the commercial treaty concluded with Greece in 1835, and by the new institution of the Austrian Lloyd's, which is supported by the government. The number of ships engaged in the commerce of Trieste is constantly being augmented, and that it cannot be exactly stated; of large merchantmen there are about 500 ships of all nations, and the number of arrivals of coastal vessels is not less than 8000. Several steamers ply between Trieste and Venice with much increase by the communication of the Lloyd's, which has a regular communication by steamers with Greece and Egypt. The harbour is defended by a strong battery on the new mole, which was formed to shelter it from the south, but is not fully protected against the north-west winds. The town is visited by thousands of passengers, who ships from suspected places perform quarantine. Among the manufactures, that of oil-soap deserves men- tion as being the largest in Europe; there are two soap manufactories, and several of leather, rosoglio, and wax.

Trieste is a seaport for a very large tract of country, the south of Germany, the Illyrian and part of the Slavonian provinces, in short, for the whole of the Austrian territories from the Tyrol to Transylvania. Among the exports are the productions of the mines of Idria, those of Hungary, and of the principal seaports of the Austrian dominions, and printed engravings from Switzerland. The imports are cotton from Egypt; hides, raisins, silks, rice and oil from the Levant; wheat from Odessa, and all kinds of tropical and colonial produce from the West Indies and Brazil.

Ship-building is carried on to a great extent, and the ship-builders of Trieste are so much esteemed for their skill, that designs for vessels of various kinds are sent as models to many foreign countries.

Among the literary establishments the Scientific and Nautical School, with 16 professors, the public library, the Gabinetto di Minerva with a library and museum, and the gymnasium, are the principal. The hills surrounding the city are adorned with beautiful country seats and gardens. About 70 years ago these hills were naked and desolate, but since has been brought to a great extent by sea from Idria, and this barren tract gradually transformed into a paradise. After the treaty of Vienna in 1809, Trieste with its territory was annexed by Napoleon to Illyria. In 1814 it returned to the dominion of Austria, and in 1818 received the title of City of Commerce (Osterreichische National Encyclopaedia; Blumenbach, Die Osterreichische Monarchie; Jenny, Handbuch Fur Reisende in Oesterreich; Brockhaus, Conversations Lexi- cos, etc.).

TRIEWALD, MARTIN, an eminent Swedish engineer and mathematician, was born at Stockholm in 1691, and educated in the German school of that city. Being intended for a commercial life, he visited England on the continent, to improve himself in the branches of knowledge as might prove useful in his future career; but having met with some disappointments, and seeing little prospect of success, he determined to embark for the north-west of the world. He was engaged in the tin trade; by forming an intimacy with Baron Fabricius, the Hofstein minister, who took him into his service as a secretary, an engagement which led to his becoming better known, and gave him an opportunity of acquiring the friendship of several eminent persons, among whom was Sir Isaac Newton. Triewald was subsequently engaged by the proprietor of some coal-pits near Newcastle, to superintend the management of the coal works, which he continued, and in his studies while in London, where he had attended the lectures of Dr. Desaguliers on natural philosophy. In this situation Triewald devoted his attention principally to mechanics, and studied the mysteries of the machine, which is found most useful to an engineer. He had never before seen a steam-engine; but he very soon made himself acquainted with the construction of that machine, and introduced some improvements in it.

In 1726, after an absence of ten years, he returned to his native country, where he constructed a steam-engine, and read lectures on natural philosophy, which he illustrated by experiments. These lectures were well received, and recommended Triewald to the notice of the king and of the states, who conferred upon him an annual pension, with the title of director of machinery. He next turned his attention to the improvement of the steam-engine, and introduced superior processes in the manufacture of iron. His zeal and dili- gence in this and other similar pursuits procured him a commission as captain of engineers and inspector of for- fifications; and while acting in that capacity he invented various machines, which are still, or were, not many years since, preserved in the Academy of Sciences at Stockholm. Several similar memorials of his talent were also deposited with the Academy of Sciences of France, which he directed his attention with a view to the introduction of improvements was the diving-bell, on the use of which he wrote a treatise, which was published at Stock- holm in 1741. The construction of his diving-hell, vol. xxii., p. 101. He invented a ventilator for the expulsion of foul air from ships, &c., for which he received honorary rewards from

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The king of Sweden and from the king of France; and he attended to agriculture and the naturalisation of foreign plants.

Trivialis was one of the earliest members and promoters of the Academy of Stockholm; in 1729 he was elected a member of the Scientific Society of Upsal, and in 1730 he became a fellow of the Society of London. He wrote several papers in the 'Memoirs of the Academy of Stockholm' for 1739, 1740, and 1747; and also made communications, which a list is given in the work referred to below, to the English 'Philosophical Transactions.'

Trivialis died suddenly in 1741.

(Alkiviad's General Biography.)

TRIVIALIS (Trifolium), the name of an extensive genus of plants belonging to the curvembryose division and to the papilionaceae tribe of the natural order Leguminosae.

This genus, which has obtained its Latin as well as its French and English designations, Trefoil, and Trefal, from its leaves possessing three segments, is one of the most extensive in the vegetable kingdom. Don, in Miller's 'Dictionary,' enumerates 165 species. They are principally inhabitants of temperate climates, and are found in all quarters of the globe. This genus has been somewhat difficult to define, and species have been admitted into it or rejected according to the views botanists have taken of its true character. Linnaeus gave an extended definition of the genus, which included many of the genera of other botanists. Some of these have been restored by recent systematists, and the genus is now defined with the following characters:—the calyx tubular, 5-leaf; corolla erect; petals white; oblong: sometimes dull, sometimes more or less conical with the petals, the filaments dilated above; the style smooth; legume ovate, with one or two seeds, sometimes oblong, with three or four seeds, and included within the decaying calyx and corolla. All the species are divided into three segments or folioli; sometimes they are seen with four or five. The flowers are disposed in dense heads or spikes, and are of a purple white or cream-colour. De Candolle has described the numerous species of this genus under seven sections, the characters of which are founded principally on the influences and on the form of the calyx, or of the corolla combined with it. We shall here select some of the most useful and remarkable of the species as illustrations of the genus.

The first section contains Trefoils with spicate flowers; oblong bracteate spikes; calyx very yellow, and not inflated:—

Trifolium incarnatum, Flesh-coloured Trefoil, or Scarlet Clover. The spikes of flowers are at first ovate, at length cylindrical, solidary, and naked at the base: the calyx hollow and hairy, with unequal awl-shaped acute teeth long, and shorter in the middle; the corolla white, ovate and obtuse; leaflets oblongate, crenated, villous; stem erect. This species is native of the south of Europe, in damp meadows.

It is an annual of rapid growth, so that in southern climates it may be sown in summer after an early crop of corn, and fed off or cut before winter. It will stand the winter well if sown later, and give very early feed in spring. It produces a great abundance of seed if allowed to ripen; and on its introduction into England great profits were made by the first cultivators of it, by growing it entirely for seed. The price however soon was so greatly reduced by abundant production, that it did not repay the exhaustion of the soil consequent on the constant cultivation of it.

It is however a valuable addition to the plants usually raised for fodder, and fills up an interval between other plants by its very early and rapid vegetation. The mode of sowing the Trifolium incarnatum is simple and attended with very little expense. In the month of August, as soon as the crops of corn have been reaped, the stubble is well harrowed to raise a small portion of mould; the trifolium is sown broadcast, three or four handfuls of the seed, in the hank, per acre. There is a double advantage in sowing it in this manner: it saves the threshing required to separate the seed, as a very slight beating will separate the florets of the head or spike sufficiently to sow them; and it vegetates sooner from the moisture retained in the hank which envelops the seed: a bush-harrow is drawn over the land to cover the seed, and it is rolled with a barley-roller, if the land be of a firm nature, or with a heavier roller if it be a loose soil. Thus the Trifolium will vegetate much earlier than if the seed had been regularly ploughed and harrowed, which would have loosened it too much.

It is not advantageous to let the Trifolium incarnatum be cut for hay. Its stem then has acquired a hard texture, and it is much finer, while it is much more fit to feed with cows and other feed before other feeds are ready in spring, or to cut it green for horses and cattle. The ground may be ploughed and prepared for spring crops as early as is required; and thus the Trifolium may remain in the ground for a few months. If the common broad clover has fallen from its case, and patches are left in the fields in autumn, the Trifolium incarnatum may be sown there with advantage. It is a very useful well or supplementary crop, spring or autumn sown, to make up the deficiency. In this case a mixture of Trifolium incarnatum and Italian ryegrass (Lotus perenne or Lepidium) has been found very useful. If the Trifolium sown early in spring, it will produce very good feed for a few months, and the land may afterwards be sown with turnips without any loss of time. It must be recollected, that the Trifolium incarnatum is a catch crop, that is, which comes in between two regular crops, without interfering with the rotation, and that it costs little more to sow the seed, which is easily raised, or may be bought at a very moderate rate. All cattle are fond of it in the young state, and it comes in a fortnight earlier. It is a most valuable crop where feed is required for cutting in spring. The great expectations now at its first introduction not having been fully realised, this plant has rather fallen in the estimation of farmers, and some are ready to cast it off; but if the broad clover is a regular rotation, it ought not to be despised as a siddy crop. When the season has prevented the sowing of spring corn, it may be advantageous to sow the Trifolium incarnatum together with Italian ryegrass, as corn is often cut or pulled up in the autumn, after having been covered during the heat of the summer, and managed by the sheep folded on it, will be much improved for the wheat crop. It must be remembered that the Trifolium requires a solid bottom, and that the heavy soil should not be spared before it is sown. This is chiefly recommended on soils which do not suit spring crops, and as a substitute for these; for under favourable circumstances the tares will produce the greatest quantity of beef. It is very useful to have these crops, from which may be selected those which offer the greatest prospect of success, when the season, the soil, or other circumstances are taken into consideration.

T. campestre, Stork's bill, is a like species: the stem erect, bracteate or simple; heads of flowers very long-stalked, nearly cylindrical, terminal stalked; the teeth of the calyx longer than the corolla, setaceous and somewhat spreading; seed ovato-accuminate; leaves lanceolate-obovate. This plant is native of Europe, and is abundant on meadows and dry pastures in Great Britain. Its soft sub-elliptical heads or spikes give it a very remarkable character.

The second section contains Trefoils with flowers disposed in ovato-conical heads, the calyx not inflated. None of the species belonging to this section are cultivated either on account of their utility or beauty. They are the species of Trifolium and T. pratense, native of Britain. The first has pale red flowers, the second white flowers.

The third section have their flowers disposed in ovato-pedicellate or sessile, usually bracteate heads: the calyx is villous and not inflated:—

T. maritimum, Sea-side or Teasel-headed Trefoil. The heads are sessile and terminal; the teeth of the calyx broad, acuminate, rigid, the lower one much longer and larger than the upper, short; the petals all of them at length enlarged and spreading; the blades lanceolate-subulate; leaflets oblongo-ovate; stem ascending. It is native of Europe, in salt marshes and sea-cliffs. It is found on the east and south coasts of Britain.

T. Alexanderum, Alexandrian Trefoil, or Clover. The whole plant is smooth; the stem thick ascending; leaf-
The kinds of the flower are lax, subfoliaceous, solitary, terminal; the teeth of the calyx are sessile, the lower one longer than the rest, about equal to the tube of the corolla; stipules lanceolate, acuminate; leaflets elliptical; stems branched, highly frequent plant in the pastures of Britain, where it can be recognised by its zigzag stem, from which circumstance it is sometimes called Zigzag Trefoil. This plant is sometimes cultivated as the place of T. pratense, as it is said to flourish better in cold tenacious soils, as well as some light lands, though its produce of nutritive matter on good soils is not, according to Mr. Sinclair, more than half as much as that plant.

The Common Purple Trefoil, or Red Clover. The stem is ascending; the leaflets are oval or obcordate; its heads of flowers are dense and ovate; the teeth of the calyx are sessile, the lower one longer than the rest; lips of the corolla are produced ligoines, or long pedunculate heads, and is frequent in meadows and pastures, where it blooms all through the summer. The leaves are usually marked with a white subacute mark in the centre. This species is considered on the whole as the least cultivated as fodder, although there are cases in which other species are preferred. [Clover.]

The fourth section embraces the species with capitile ovaries; the heads globose and sessile, or pedunculate; the petals usually become deflexed as they increase in size; the calyx is not inflected.

T. repens, White Trefoil, White or Dutch Clover. It is umbellulate globose heads; legumes with four seeds; each of the calyx unequal; the leaflets obcordate, serrulate; the stem creeping. This plant is very abundant in the meadows and pastures of Britain, and, next to the T. pratense, is valued and cultivated most of all the clovers. According to the soil on which it is grown, and the climate to which it is exposed, this plant assumes great varieties; and a number of these have been named, and some have been elevated to the rank of species. This plant is said to be the Shamrock of Ireland, and is worn by the Irish as an emblem of liberty. The shamrock does not appear to have been a clover, but the xalis acetosella, which has also leaves with three divisions. Leaves of this character have, from a very remote period, been regarded with superstitious reverence.

The holy trefoil's charm
was supposed to be very 'noisome to witches,' and to keep those who wore it from the influence of evil spirits of all kinds.

The T. suffruticos and glomeratae are British species belonging to this section.

The fifth section have their flowers arranged in dense heads; the petals usually become deflexed as they increase in size; the calyx is not inflected, but the upper one, after flowering, becomes inflected, and forms an arch over the legume. It includes the T. suberum and fragiferum, both of them British species; the first has white or pale red flowers; the second has two-coloured flowers, and, when in seed, resembles a strawberry.

The sixth section has large flowers with concolorous per- namental petals, of a red vivid colour, or the T. pratense; this section includes both the T. alpestre, which is a small plant with large purple flowers. It inhabits the higher Alps. The roots have a sweet taste, very rarely resembling those of liquorice, for which they are often substituted.

The last section have their flowers disposed in an ovate, pedunculate head, with scarious yellow petals, having the vesillum deflexed.

T. procumbens, Yellow Clover, or Hop Trefoil. It has been frequently cultivated, and is of an oval, pedunculate head, with scarious yellow petals, having the vesillum deflexed, the central one stalked. It is frequent in dry pastures and on the borders of fields. The heads of flowers very much resemble the hop, hence the name. This plant is frequently cultivated with the white clover for fodder.

There is another British species very nearly resembling T. procumbens, the T. filiforme, Lesser Yellow Trefoil, from which it may be distinguished by its large, dense, concolorous purple flowers. This species has seldom been cultivated as fodder, but its produce is too small to answer for cultivation as fodder.

Many of the trefoils may be introduced into the garden: they require little care, and will grow almost in any good soil. Those which are perennial may be increased by dividing their roots and planting them out in the spring; or both perennial and annual kinds may be raised from seed, which may be sown in an open ground.

(Don's Miller, vol. ii.; Sinclair's Hortus Grannimum Woburnensis; Koch's Flora Germanica; Burnett's Outlines of Botany; Hooker's British Flora.)

TRIFOLIUM, a term of uncertain origin, applied to the upper galleries formed by small open arches above those dividing the nave from the side-aisles of a church, and beneath the clerestory windows, this intermediate tier being within the sloping roof over the aisles. While they are out of economic, and to a certain degree, below from the pressure of too much solid wall, they also serve to fill up what would else be a blank space between the clerestory and aisles, and that in such manner as to produce a giving and continuity of the galleries, which in this country are sometimes called 'Nunneries,' but in Germany the 'Männerchor,' are not confined to the nave, but continued in the transepts, so as to afford a passage almost entirely round the upper part of the building. In general the triforium is very shallow or narrow, and the arches in front of it small and low; and of these last there are two, three, or even six, on each of the larger arches separating the nave from the aisles. There are however very great differences in the triforium, even in buildings of the same period and style. In some instances the triforium is very lofty and open, as in the Abbaye aux Hommes, Caen, and in the choir of Bayeux Cathedral; although the nave of the same edifice offers an example directly the reverse, the triforium consisting there of a range of very low and small arches; while the clerestory windows are remarkably large and lofty, much larger in fact than the tier-arches separating the nave and aisles. In the Norman naves of some of our cathedrals the triforium arches are as wide and nearly as high as those of the aisles; and the triforium itself is so spacious as to form an upper aisle, lighted, like the lower one, with windows. The triforium of this kind, in our larger boroughs, except that in the latter the larger triforium arches corresponding with those below are subdivided into two lesser ones with a column between them. At Gloucester, on the contrary, [also Norman] the triforium arches are low and small, being divided at first into two, each of which is again similarly subdivided, so as to make four openings over each of the large arches below. In the nave of Wells Cathedral the triforium consists of an uninterrupted range of small arches of peculiar character, in which the openings are very narrow in proportion to the solid parts or moulded piers between them. There is indeed so much variety of design, character, and combination, of the triforium, clerestory, that a comparison of the internal elevations of different Gothic edifices, in that respect, would form a highly interesting study.

TRIGLOCHYN (spoken, three-pointed), the name of a genus of plants belonging to the natural order Juncaginaceae. It has a perianth, with six concave deciduous leaves, three outside and three inside; the anthers are sessile, lodged in the leaves of the perianth, the back of which is turned towards the ovary; the capsules are from three to six in number, are 1-seeded, and united by a longitudinal receptacle, from which they separate at the base. Each species has several creeping runners, spreading on marshes, sides of rivers, ditches, and wet meadows. Two only of the species inhabit Europe, and these are found in Great Britain.

T. palustris, the Marsh Arrow-grass, has a 3-celled fruit, of a linear form, attenuated towards the base. When bruised, the leaves give out a fetid smell. In dry seasons
TRIGONIA (Linn., 1753), a family of echinoids known as "cardiids," is a type of sea urchin with a distinctive "cardiac" shape. The family includes species with a variety of colors and sizes, but all share a similar body plan. The shell of a typical trigonia has a prominent "heart" shape, with a central "nipple" or "apex" that projects upwards. This gives the family its common name, "cardiids," as the shells resemble a heart.

The shells of trigonias are typically composed of a central axis or "cardium" and a series of smaller "omphalodes" or "omphalae." The cardium is the largest and most prominent of these structures, and it serves as the basis for the rest of the shell. The omphalodes are smaller and less prominent, and they are arranged in a spiral pattern around the cardium.

The trigonia shell is a three-dimensional structure, with a complex internal arrangement of spines and spines. The spines are arranged in a series of "spinelets" or "spinelets," which are themselves composed of smaller spines. These spines are important for defense and locomotion, as they can be moved and extended to produce a "stinging" effect on potential predators.

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M. de Blainville divides Trigonis into the following sections:—

A. Trigonal species.

Example, Trigonis nodulosa, fossil, Courtragon.

B. Suborbicular or Radiated species.

Example, Trigonis petricola, Lam., recent.

C. Species with a suborbital summit, and a large striated tooth at the hinge. (Genus Opis, De- France.)

Example, Trigonis carinoloides, fossil.

Only one recent species is known, first published in the Annales du Museum under the name of Trigonis margaritacea, but Lamarck has recorded it under that of Trigonis

Description of Trigonis margaritacea.—Shell suborbiculate, nacreous within, ribbed externally with elevated verrucose somewhat sharp ribs, disposed in rays; margin plicated.

This species, which has only been found in the seas of New Holland, appears to be of moderate size. Lamarck compares its external appearance to that of a peetum without ears. It has been found at depths ranging from six to fourteen fathoms, on sandy mud.

TRIGONOMETRICAL CURVES. Any curve having such equations as

\[ x = r \cos \theta, \quad y = r \sin \theta, \quad x + y \sqrt{-1} = r \sqrt{-1} \]

or

\[ x = a \cos \theta + b \cos 2\theta, \quad y = a \sin \theta + b \sin 2\theta, \quad &c. \]

To construct the forms of such curves from the knowledge of the fundamental properties of the sine, cosine, &c., should be an early exercise of the student in trigonometry, and will be of use in his subsequent reading.

TRIGONOMETRICAL SERIES. Infinite series which are of the form

\[ a \sin x + b \sin 2x + c \sin 3x + &c., \]

and

\[ a \cos x + b \cos 2x + c \cos 3x + &c. \]

are used extensively in the higher parts of mathematics. The common mode of finding their equivalents, when \( a + bz + cz^2 + &c. \), admits of representation in a finite form, is very easy. For instance, let it be required to find

\[ 1 + a \cos x + a^2 \cos 2x + &c. \]

Assume 2 \( a = x + x^{-1} \), then

\[ 2 \cos ax = z + z^{-1} \]

and substitution gives for the whole series,

\[
\frac{1}{2} \left( 1 - a x \right) + \frac{1}{2} \left( 1 - a x^{-1} \right) \left( \frac{2 - a (z + z^{-1})}{1 - a (z + z^{-1}) + a^2} \right)
\]

which is

\[ 1 - 2a \cos x + a^2 \]

The most remarkable property of these series is that they are capable of representing discontinuous lines, so that an arc composed of arcs of different curvatures may have every one of its points made to satisfy an equation of either of the preceding forms. The whole of the discontinuous undulation, for instance, drawn in Acoouves (p. 92) might be included under one trigonometrical equation. See Dr. B. Enn's "Elemental Calculus" (Lib. U. K., p. 621). In the higher parts of physics, this property is of the greatest importance; and without it the whole range of analysis. But it will not perhaps appear so singular if we remember that every curve made of arcs
of different curves can have a continuous curve, represented even by a common algebraical equation, drawn as near as we please to any collection of its arcs. Lagrange showed the use of a finite trigonometrical series to be a very easy mode of actually representing the ordinates of this approximate curve; the infinite trigonometrical series is the limit which actually attains, algebraically speaking, the perfect representation of that to which a finite number of terms is only an approximation.

**TRIGONOMETRICAL SURVEY.** The method of conducting ordinary surveys for topographical purposes having been explained under another head [Surveying], we shall here treat of geodetical measurements in reference only to the longitude and the figure of the earth.

We propose therefore to give a short historical notice of the principal trigonometrical surveys which have been undertaken in different parts of the world for measuring terrestrial degrees, particularly by triangulating considerable portions of the earth's surface; to describe the general nature and objects of the operations to be performed in carrying on such surveys, and the principles upon which the computations are made; and to state the dimensions of the earth, considered as resulting from the revolution which has been deduced from the comparison of those measures of meridional arcs which appear to have been executed with the greatest precision.

The following trigonometry to geodetic operations belong to Whilbeed Snell [Snell], who in 1617 undertook a survey of Holland, for the double purpose of establishing the geographical positions of the principal cities of the country, and of determining an accurate terrestrial meridian. The method which he followed was the same in principle as that which would be adopted at the present time. Having formed a series of triangles extending over the country, he observed their angles with a quadrant, the height of the sun being observed by an altimeter which was carefully measured with wooden perches on the ground. He also determined the direction of the meridian at Leyden, and observed its inclination to a side of one of his triangles, and therefore computed the bearing angles of the points.

Lastly, by observing the attitude of the pole-star with a five-feet quadrant at Alkmaar, Leyden, and Bergen-op-Zoom, he determined the amplitudes of two celestial arcs and on comparing the amplitudes with the terrestrial distances computed from the triangles, and reduced to the direction of the meridian, he concluded the length of a degree to be 59,800 Rheindorper perches, or 58,100 French toises, equivalent to about 604 English miles. The result is about 3 miles too small. In 1623 Snell measured a new base, and was preparing to correct some errors which he had detected in the calculations, when his labours were cut short by his early death. Muschenbrock, a century after, in 1717, undertook the virtual repetition of Snell's observations, and found 1° = 57,003 toises, or 69 miles. (Snellius, *Eratosthenes Batavus de Terra ambitus vera quantitate*, Leiden, 1617; Muschenbrock, *Discretiones Physicae*, Paris, 1717.)

About the middle of the same century Riccioli and Grimaili undertook to measure an arc of a great circle of the earth in Lombardy. They formed a chain of triangles between Bologna and Modena, observed their angles with a quadrant, and computed their sides from a base measured on the road leading out of Bologna. The distance between the two cities was found to be 20,489 paces. Instead of reducing these distances to the mean parallel, they observed the infinite latitude that at time, be made with sufficient precision, and accordingly the result was still more erroneous than that of Snell. He found the amplitude of the celestial arc to be 10° 22', whereas Snell found it 10° 18', or 10° 19' 14'' English miles. (Riccioli, *Geographiae et Hydrographiae Reformatae Libri XII.*; Bononiensis, 1661.)

Picard, in 1669, undertook to measure the meridional arc between Dunkirk and Cape Comminges. This undertaking was conducted with far greater precision than any previous one of the same kind, and the result had a memorable application, as it furnished Newton with a sufficiently accurate knowledge of the earth's diameter, and consequently of the dimensions of the lunar orbit, to enable him to compute the force of terrestrial attraction at the distance of the moon, and thereby establish the law of gravitation. The angles were measured with a quadrant, furnished with telescopes having cross-wires in their foci (an improvement in the art of observing quadrant angles introduced by Bouguer), and reduced to a base of 56,083 toises. The latitudes were observed with a zenithal instrument at Malvoisine (near Paris), at Amiens, and at Dunkirk, and an intermediate point, so that two comparisons of celestial arc and terrestrial arc were obtained, thus

\[ 1° = 57,083 \text{ toises}, \text{ equivalent to } 364,876 \text{ English furlongs, or about } 69.1 \text{ miles}. \]

This is a very near approximation to the true length of the degree at the same place, as it is given by recent and more exact determinations, but it preceded in part, from about 200 years, the first observation of Cassini, which was in 1718.

Picard's measurement gave rise to a more extensive operation,—the prolongation of the meridian through the whole extent of the French territory, and the construction of a geometrical map of France. The triangulation for this purpose was begun in 1683 by Dom. de Commin, but after a few angles had been measured, the work was suspended till 1700, when it was resumed, and in the following year the triangles were extended to the Pyrenees. The whole of this work was executed by James Cassini, in 1718. Cassini adopted Picard's base, but two bases of verification were measured near the extremities of the arc. A very unexpected result was obtained by this comparison; the celestial arc with the measured distance between the parallels of Paris and Collioure (the southern extremity) was 57,087 toises, while the arc between Paris and Dunkirk gave 1° = 56,887 toises. This was afterwards explained by finding a base of 55,529 toises, instead of 56,083, on which was laid the meridian. This correction made the meridian become shorter as the latitude increases—a consequence directly opposed to the theory of attraction (Cassini, *Traité de la Grandeur et de la Figure de la Terre*).

The discussions to which this result gave rise in the *Academy of Sciences* were the immediate cause of the two celebrated expeditions to Peru and Lapland, which three years later were undertaken under the auspices of the French government, for the purpose of definitely settling the question of the extent of the earth. In 1735 Bouguer, La Condamine, and Godin, members of the Academy, set forth for Peru, and they were accompanied by the Spanish officers, Juan and Ulloa. From the unfavourable nature of the country, the defective state of their instruments, and other causes, this party encountered very great difficulties, and several years elapsed before they were able to conduct the observations which were required. The angles were measured on the plain of Quito, between the parallels of 23° 59' N. and 3° 42' 32" S. Lat. A primary base of 6,251 toises was measured by Bouguer and Godin separately, but a comparison of the same in different stations showed a difference of 97 toises; 5,529 toises was found to differ less than a toise from the length computed from the first base through the series of triangles. The measuring-rods were of deal, 20 feet in length, and compared daily with an iron toise, which from this application has been called the toise of Peru, and has become celebrated in the history of geodesy, being in fact the standard to which all the degrees measured on the Continent have been ultimately referred, and in terms of which the great authorities of the subject define the length of the degree. The angles were measured with quadrants of 3 feet radius, and reduced to the horizon by calculation; in some instances the difference of altitude of two signals observed from the same station exceeded a mile. The latitudes at the extremities were observed simultaneously with zenith sectors. Three different results were computed. Bouguer found the length of the degree, reduced to the sea-level, to be 56,733 toises at the temperature of 15° of Réaumur's scale (the Fahrenheit); Condamine found 56,749 toises, and the Spanish officers 56,768 toises.

(Bouguer, *La Figure de la Terre*, 1749; Condamine, *Mesure des Trois Premiers Grands Circuits effectués dans l'Amérique Septentrionale*, 1751; Juan and Ulloa, *Fouilles de l'Académie Royale de Philosophie*.)

While Bouguer and his associates were carrying on their operations in Peru, an arc of the meridian was measured near the polar circle by Maupertuis, Clairaut, Cassini, La
nonnier, and Outhier. This party reached Torca, at the extremity of the Gulf of Bothnia, in 1736, and established a chain of triangles along the line of the river stretching to the parallel of 66° 48' 22" N. lat. A base was measured on the frozen surface of the river. The situation of this base, and an average of the baselines measured, was found to be 67° 29' 47", and the terrestrial distance between the parallels 55,023 toises; whence the amplitude was determined to be 173°, 47' 7", exceeding Picard's degree by 362 toises.

In the course of the operation the length of a degree of longitude was also determined. The terrestrial arc extended across the mouth of the Rhone from Cettia to the entrance of Lisse, and the difference of longitude was found by gunpowdering in the open air, at an intermediate station, and noting the difference of the apparent times at which the flash was seen at both extremities. (La Memière de l'Observatoire de Paris Vérifié, &c., 1744.)

In 1751 Boscovich and Le Maire began a survey of the Papal States, and in the course of the operation determined the longitude of the general Royal Observatory, near St. Peters, at Rimini. The sides of the triangles were computed from a base measured on the seashore near the latter place, which consisted of two parts making an angle of 90° 10' with the base. The sides were measured with still greater precision by Meehan and Delambre. In the course of the operation the length of a degree of longitude was also determined. The terrestrial arc extended across the mouth of the Rhone from Cettia to the entrance of Lisse, and the difference of longitude was found by gunpowdering in the open air, at an intermediate station, and noting the difference of the apparent times at which the flash was seen at both extremities. (La Memière de l'Observatoire de Paris Vérifié, &c., 1744.)

And in 1792, measured an arc of meridian at the Cape of Good Hope. The two extremities were connected by two large triangles, whose common side was deduced by means of two small triangles from a base of 6467.25 toises, situated near the middle of the sea. The amplitude (1° 13' 1729) was determined with a zenith sector of six feet, and the angles were measured with a 3-feet quadrant. The final result gave 1° = 57,037 toises, or 300,729 English feet, which is nearly equal to the degrees measured in France, 10" farther from the equator. (La memerie des Mois de l'Acad. Royale des Sciences for 1751; Fundamenta Astronomiae, 1750.)

On account of the anomalous result of this survey, including an error in the base through 20 miles, the meridians of the southern hemisphere, doubts have frequently been entertained of its accuracy; but as Mr. Maclaurin is at present engaged in the verification and extension of the arc, the question is now on the eve of being settled. The correctness of the astronomical amplitude has in fact already been most satisfactorily established; forty stars were observed by Mr. Maclaurin with Bradley's zenith sector at both extremities, and the difference between the resulting amplitudes which is 42 terrestrial seconds, is as great as could be expected. (Monthly Notices of the Royal Astronomical Society, April, 1840.)

Becarría, between 1782 and 1784, measured an arc of 17 meridians in Lombardy. The instruments and methods used were the same as those employed at Ancône. The amplitude was 1° 7' 47' 7", and the length of the degree found equal to 57,468 toises. This result greatly exceeds that which other observers gave reason to expect, and the cause has been ascribed to the disturbance of the plumb-line of the sector by the attraction of the mountain masses on which the arc was abutted at both extremities. (Beccarías, Gradus Taurinensis, &c., 1774.) This arc was re-measured by Plana and Carlini in 1822, who found the amplitude to be 1° 7' 39", and the length of the degree 57,408 toises, a result still more at variance with other determinations.

Two surveys, executed by Liesgagn in Austria and Hungary, between 1762 and 1769, have been usually cited in meridional geography, but in all these surveys there was no abatement of the meridian, and they are not deserving of no credit. The Austrian operation comprised nearly three degrees of the meridian of Vienna, from Brun in Moravia, to Varsadion in Croatia; and since the beginning of the present century the Austrian survey has been re-measured in the course of a general triangulographical survey of the Austrian states. For some distance from Brun, Liesgagn's results agree with the recent ones; but in the last triangles (in consequence, it is supposed, of missing a signal) the errors in the lengths of the sides are from 1060 to 2309 toises; while that in the length of the meridional arc amounts to 4533 toises. Baron Zach, who examined the manuscripts of Liesgagn, affirms that both the astronomical and geodetical observations were not only faulty and ill calculated, but designedly altered to produce a better agreement. (Liesgagn, Diversio gradum Meridiani Viennae et Hungariae, Vienna, 1770; Des Zach, Correspondauze an die Geodätischen Beobachtungen, vol. vi.)

The first geodetic survey executed in England was undertaken with the immediate object of establishing a trigonometrical connection between the observatories of Paris and Greenwich, in order to determine the difference of longitude between the two. Cassini de Thury, was in 1783 presented by the French ambassador to the king, who placed funds at the disposal of the Royal Society for providing the requisite apparatus. In order to accomplish the proposed object, it was necessary to connect the observatory of Greenwich with the French are of meridian, by carrying a series of triangles from Greenwich to Dunkirk. This was undertaken by General Roy, assisted by Mr. Dalby, who had been ordered to the service of the Royal Society for the purpose, and by the surveyor-general of Kent, Carlini, and by Cassini, Meechin, and Legendre. In the course of this survey the operations were conducted with a degree of accuracy and precision, of which, till that time, there had been no example. The methods of calculations were however less excellent; the three observed angles of each triangle were made equal to 180° by an arbitrary correction, and the sides computed by plane trigonometry. By reason of the small extent of country surveyed, the neglect of the earth's curvature did not lead to any serious error, but such a method of proceeding would be inadmissible at the present day. A base of verification of 28,543 feet was measured on Romney Marsh with a steel chain, and the difference between the measured length and the length computed from the Hounslow observatory was only about 0.29 inches. So near an agreement might afford a satisfactory proof of the general accuracy of the work, but this has since been submitted to a more decisive test. In 1821 and some few following years, the angles were re-measured by Colonel Colby and Captain Kater with the same excellent instrument, and the triangles calculated with reference to the sphericity of the earth. On comparing the results with those of General Roy, the greatest difference in the distances observed in the base at Dover and Calais, and this amounted only to 12 feet, the whole distance being 137,472 feet. (Roy, Phil. Trans. 1790; Trigonometrical Survey of England and Wales, vol. 1; Kater, Phil. Trans. 1824.)

The resolution adopted by the French Convention in 1791 to establish a decimal system of weights and measures of which the unit should be an aliquot part of the quadrant of the meridian, gave rise to a remeasurement of the meri-
dian of Paris from Dunkirk to Barcelona. In the conduct of this survey, the most important in reference to the figure of the earth that has yet been executed, the French astronomers have extended their inquiries to the investigation of the terrestrial figures at many points of both the north and south of Europe, as well as those that have already been studied in the northern part of the world. The results of these inquiries have led to the development of a more accurate understanding of the curvature and shape of the earth, which is of great interest in the field of geodesy.

In the northwestern part of Europe, from Dunkirk to Rhôden, including about two-thirds of the whole, was assigned to Delambre, and the southern part to Barrere. In fact, Mechin had occasion to determine the latitude at Barcelo-

na, which is only about a mile distant from Montjouy, he found a discordance between the results at these two places amounting to 0°, and all his efforts to reconcile or explain the peculiarity fruitless.

From the results of this operation, compared with the degree measured in Peru, the dimensions and ellipticity of the earth were determined, and the merid. The earth was assumed to be a sphere of revolution; the de-
duced ellipticity was 1/334; and the merid. or ten-millionth part of the quadrant of the meridian, at the temperature of freezing water, was fixed at 443,266 lines of the plate of Peru, the normal temperature of the iron foise being that at Rœumur, or 61° 19′ of Fahrenheit. (Base du Système Métrique Décimale, 3 vols. to., Paris, 1805, 1807, 1810.)

The prolongation of the meridian through Spain, which formed a part of the original project, was interrupted by the death of Mechin, but was subsequently effected (1807-1809) by Biot and Arago. By means of a very large triangle, one side of which exceeded 100 miles, they con-
nected the island of Aviza with the coast of Valencia; and another triangle carried the arc to Formentera, a small island still farther to the south. The amplitude was thus increased to upwards of 12 degrees. (Biot and Arago, Recueil d’Observations Géodésiques, &c., 1821.)

In the observing of the latitude of Paris, that notwithstanding the parade of a commission and the extraordinary precautions taken to ensure accuracy in the computations, a serious error was committed with respect to this arc, which was only reduced by the means of the tables of triangles compiled by Prof. Meckel (without any attempt to return to the misapprehension of a formula, the distance between the parallels of Montjouy and Mola (the station on Formentera) was computed without applying the proper correction for the convergence of meridians. The distance originally given by the commission was 15360577 toises; but the distance when the computation is correctly made is 153673-61 toises (Bessel, Astronomische Nachrichten, No. 458), the difference being 67-64 toises. In consequence of this commission, and of the introduction of some other arcs since measured into the data for deter-

mining the figure of the earth, the length of the quadrant of the meridian expressed in terms of the local métre, according to the best determination which can at present be made of the dimensions of the earth, is 10,000,855:76 métres; in other words, the local métre would require to be lengthened by about the 0,000,856th part of itself in order to agree with the ideal métre, a ten-millionth part of the quadrant of the ellipsoidal meridian. This circumstance may serve to show the futility of any proposal to restore a lost standard from its assigned relation to the magnitude of the earth. The French métre is in fact nothing more than a refinement of the toise; the unit of which, the bases were measured and the meridian computed.

The arc which was measured by Maupertuis and his associates in Lapland in 1736, was remeasured by Svan-
borg in 1801-1803, and extended to the latitude of about 40°. A new base was measured with iron bars which were compared with a standard métre in Paris. The terrestrial angles, as well as the latitudes and azimuths, were measured with repeating circles, and the methods of observing and computing were standard. All the details of the operation appear to have been executed with great skill and ability; but by reason of the inadequacy of the instrument, the latitudes are not supposed to be considered as certain, while the azimuths are accurate within less than one part in ten thousand with respect to the temperature at which the measurements were compared with the standard métre. The result gave 1° = 57,190 toises, which agrees much better than that of Maupertuis (57,195 toises) given in the Exposition des Opérations faites en Laponie pour la Deter-

mination d’un Arc du Méridien, &c., Stockholm, 1815.)

A trigonometrical survey of Holland was executed under the direction of Gen. Krajenhoff, from 1806 to 1807, which was regarded as a continuation of the general survey of France. No base was measured, but the dis-
cances were computed from a side of one of Delambre’s adjacent triangles. The angles were measured with repeating circles, and Delambre’s methods adopted throughout. As a verification, some distances were deduced from two different series of triangles, and the greatest discrep-
dances were found to amount only to one métre in 912 toises. (Krajenhoff, Mélanges, pp. 129-198.) The Engi-
nuines faites en Hollande pour servir de base à la Topog-

raphe de cet état; Exécutées par le Lieutenant-Géné-
ral Krajenhoff, &c., A. la Haye, 1815.)

A trigonometrical survey of the British Islands, under the direc-
tion of the master-general of the Ordnance, was begun in 1791, and has been continued to the present time. The first conductors of this national undertaking were Col.

Williams and Captain (afterwards General) Mudge, of Roy’s Engineers, and Mr. Dalby, who later assisted General Roy. They began their operations by measuring General Roy’s base on Hounslow Heath with two steel chains of 100 feet in length, which had been very carefully prepared by the Board of Ordnance. No general plan of operation appears to have been fol-

lowed with respect to the triangulation, which was carried along the southern coast westward for the purp-

ose of determining the relative positions, geographical headlands and harbours, and has gradually been extended over the whole kingdom. Four other bases, besides the one on Hounslow Heath, were measured in England, namely, at Leith in Scotland; at Houndslow Heath; at Misterton Carr, in Lincolnshire; and Rhuddan Mase-

near St. Asaph. For the determination of the geographical positions the direction of the meridian was determin-
ed at five intermediate places between Dover and Land-

End, viz. Beachy Head, in Sussex; Dunslow, in the Isle of Wight; Black Down, in Dorsetshire; and St. Agn

Beacon, in Cornwall. In 1801 and 1802 the arc of the meridian extending from Dunslow to Clifton in Yorkshire was determined by Mudge. The two places were con-

nected by a chain of twenty-two triangles, by which the terrestrial distance was computed from the base on Hounslow Heath and Misterton Carr, and their astron-

omical latitudes were determined with great accuracy by Ramsden, carrying an eighty-foot telescope. The lati-
dude was likewise observed at Arbury Hill, near the middle of the arc. By means of this intermediate observation we have the intersections of the arc by the parallels of the Green

wich Observatory and the Duke of Marlborough’s Obser-

vatory at Blenheim, the whole was divided into four parts, the lengths and amplitudes of which will be given in the table at the end of this article. In 1806 the meridian base was the same as the base in 1801; and the latitudes and azimuths determined, rather more than a degree to the north of Clifton. With the view of fixing a scale of longitudes for the great map of England, an arc of a parallel circle was determined by means of the observations of azimuth at Dunslow and Beachy Head, and the line was continued from the triangulation. The result gave the length of a
degree of longitude on the parallel of Dunns, viz. 30° 37' 7", equal to 332,914 feet, which is longer by about 762 feet seventh section of the best determined area of meridian. But this method of determining the difference of longitude is liable to some uncertainty, as the result is considerably effected by small errors of reduction, and it is well known that all the longitudes on the southern coast given in the survey are erroneous to the extent of several seconds. 

The last-cited work brings down the history of the survey to 1811, and from that time to the present no authorized or authentic account of the subsequent operations has been published. Were it not indeed for the admirable papers which were written on the subject by Colonel Trigonometrical Survey, England, is the last thirty years. The operation has however never been lost sight of, and is at present in active progress. For some years after the last published account, the triangulation was carried on in Scotland both along the eastern and western coasts. At the survey of Ireland was begun a base was measured on the banks of Lough Foyle, near Londonderry, which will be described hereafter, and differing from any which had previously been used, and with precautions to ensure accuracy which probably have never been surpassed. Depending on this base, a net-work of latitudes was computed from the Hebrides, and the angles measured with the great theodolite of Ramsden, and partly with a new instrument of the same kind, of two feet in diameter, constructed by Troughton and Simms. In 1818, the former was computed across the channel, the Irish triangles were connected at several points with those formerly observed in Wales and the west of Scotland; so that these last, which were computed from bases measured with the steel chain, may be, and indeed have been, interpolated in terms of a new base. It may be presumed that the sides of the triangles—only in Ireland, but in Scotland also—will be computed from the Irish base, about the accuracy of the former, and the employment of one or two counties, the topography of Ireland has been completed; and we are informed that the angles of the different chains of primary triangles extending over the whole of Scotland and the adjacent islands have now also been observed. Astronomers look forward with much interest to the completion and publication of the details of his great national undertaking, the experience and well-known ability of the distinguished officer to whom the important tasks of so long an undertaking are intrusted. We have every assurance that it will be in every respect worthy of the age and the country.*

A trigonometrical survey of India was begun by Colonel Lambton, and has been continued, since the death in 1823, under the direction of Colonel Everest. It was originally undertaken for the purpose of connecting the coasts of Coromandel and Malabar, and of determining the altitudes and longitudes of the principal places in the peninsula; and although it has of course been carried on chiefly for the purpose of general geography, it has afforded an important contribution to our knowledge of the earth's figure by two areas of meridian, one of them the longest which has been measured in any country. The first was in the neighbourhood of Madras, and its amplitude only 1° 35'; the second begins at Punnah, near Cape Comorin, lat. 9° 32', was continued up to the middle of the peninsula 8° 43' lat., by Colonel Lambton; and has been extended to Kullianapoor, lat. 24° 17' 11" 8' by Colonel Everest. In connection with these areas six bases were measured by Colonel Lambton, and two by Colonel Everest. The methods of proceeding were in almost all respects the same as in the Ordnance survey of England.

The horizontal angles were observed with a theodolite of three feet diameter by Cary, and the latitudes with a 36 feet zenith sector by Col. Everest. The results were correct opinion of the degree of confidence to which the results of these operations are entitled. Judging from the statements of Colonel Everest, we are disposed to regard him in respect of his operations, and the single instance of the Ordnance survey, as entitled to the highest respect; those obtained in the early part of the Ordnance survey, and assuredly not to be in competition with those of the recent surveys in Ireland, and in France and Germany. It appears that on one occasion the great theodolite received an accidental blow by which the limb was completely distorted, and though the injury was so successfully repaired by Colonel Lambton that the difference of areas of 90', taken on any part of the limb, was found not to exceed 20', new measurements were not necessary in the subsequent use of the instrument. Prior to the measurement of one of the bases it was found that the joints of the steel chains were thickly covered with rust, in clearing away which the length could scarcely fail to be altered. In the actual measurement the measuring-chain was not supported on coffers, or stretched by a constant weight; it was laid on the ground and stretched by a hand-captain. These circumstances give reason to presume no high degree of precision. With respect to results, the meridional distance between Daumergilda and Takal Khera, deduced from the Bodor base (measured by Colonel Lambton), was 1,105,619 feet, and the same distance from Khera base (measured by Colonel Everest) was 1,105,381 feet, the difference being 237 feet; and when the former base was computed from the latter, through the series of triangles, the difference between the result and the true length was found to be 78.72 inches. Discrepancies of such amount are incompatible with the extreme precision now aimed at in geodetical operations, but great allowance must be made for the difficulties arising from the climate, the nature of the country, and other unfavourable circumstances; and indeed it would scarcely be possible to appreciate too highly the ability, energy, and devotion displayed both by Colonel Lambton and Colonel Everest in the conduct of this important undertaking. It is satisfactory to be able to add that the recent operations appear to have been carried on in a manner which will place the results beyond suspicion. In 1831-33 a new base was measured by Colonel Everest at Dhen Dun, in the Doab territory, with a result similar to that used by Colonel Colly in Ireland. The length was nearly 73 miles. It was measured twice, and the difference between the two results amounted only to 2.4 feet. (Lambton, Colloque Recherches trigonom., t. x., p. 391.) In 1831, Monthly Notices of the Astron. Soc., p. 217.

Since the last general peace trigonometrical surveys have been carried on in all the principal countries of Europe—England, France, Italy, Austria, Bavaria, Denmark, Prussia, and Russia. It would be foreign to our purpose to describe the details of these operations, even if the materials for doing so were at our command; but we shall briefly notice those which have a scientific interest, by reason of the data they afford for determining the figure of the earth.

* Of the surveys now alluded to, one which was carried across the Alps in 1821 and some of the following years, is remarkable by reason of the difficulties the country presented. The principal object was to measure the angle formed by the Italian and Swiss borders, a fact that had formerly been measured along the mean parallel of 45°, on opposite sides of the Alps; one extending from Fiume in Illyria to Turin, and the other stretching across France from Cordouan (near Bordeaux) to the frontier of Savoy. This operation was undertaken jointly by the Austrian and Sardinian governments, and executed by parties of engineer officers of both countries, who acted independently of each other, so that all the angles were an independent instrument. It is remarkable that both the previous surveys, it gave the length of an arc of the mean parallel extending through nearly 13° of longitude, by means of instantaneous fire-signals (explosions of sulphur) observed and determined by means of six independent comparisons of the astronomical and geodetical areas were obtained, but the results did not present a satisfactory agreement. The whole length was 217
Two arcs of meridian have been recently measured in Hanover and Denmark, which, though of comparable extent and with all the details of the work given in the same skilful manner in which the operations were conducted, and the great probable accuracy of the results. The first was obtained by connecting the two observatories of Göttingen and Altona, and the second nearly in the same meridian, by means of a chain of triangles proceeding from a base which was measured by Gauss in 1820. From the same base another chain of triangles was carried through Norway, by means of which the geographical distance between the parallels of Lauenburg (in Hanover) and Lynsbel (in the island of Alsen) was computed. The celestial arc was determined by Schumacher with Bradley's zenith sector, sent from the observatory at Greenwich for this purpose.

A special trigonometrical operation has been carried on in the island of Jersey, of which a description is given under the head of Jersey. The measurement of the meridian, in amplitude, was measured on the meridian of Dorpat, 26° 43' 45" to the east of Greenwich. We have the details with respect only to the portion of the arc comprehended between Jacobstadt (on the Düna) and Hochland (in the Gulf of Finland), which was determined by Struve between 1821 and 1831. For observing the angles, Reichenbach's universal instrument, having a horizontal circle of 14 inches diameter, was used, and the amplitude was determined with great precision. The measurements of the arc are the result of the operations of these three independent astronomers.

Measurement of the Base.—The foundation of every trigonometrical survey is the measurement of a ground-line, or base, in terms of which all the distances are to be computed. This is an operation which is attended with considerable trouble. The precision of 200,000 feet in 1 mile is considered the most minute precision; for any error with which the result may be affected is multiplied in the sides of the triangles in the ratio of their length to the length of the base; and other operations of a similar kind are subject to the same proportion. An error in the base amounting only to an inch in the mile would vitiate the determination of the earth's diameter to the extent of 110 yards.

The general method of proceeding may be thus described: A base is measured as free from obstructions and as nearly level as possible. The terminal points must be defined by permanent marks; for example, by a fine dot, or the intersection of two straight lines, on a rock or a small hillock. The line of the base is traced by a transit-instrument adjusted over one of the terminal points, and directed to a flag-staff or other signal erected at the other, by which the observer is enabled to direct his sights. A series of stations is placed in the ground, all ranging in the same vertical plane. The measuring apparatus may be constructed and applied in various ways, but in all cases the following conditions must be observed:—1. The successive measuring-rod or base measuring-rod must be carried from station to station by means of a carefully checked long bar, without passing through the terminal points of the base; 2. the temperature of the rods must be observed at the time they are applied, and their rate of expansion determined; 3. the effects of temperature must be reduced to the length at a given temperature; 4. they must be supported in such a manner as to have no tendency to flexure; and 5. each rod, when adjusted in the line of the base, must be exactly horizontal, or its inclination exactly determined. In order that the corresponding horizontal distance may be computed.

Previously to General Roy's measure of the base on Hounslow Heath, the measuring apparatus used in all ordinary surveys and operations was the instrument described by Laussie and Cassini in France) consisted of deal rods, usually about 20 feet in length; but deal rods, however well seasoned, are found to be considerably affected by the hygrometrical state of the air, and liable to suffer from irregular expansions and contractions, the effects of which cannot be accurately estimated, even when they are compared from time to time with a standard metallic bar. For this reason General Roy, after he had measured the base with deal rods, (which he had replaced by two below glass tubes. The tubes were 20 feet in length and about an inch in diameter, and the extremities were defined by metal buttons, ground perfectly flat, and perpendicular to the tube; at the other end of the tube there was attached to a rod of brass, passing through the tube, a sort of point or slider, capable of being pushed up a certain way within the tube to a spring. A fine hair was fixed to the slider, and another on the glass tube, were so adjusted, that when the hair in the glass tube came into coincidence (which was observed through the glass), the distance between the flat ends of the metal buttons was exactly 20 feet at the temperature of 62° Fahrenheit. In making the contracts, the flat end of one of the slides was pressed by a screw apparatus against the movable end of the other, until the coincidence of the lines took place, so that a constant pressure was applied equal to the tension of the hair. When the Ordinance survey was begun, the base was again measured with the instrument described by Ramsden, of 100 feet in length, and consisting of 40 small brass handles; and in order to bring the marks successively to the same point on the base-line the following contrivance was used. The base was driven into the ground, but not connected with the chassis or its supports, was placed contiguous to the preceding end, A, and adjusted by means of a screw apparatus, so that the point of the scale coincided exactly with the mark on the handle. The chassis was then cut off at one length; and when again placed on the coffer, was driven back against the stretching-weight, until the mark on the handle at the following end, B, coincided with a
of the scale, which had remained fixed in its place.

In this manner the points of the two columns occupied the
same point on the line of the base, or the distance between them was known in terms of the scale. The same method was followed in measuring several other bases in England, the columns being connected together after the manner of another branch, which was kept for this purpose. The advantage of the chain depends solely on its great length, by reason of which the number of coincidences (in making which the chief difficulty consists) is considerably reduced; but this advantage is probably more than counterbalanced by its inability to alter from wearing or corroding at the joints, and the insufficient security afforded that, notwithstanding the stretching, all its points are in the same straight line. The use of the chain has been confined to the English and Indian surveys, and is now abandoned in both.

The apparatus used by Delambre and Merson in measuring the two bases in France, on which the length of the meridian depends, was constructed as follows:—The measuring-rod was a thin bar of platinum, two toises in length, half an inch in breadth, and two lines in thickness. The next was covered by another bar of silver, somewhat shorter, the two being firmly connected by screws at one end, but free at every other point, so that the expansions and contractions of each were not affected by the other. The relative expansions were thus indicated by the distance between the free extremities of the two bars; for measuring which a finely divided scale was cut on a part of the platinum bar, and a vernier attached to the extremity of the copper bar. The relative expansion gave the means of computing the absolute expansion of the platinum bar at the time of the measurement. Four of these compound bars were used together; and when all were adjusted in the line of the base, and the requisite observations made and recorded, the last was carried forward and placed first, the others being left in their places. The ends were not brought into contact; a small interval was left between each and the next, which was measured by a slide, or small scale of platinum, attached to that end of the platinum bar which was not covered by the copper bar. For the measure of the Hanoverian base Gauss employed three bars of hammered iron, two toises in length, and about an inch in breadth and thickness, enclosed in boxes so as to leave only the ends projecting, and supported by counterpoises to prevent flexure. The ends were covered with steel plates, one flat and the other spherical; and when the bars were placed in the line of the base, a small interval was left between the flat end of one bar and the convex end of the next, which was measured by dropping into it a thin wedge. Struve also employed iron bars in measuring the Russian base. In this case however the ends of the bars were brought into contact, and as the bar and that which had been adopted by General Roy in using the glass rods. But the apparatus which formed the moveable extremity of Struve's rod consisted of a bent lever which turned on an axis passing through the bar, near its extremity, the motion of the short arm of the lever being in the direction of the length of the bar. The short arm terminated in a hemisphere which projected a little beyond the end of the bar; and in making the contacts, the flat and fixed end of the bar was pressed against the hemisphere, until an index on the extremity of the long arm of the lever stood at the middle of a scale connected with the bar, in which position the distance between the plane in which the bar terminated at one end, and the apex of the hemisphere at the other end, was exactly two toises at the normal temperature. A steel spring acting on the long arm of the lever regulated the degree of pressure applied in making the contacts.

In measuring the Prussia base Bessel used four compound bars constructed on the same principle as those of Delambre. The apparatus, which is simple and ingenious, will be readily understood from the annexed figure, in which the two ends are shown. i's a bar of iron two toises in length, an inch broad, and a quarter of an inch thick, and z is a bar of the same metal and half the breadth. The two bars are firmly connected by screws and soldering at the end z. The rice bar z terminated in two knife-edges of steel, the edges being horizontal. k' is a piece of the iron bar which is placed vertically, or at right angles to the former. The length of the measuring bar, or two toises at the normal temperature, is defined by the knife-edges at z and k; while the interval between z and k varies with the temperature, and indicates the degree to which the absolute expansion of the iron bar becomes known. This interval was measured by inserting a thin glass wedge between the knife-edges, and when the bars were placed in the line of the base, the distance between the knife-edge k of one bar and z of the adjacent one was measured in the same manner. By means of fine divisions on the parallel sides of the glass wedges an interval in the direction of the base so small as the 12,000th part of an inch was made visible.

For the measurement of the Irish base an apparatus was employed by Colonel Colby in which the expansion of the measuring-rod was compensated in such a manner that no error resulted from the change of temperature. The principle of this very ingenious apparatus will be understood from the following description:—A B is a brass bar, 10 feet in length. C D a bar of iron, firmly connected with the former at the middle E. Two steel tongues A P, B Q are connected with the extremities of the iron bars by double copper bands to play to the tongues to prevent interference with the free expansions of the bars. At a certain normal temperature the steel tongues are perpendicular to the direction of the bars. Suppose then them in this position, and that an increase of temperature takes place; the brass bar will become longer than the iron bar in consequence of its greater relative expansion, and a straight line A C P (on the middle of the tongue) will come into the position A P, intersecting its former direction at a point P, so situated that P C has to P A the ratio of the expansion of the iron bar to that of the brass bar. But this ratio being constant, P is a given point; and as the corresponding point Q on the other tongue is in precisely the same circum(stance, it follows that the distance between P and Q will remain unaltered in all temperatures, provided at least both bars have the same temperature. This invariability is however not absolute, for when the tongue comes into the oblique position a P is longer than A P, and consequently the point marked on the tongue will be between a and the variable point. Hence an increase of temperature must increase the distance between P and Q; but the effect is insensible. The distance between the two bars was about two inches, and the distance of P from the iron bar or P C (which was determined experimentally) about three inches and a half. The bars were enclosed in strong wooden cases, having only the ends of the steel exposed, and the cases laid upon trestles. Five or six sets of bars were used together; and when levelled and adjusted in the line of the base, the interval between the point Q on one bar, and the point P on the other, instead of being variable (as in the methods of Delambre and Bessel), was made equal to a given constant quantity. This was effected by means of a microscoic apparatus, constructed on the same principle as the measuring apparatus, two microscopes take the place of the above; and their foci being the points whose distance remains invariably. The microscopes were six inches apart, and between them, at the same distance from each, was a small telescope invariably connected with the two microscopes of which the microscopes were attached; the whole being so disposed that the three optical axes were in the same plane, and parallel to each other at the normal temperature. This apparatus being placed parallel to the line of the base, over the end of one of the sets of measuring bars, in such a manner that the point Q on the steel tongue was
bisectioned by the cross-wires of one of the microscopes, the
next set of bars was moved backwards or forwards until
the point P (Fig. 3), indicated by the cross-hairs of the other
microscope. A very delicate level fixed on the upper bar
of the microscopic apparatus gave the means of adjusting
the optical axis of the telescope exactly in the vertical; by
which means, when it was necessary to suspend the opera-
tions, the level of the bar from which the measurement
was to be resumed could be determined with much greater precision than by the
usual means of a plummet. The measuring-bars were
observed by the microscope, which had a standard image
wherefrom the bar is divided with reference to a
practical convenience: it cannot be affirmed that the
results of any one of them are decidedly more accurate than
those of the others. Col. Colby's apparatus is ex-
ceedingly beautiful in theory, but the play of the joints by
which the tongues are connected with the bars, and the
uncertainty there must be about the determination of the
invariable points, and that their distance remains un-
alterable, though the temperature of the atmosphere is not,
are obvious disadvantages. Bessel's apparatus is the
most compact, and in fewest pieces; and we should
imagine that his mode of measuring the intervals between
the successive bars would be found easier in practice than
making the adjustment between the bar and the pedestal.
On the other hand, the adjustment of a point under the focus of a
microscope is an operation which can probably be exec-
uted with greater precision than the measurement of the
distance between the solid bodies, whether by a scale and
vernier, according to the method of Delambre, or by a
finely-divided wedge, as used by Gauss and Bessel.

The length of the base is a matter of some importance.
Theoretically speaking, it cannot be too long. If a
distance is to be taken as the base of a triangulation
(an arc of meridian, for example) deduced from a trigonometrical operation in m
times the length of the base, then, putting errors of ob-
servation and calculation out of view, the probable error in the
length of the base in the ratio of $\sqrt{m} : 1$; consequently the longer the base the
less is the probable error of the result. On the other hand, the probable error in the measurement of the base increases as the square root of its length; so that a distance deduced
from a base of three miles measured only once would have as
great a probable error as if it had been deduced from a base
of only one mile measured three times, and the mean root
mean error length.

Hounslow Heath was 27,403 feet, or about 5 miles; and
the other bases measured in England were from 46 miles to
about 7 miles. In the Indian survey the bases averaged
about seven miles. The two bases at Meul and Perigian,
on the lateral base of the equator, are often employed, and lie
both up and down both ways, and each consists of two parts
inclined to each other. In the Irish base eight miles were
directly measured with the compensation bars, and two
miles were added by triangulation. Struve's base was 2315
miles, or about 28 miles. The Prussian base, measured
by Bessel, was only 935 miles, or about a mile and
eighty. Baron Zach, who measured some small bases in
Italy, contends that long bases, such as were measured in
the French, English, and Indian surveys, are attended with
no advantages corresponding to the expense they occasion;
and Professor Schweid, in an interesting account of a base
of 2840 feet, measured by him near Spire, reasons to the same effect. (Die Kleine Stuttgart, 1802.)

Although we cannot subscribe to these opinions, it must be
admitted that as instruments and the methods of ob-
serving and computing the observations have been
improved, the necessity for frequent verification by
the measure of new bases has been proportionally diminished.

When the measuring-rods have been applied to the
whole line of the base, and the proper reductions made for
expansion, etc., the distance is obtained by the
measurement between the terminal points, in terms of the
stationary base, which the measuring-rods are referred to, on an arc of a great
circle of the earth. In order that the results of different
surveys may be comparable with each other, this circle
must be made the same; and it is usual to substitute for the arc actually measured, the corresponding arc on the surface which coincides with the mean level of
the sea. Let $l$ denote the measured length of the base.

$$l = \frac{2}{3} \times \text{mean level of the sea}$$

The surveyors have to decide, at the conclusion of the
survey, the mean level of the sea, which is supposed to be
above that level, and the radius of the earth: the $r$ found from this proportion, $r+h$; $r = l$.

Triangulation.—In commencing the triangulation, the
first step is to make choice of the points or stations where
the triangles are to be measured, and for this purpose the
choice of stations must be determined in some measure
by the nature of the country, and with reference to the
object of the survey; but care must be taken to avoid very
acute angles, as at the extreme points of the base, where
angles will rise give large errors in the lengths of the
sides deduced from them. The best-conditioned triangles
are those which are nearer equilateral. The
principal triangles should be of considerable magnitude, for the
pro-
duction of a series of triangles which are situated in
as series of triangles increases with the number of
intermediate triangles. Sides averaging from 20 to 50 miles
may be considered as the most convenient; but in mount-
ainsous countries, or for connecting stations separated
by a sea, the magnitude of the triangles will sometimes
be limited only by the distance at which the signals cease
to be visible from each other. When the object of the sur-
vey is not to determine the figure of the earth, but the
longitudes and latitudes above sea-level, as well as the mutual distances of these primary
stations, should be determined with all the precision it is
possible to attain. The more remarkable features of the
country are left in the field of observation by the
triangles, by secondary triangles, which, being liable only
to small relative errors, may be determined more expedit-
ously by less precise observations or with inferior instru-
ments. The angles of the triangles may be considered as
the measure of the surveyor's compass and chain. (Surveying.)

Signals.—When the stations have been chosen, the next
point to be considered is the erection of signals. In
the earlier surveys, the usual practice was to select such
contrivances as the convenience of the time or place
suggested, windmills, &c.; but experience has shown that
objects of this kind, even when found (which will seldom
be the case) in those positions where it is desirable that
the signals should be seen, are not well adapted for signals, and that in general the most
advantageous course is to construct them for the express
purpose. In the earlier part of the English survey, the
observations were chiefly made by night, and the signals
were reverberatory lamps with concave metallic reflectors
supported by flag-staffs, and enclosed in tin cases, having
plates of glass in front to screen the light from the action of
the wind. Such signals answer well enough for
longer distances, and in the Irish survey the positions of
the French are of meridian, also employed rever-
beratory lamps and concave reflectors; and in one case the
distance between the station and the signal exceeded 100
miles. Fewer lights, and other contrivances, have also been used as signals. Delambre
constructed his signals of wood in the form of truncated
conical pyramids, and observed by day. For the large
triangles in Ireland and the west of Scotland, Colonel Cob
built up conical piles of day-stone, whose base was
thrown down when the instrument was taken to the spot, and which built up when it was necessary to observe the same signal
from other stations. Such signals were found to be visible
from the telescope of the greatest instruments, 90 or 100 miles in favourable weather. Plates of polished
metal, placed so as to reflect the light of the sun in the
proper direction, have been found a powerful means
for rendering a station visible. Gauss proposed the heliostro-
pe in which the reflecting surface of the receiver glass
was the signal which was principally used by Struve and Bessel. Another method, adopted by Bessel for short dis-
tances, was the reflection of light from a hemisphere of
silver or copper. These two have the advantage of rendering the observer dependent on
illumination, but in other respects they afford excellent signals, as the light proceeds from a point, the observation is not sup-
pended by the precision of the horizon. Indeed, the luminous point is not in the axis of the signal,
but as the radius of the hemisphere and the azimuth of the
sun at the time of the observation are known, its position
with reference to the axis can be accurately computed, and
a correction applied if the deviation is sensible. But at
traces bodies used as signals render a similar correction necessary when the light falls upon them obliquely. To avoid this inconvenience, Stanberg observed the light of a sky through a rectangular opening in a blackened card which turned about a vertical axis, so that its plane could always be placed normal to the light-signals are found inconvenient, by reason of the unsteadiness and the oscillations of the light; and accordingly geometrical observations are now generally made by ey; nevertheless, under peculiar circumstances, night observations may be advantageous, or even necessary, bus, in India, Colonel Everest found that the greater section during the night sometimes rendered stationing which could not be seen by day, being hid by the darkness.

With respect to the instruments and the methods of observing in geometrical surveys, ample information is given in the articles Theodolit, Repeating Circle, &c. We may here remark however, that as each signal (speaking generally) is the common vertex of several triangles, an angle required for the calculation of a triangle may frequently be obtained from the sum or difference of other angles at the same point, as well as by direct observation. This circumstance permits the observations to be made various ways, and affords an important means of verification; but in order that full advantage may be derived in this, the observations must be made and combined according to some systematic plan. Stuve followed for the triangulation, adopted the plan of observing successively the direction of every signal visible from his station, in reference to a certain arbitrary direction; and the same method was followed by Bessel. This appears to be the mode of conducting the observations by which an observer is enabled to make the most of his position.

Reduction to the Centre of the Station.—It is desirable that the centre of the instrument should always be placed in the vertical line which coincides with the axis of the signal at the same station; but the strict fulfilment of this condition may sometimes be impossible, or at least extremely inconvenient. In such cases the instrument is placed near the station, the direction, of course, rendering the eccentricity. Let C be the centre of the station, E the place where the instrument is placed, A and B the distant signals, so that A CB is the angle which is required, and AEB the angle actually measured. Let the distance CE be denoted by d, and AEC (computed approxi- mately) be the angle measured in seconds, between ACB and AEB is found from this formula—

\[ AEB = a \sin (BAC - BCE) = a \sin BAC, \]

where \( a = 206265^{2} \), the number of seconds in an arc of one degree, equals \( 1 \) when the radius, or \( 1 \) when the degree.

Reduction to the Horizon.—Although the theodolite has now come into general use, perhaps universal, in carrying on important geodetical operations, we shall add the formula by which an angle measured in the oblique plane passing through the instrument and the two observed objects is reduced to the horizon. Let A and B be the remote signals, C the angle in the oblique plane, C its projection on the plane of the horizon and let a and \( \beta \) denote respectively the number of seconds by which A and B are observed to be elevated or depressed above or below the horizon of C; then

\[ C = \{a + \beta \tan C + \{a - \beta \cot \} \sin \} \]

denoted to the centre of the station and the horizon, their values as given by the instrument, being all affected with some portion of error which it is impossible by any means to get rid of, must undergo the process of correction or illuminis, or be made to satisfy certain mathematical conditions, before a determinate result can be deduced from them. In order to establish these conditions the following quantity must be computed for every triangle in the set.

Spherical Excess.—The spherical excess of a triangle on the surface of a sphere or spheroid, formed by the sections of planes perpendicular to the surfaces, is the excess of the sum of the angles of the triangle over \( 180^\circ \). It is a given relation to the area of the triangle depending upon the radius of the sphere; and in a geodetical survey the data for computing it are, in every case, a side, e, and the three observed angles at A, B, C, of which the third is supposed opposite to e. Let S denote the number of square feet in the surface or area of the triangle, E the spherical excess in seconds, and \( r \) the radius of curvature in feet; we have then \( S = \pi \sin B \sin C \), and \( E = S \div r \), where \( r = 206265^{2} \).

On the spheroid, the radius of curvature of a section perpendicular to the surface is variable, and depends both on the latitude and the inclination of the section to the meridian.

For a series of triangles included between two parallels of latitude whose distance is not more than two or three degrees, \( r \) may be supposed constant in computing the spherical excess; and as the nearest approximation to its true value, we may, in the section considered, regard the section which intersects the meridian in an angle of 45° at the middle latitude. The general formula for the radius of curvature of an oblique section is

\[ \frac{1}{r} = \frac{1 - ee + ec \cos^2 \theta - \cos \theta}{1 - ee \sin \theta} \]

where \( a \) is the radius of the equator, \( e \) the eccentricity (so that \( ee = (aa - bb) \div aa, b \) being half the polar axis), \( \theta \) the latitude, and \( \theta \) the azimuth, or inclination of the section to the meridian.

Let \( \rho \) denote the radius of curvature of the meridian (for which \( \theta = 0 \)), \( \rho \) of that of the section perpendicular to the meridian (for which \( \theta = 90^\circ \)), the formula gives

\[ \frac{1}{\rho} = \frac{1}{r} \left( \frac{1 - \sin \theta}{(1 - \sin \theta)} \right), \]

whence also

\[ \frac{1}{r} = \frac{1 - \sin \theta}{(1 - \sin \theta)} \frac{1}{r} = \frac{1}{(1 - \sin \theta)} \]

from which \( \frac{1}{r} \) is readily computed for any value of \( \theta \). When \( \theta = 45^\circ \), the second term vanishes.

In the latitude of Greenwich (51° 29' 39''), \( \rho = 20011961 \) feet, \( e = 2066473 \) feet, whence (making \( \theta = 45^\circ \))

\[ \log (a + r) = 0.67251 - 10, \quad \log z = 0.67251 - 10, \quad \log \frac{a + r}{r} = 0.67251 - 10. \]

In E to the relation \( r = 206265^{2} \), we must have \( 2 = 9 \cdot 37\% 9; \quad 2 = 2.97.800.000 \) square feet, or nearly 761 square miles, that is to say, the spherical excess amounts to \( E \) for every 761 square miles in the area of the triangle. The calculation of the area therefore does not require to be made with much accuracy, and may be facilitated by means of subsidiary tables.

Correction of the Observations.—One of the improvements for which practical geodesy has recently been improved is due to the German astronomers, particularly Gauss and Bessel, is a general method of combining and correcting the observations according to the principles of the theory of probability, so as to deduce the result which is most probably nearest the truth, or which gives the best representation of the whole of the observations. Formerly the process was to regard each triangle as a complete and independent whole, and to adjust the observed angles (usually by some arbitrary process, or according to the observer's judgment of their relative goodness), so as to fulfill the condition of their sum being equal to 180° together with the spherical excess, without regard to the relations subsisting among the angles of the quadrilaterals or other polygons formed by the lines connecting the angular points. But this mode of proceeding affords a very imperfect solution of the problem; for in order to obtain the best result which can be deduced from the observations, it is indispensable to have not only to take into consideration the condition already assumed, but to every independent relation subsisting among the angles of the whole series of triangles included in the survey; and the more numerous the relations are which the observations are made to satisfy, the greater will be the probable accuracy of the final result.

The equations of condition which express the independent relations connecting the angles of a system of geodetical triangles arise chiefly from three sources:—1. The sum of the three angles of each triangle is equal to 180° plus the spherical excess; which excess, being in all cases a very small quantity, can be computed to such a great degree of accuracy, that it may be regarded as absolutely exact. 2. If there be a system of triangles so connected, that the first, the second a side e in common with the first, the third a side d in common with the second, the fourth a side a in common with the third, and so on to the last, which has a
side \( k \) in common with the preceding one, and another side \( l \) in common with the first, then, on forming the identical equation

\[
1 = X = a \frac{x}{a} + b \frac{c}{b} + c \frac{d}{c} + \ldots + l \frac{a}{l}
\]

and substituting for these ratios those of the sines of the angles opposite the respective sides, each being diminished by a third of the spherical excess of the triangle to which it belongs, an equation of condition is obtained which should be satisfied by the observed side \( a \). When the angles observed at any station include the whole circuit of the horizon, their sum must be equal to 360°; but this condition can only be made available when the angles are determined independently of each other.

In a complicated series of triangles some difficulty may be found in determining the exact number of independent relations furnished by the angles and sides of the figures, but this will be materially lessened by attention to the following considerations:—If a point, \( P \), whose position is still unknown, be observed from two other points, \( A \) and \( B \), already determined, and the directions of \( A \) and \( B \) be also observed from \( P \), we have then three angles for correction, and one equation of condition of the first kind. If the unknown point, \( P \), be observed from three known points, \( A, B, C \), and each of these be also observed from \( P \), we have then five angles for correction, and three equations of condition, namely, two of the first kind, furnished by the two triangles \( ABC \) and \( BPC \), and of the second: and, generally, when a point \( P \) has been observed from \( m \) stations whose positions are already known, and each of these has been observed from \( P \), we have then \( 2m - 1 \) angles for correction (one each of the given points and \( m - 1 \) at \( P \)), and \( 2m - 3 \) independent equations of condition, namely, \( m - 1 \) of the first kind, and \( m - 2 \) of the second.

An example will render this sufficiently clear. Let \( A, B, C \) be three points already determined, and \( P \) a new station at which the directions of \( A, B, C \) have been observed, and which has itself been observed from those points. These observations give five independent angles to be corrected, namely, two at \( P \), and one at each of the other stations, and three equations of condition, which are thus found:—The two triangles \( APC \) and \( BPC \) give two equations of the first kind, namely,

\[
\begin{align*}
1. & \quad A P + A C + A C P = 180° + E, \\
2. & \quad B P + B C + B C P = 180° + E'.
\end{align*}
\]

On considering the three triangles \( A P B, B P C, A B C \), it will be seen that the side \( P B \) is common to the first and second, \( B C \) to the second and third, and \( A B \) to the third and first. Forming therefore the identical equation

\[
1 = A B \cdot B C \cdot P B
\]

and substituting for those ratios those of the sines of the opposite angles (each diminished by one-third of the spherical excess), we get the equation of the second kind:—

\[
\sin P A B, \quad \sin B P C, \quad \sin A C B,
\]

When the equations of condition have been thus formed, the observed values of the different angles are substituted in them, each being increased or diminished by a small indeterminate correction. These corrections are then determined simultaneously by solving the equations according to the method of minimum squares, or so that the equations of condition shall be satisfied as nearly as possible, (they cannot be satisfied exactly, and the sum of the squares of the corrections will be a minimum. For further details on this subject, and examples of the application of the theory to trigonometrical surveys, we must content ourselves with a reference to the "Supplementum Theoriae Coniunctionis," Sec. of Gauss (Göttingen, 1828), where it is applied to a portion of the triangles surveyed by Krayenhoff in Holland; to Nos. 121 and 122 of the "Astron. Nachrichten," where it is applied by Rosenberger to Maupertuis’s measurement in Sweden; to No. 486 of the same work, where it is applied by Bessel to the computation of the triangles at the southern extremity of the French arc of meridian; and to the "Grauboden," recently referred to. The advantages of the method are twofold. In the first place there is the probability that the result is nearer the truth than if it had been deduced in any other way; and secondly, a general advantage is thereby gained in simplifying the method of calculation is substituted for an incomplete and arbitrary one.

In proceeding according to the ordinary method, regarding the triangles as independent of each other, the most difficult part of the work consists in the determination of the three observed angles and 180° + \( E \) is the aggregate error of the three determinations. If each angle was determined by an equal number of equally good observations, the probable error would be the same in each; and if the aggregate error be properly divided the aggregate error equally among the three. If the observations are assumed to be equally good, but each of the angles has been determined by a different number, then the parts of the aggregate error which should be thrown upon each angle is reciprocally proportional to the number of observations by which it was determined; but when the individual observations are not equally good (and this is the general case) the distribution of the aggregate error should be made in a manner that the amount of the correction to be applied to each angle is proportional directly to the sum of the squares of the differences between each observation and the arithmetic mean of the whole, and inversely as the square root of the number of observations by which the angle was determined. If an angle has been determined by a single reading, the portion of the aggregate error to be assigned to it may be made proportional to the square of the mean error of a single observation, or proportional to the square of the differences from the mean divided by the number of observations of the errors of a series of observations at one of the other angles made under similar atmospheric circumstances. Such is the method which the theory of probable error indicates; but in most of the cases where they have yet been published, the distribution of the aggregate error among the three angles has been made, as already remarked, according to some arbitrary hypothesis.

The three angles of the triangle now described, are regarded as the true geodetical angles, or rather as the spherical angles formed by the arcs of the great circles which intersect in the verticals passing through the stations on the surface of the oscillating sphere. It is strictness there are no practical means of determining the true geodetical angles, i.e. the angles made by the obser-

vations on the sphere. The observed angle is not the geodetical angle, but the angle made by the two planes which pass through the verticals in the station, and pass through the remote signals.

**Calculation of the Sides.**—The method of computing the sides which first suggests itself, is to convert the given angles into degrees of a circle, and to find the lengths which shall be equal to that of the earth, and apply the formulas of spherica-
great precision is required) to three or four decimals of a second, and the above formulas will have a practical application. They were used by Bessel in the recalculation of the triangles at the southern extremity of the French are and in France in the meridian; and have been placed more willingly as they have not hitherto, so far as we know, found their way into any English work.

Professor Busseneger has also given a formula for the calculation of the sides of a geodetical triangle, which may be substituted for the method of Legendre in cases of verification. Let a be the known side, A, B, C, the corrected spherical angles, \( \sin m = 0.3442495 \), the modulus of the common logarithms, and \( n = m \div 3 = 0.000007 \), then

\[
A' = A + \cot B' - \cot B \quad \text{log} a = \log a + \log \sin B - \log \sin A + \frac{\pi}{2} \quad \text{log} c = \log a + \log \sin C - \log \sin A + \frac{\pi}{2}
\]

With the help of a small table of natural tangents, this method is sufficiently more troublesome than Legendre's. The chord method is more tedious than either, and does not appear to be attended with any corresponding advantage.

**Lattitudes, Longitudes, and Azimuths.** — Having ascertained the terrestrial distances between the several stations, the next step is to determine their geographical positions or situations with respect to the equator and an assumed first meridian. For this purpose the latitude and longitude of one station at least, and the azimuth of a side of one of these triangles, must be accurately determined by astronomical means; we have then the data that are necessary for computing the geographical position of every other angular point, and the bearing of every other side, through the whole series of triangles, assuming the earth to be a spherical rotation of known dimensions and ellipticity, or its consequence however which always exists respecting the exact form and curvature of any particular portion of the earth's surface, or rather the irregularities of local configuration, require independent astronomical observations, particularly of azimuth, to be made at more stations than one, when the triangulation extends over a considerable tract of country.

If the country included in the survey contains a fixed observatory, this will of course either form one of the principal stations or be connected with the principal triangles, and may be taken as the point of departure. In this case the astronomical position of the fundamental point is known with the greatest certainty; and the median-mark of the transit-instrument affords the surest means of determining the bearing of any signal visible from the observatory. At any other station the best method of determining the azimuth is probably by observing the signal, by setting up a temporary mark as nearly in the meridian as may be, and determining its deviation with a transit-instrument by some of the methods used in practical triangulation. For the purpose of determining the angle between the mark and the signal at another of the principal stations is then measured with the theodolite, whence the azimuth of the signal becomes known. But as this method cannot always be conveniently followed in geodetical observations, the usual practice is to make the surveying instrument itself subservient to the determination of azimuths. In the English survey the method commonly adopted was, to observe with the theodolite the angle between a flag-staff and the pole-star at its extreme digres- sions east and west, and to take half the sum of the two angles as the azimuth of the staff. In determining the azimuth in this way a very accurate adjustment of the instrument is necessary. The method usually followed in the Continent has been to observe the angle between a referring signal and the sun, or some star whose place is well known, when near the horizon; and as the azimuth of the sun or star at a given instant of time can be computed with great precision, the observation is a very sure and particular cause of error, unless in the determination of the exact clock-time. The result is usually made to depend on the mean of a great number of observations.

The problem on the derivation of which the calculation of the geodetical latitudes and longitudes of the stations, and the azimuths of the sides of the triangles, depends is this: Let A and B be two stations whose distance has been determined, and suppose the latitude and longitude of A to be known, together with the azimuth of A as seen from B; it is required to find the latitude and longitude of B, together with the azimuth of A as seen from B. The azimutual angles are supposed to commence at the south
Taking the point F for example, let FA be the arc of the parallel circle on the spheroid, passing through F and its intersection with the meridian of A, then AA (which always stands for the meridional coordinate of A,) is the distance of parallels to the difference of latitudes. To compute \( f/\alpha \) we have, from the properties of the spheroid, the formula \( f/\alpha = \tan \gamma/2 \), in which \( \gamma \) is the approximate latitude of F and R the distance from the centre of the earth; and \( \mu/\mu = \tan \varphi \), where \( \varphi \) will be sufficiently accurate to use, the radius of curvature of the meridian corresponding to the latitude. The distance \( f/\alpha \) thus found is expressed in feet; to convert it into seconds of arc we must multiply by \( \omega^2 \); hence the difference of the latitudes of F and A, expressed in seconds, is:

\[
\frac{f}{\alpha} = \frac{\omega^2}{2} (\alpha - \beta) = \frac{\omega^2}{2} (f/\alpha - f/\beta).
\]

The latitude of F and its distance \( F\beta \) from the meridian of A being known, its longitude, or the arc \( \phi \) of the parallel circle, is found, if already given, by the radius \( \alpha/\beta \) of curvature of the parallel arc \( \alpha \), then \( (\omega^2/\beta) F\beta \) is the number of seconds in \( F\beta \), and hence the difference of latitudes of \( F \) and \( A \) in seconds is:

\[
\frac{f}{\alpha} = \frac{\omega^2}{2} (\alpha - \beta) = \frac{\omega^2}{2} (f/\alpha - f/\beta).
\]

When the positions of a considerable number of points are to be determined, the calculations can be facilitated by forming a table of the values of \( f/\alpha \) with every value of \( F/\beta \) proceeding by small differences, 100 feet for example. In following this method however the observations on the azimuths of the meridian are to be carried on an assumed meridian, to obviate the difference of the curvilinear distance and its properties on the horizontal plane becomes sensible, and hence in the survey of a large country the direction of a new meridian (or the azimuths) requires to be determined astronomical or by geodetical triangulation. Thus the angle between the east or west of the point of departure. It is scarcely necessary to add that the positions of the secondary points are computed without reference to the curvature, or convergence of meridians.

The method of computing the distance between the parallels of two remote stations, A and F, which have now been described, is that which is usually followed in measuring areas of meridian. To this purpose, indeed, it is particularly adapted, for as the chain of triangles runs nearly north and south, or east and west, the differences of latitude and longitude are more readily computed by referring the calculations to an assumed meridian by means of parallels and perpendiculars. Let A, B, C, D, E, F be the summits of a chain of triangles, and X Y the direction of the meridian passing through the first point A, and let perpendiculars BA, BC, CD, DE, EF be drawn from each of the other points to XY. Suppose the angle XAB (the azimuth of B on the horizon of A) to be determined by astronomical observations; then, as the angles at B, C, D, E, F, are all known from the geodetical observations, the azimuths which the several sides of the triangles make with XY are easily computed; and the distance on the meridian between the perpendiculars through the extremities of any side can be found by multiplying the length of the side into the cosine of its inclination observed as the distance on the meridian from the point of departure A, to the foot of the perpendicular through any other point, F, is equal to the sum of the sides which join A and F, each multiplied by the cosine of its inclination. Thus the sum of the products of the three sides A B, B D, D F, by the cosines of their respective inclinations, gives AB \( \cos \beta \) and \( \cos \gamma \); or the sides AC, CE, EF, reduced in the same manner, give AC \( \cos \gamma \) and \( \cos \beta \); hence the distance from A to the perpendicular through each point becomes known.

In like manner, on multiplying the length of any side into the sine of its inclination, we have the difference of the distances of its two extremities from XY, and the distance F, of any point, F, from XY, the differences of parallels (taken with their proper signs) in respect of all the intermediate sides between A and F. These relations are more shortly expressed by algebraic formula. Let the inclinations of the three sides intermediate between A and F, for example, A B, B D, D F (the angles at the different points being reckoned in the same direction), be respectively \( \alpha, \beta, \gamma \); then, attention being given to the algebraic signs of the trigonometrical functions.

\[
A = \cos \alpha + \cos \beta + \cos \gamma,
\]

\[
B = \sin \alpha + \sin \beta + \sin \gamma.
\]

By this means, all the angular points of the series are referred to the meridian of the first, exactly in the same manner as the different points of a curve are referred to its axis by their co-ordinates.

We have now to determine the differences of latitude.

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**Diagram**

[Diagram showing the meridian passing through A, B, C, D, E, F, with perpendiculars drawn to XY, and calculations for distance and latitude.]
898 shows reason for supposing that in France the curvature of the surface is considerably different on the east and west sides of the meridian of Paris.

**Determination of the Altitudes.**—In order to complete the field of the observations for a horizontal ellipsoidal survey, it only remains for us to point out the manner in which the relative heights of the stations are observed at comet. The observations required for this purpose are based on the principles of the great work of Bessel in geodetic surveying. The observed heights of all the stations are determined by two methods: firstly, by the terrestrial method, which is applied from each station; and they may be made with the theodolite or any instrument with which angles can be measured in a vertical plane. The chief difficulty attending the determination arises from the uncertainty of the terrestrial refraction. It may be assumed that the coefficient of refraction is the same at both stations, and that the observations are made under similar atmospheric circumstances, this cannot well be supposed to lead to error. Such observations also give a more certain value of the observed refraction than can be deduced from the astronomical work, which, besides the hypotheses necessary for connecting the variation of temperature with the altitude, assumes also (for the present purpose) that the variation of temperature follows the same law throughout the whole distance from the one station to the other.

For this reason, the refraction being made for both the works, the observations at the stations were made generally by night, when the refraction is greatest.

We shall conclude this article with a statement of the results of the measurements of meridian arcs, which appear the most deserving of confidence, and of the elements of the elliptic sphere of revolution to which they most nearly correspond, as determined by Bessel, in the *Astronomische Nachrichten,* No. 658 (Altana, 1841). The original data are given in the works to which reference has already been made; but it is necessary to remark that as the sector observations from which the amplitudes of the English and Indian arcs were deduced have been recomputed by Bessel, some slight corrections are now in the latitudes, and the original distances are reduced to British standard feet according to the comparisons of Captain Kater. The distance between the parallels of Mula and Montjoye in the French arc has also been recomputed by Captain Kater, in the *Phil. Trans.* for 1821, namely, 0°3459255:1. The normal temperature is that of the air, or 15° of Réaumur, equal to 61° of Fahrenheit. The numbers in the last column show the variations which are required to be made in the observed latitudes given in the second column, in order that the measured arcs may all belong to the same sphere of rotation. These variations were determined by a method on the principle that the sum of their squares should be a minimum.

1. **Petersian Arc.**

<table>
<thead>
<tr>
<th>Latitude</th>
<th>Distance in Seconds</th>
<th>Meridional Arc</th>
<th>Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>67°58'35&quot;N</td>
<td>72°39'14&quot;S</td>
<td>469,219</td>
<td>-434</td>
</tr>
<tr>
<td>53°43'29&quot;N</td>
<td>48°45'13&quot;S</td>
<td>460,562</td>
<td>-258</td>
</tr>
<tr>
<td>48°41'39&quot;N</td>
<td>43°44'46&quot;S</td>
<td>456,021</td>
<td>-336</td>
</tr>
<tr>
<td>43°40'49&quot;N</td>
<td>38°44'48&quot;S</td>
<td>452,873</td>
<td>-357</td>
</tr>
</tbody>
</table>

2. **First East Indies Arc.**

<table>
<thead>
<tr>
<th>Latitude</th>
<th>Distance in Seconds</th>
<th>Meridional Arc</th>
<th>Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>19°57'23&quot;N</td>
<td>14°56'22&quot;S</td>
<td>449,219</td>
<td>-371</td>
</tr>
<tr>
<td>14°56'22&quot;N</td>
<td>9°55'20&quot;S</td>
<td>440,562</td>
<td>-258</td>
</tr>
<tr>
<td>9°55'20&quot;N</td>
<td>4°54'18&quot;S</td>
<td>436,021</td>
<td>-336</td>
</tr>
<tr>
<td>4°54'18&quot;N</td>
<td>-1°53'16&quot;S</td>
<td>432,873</td>
<td>-357</td>
</tr>
</tbody>
</table>

3. **Second East Indies Arc.**

<table>
<thead>
<tr>
<th>Latitude</th>
<th>Distance in Seconds</th>
<th>Meridional Arc</th>
<th>Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>26°21'23&quot;N</td>
<td>21°19'11&quot;S</td>
<td>449,219</td>
<td>-371</td>
</tr>
<tr>
<td>21°19'11&quot;N</td>
<td>16°17'40&quot;S</td>
<td>440,562</td>
<td>-258</td>
</tr>
<tr>
<td>16°17'40&quot;N</td>
<td>11°16'19&quot;S</td>
<td>436,021</td>
<td>-336</td>
</tr>
<tr>
<td>11°16'19&quot;N</td>
<td>6°14'48&quot;S</td>
<td>432,873</td>
<td>-357</td>
</tr>
</tbody>
</table>
The elements of the elliptic spheroid of rotation deduced from the above data, and to which the above variations of latitude correspond, are as follows:—Let $a$ denote the semi-major axis of the ellipse on which the section is cut, $e$ the eccentricity, and $\theta$ the inclination from the plane of the equator to the plane of the section.

$$
\begin{align*}
a & = 20922800.0, \\
b & = 20883657.16 \text{ English feet}, \\
a - b & = 361427.9, \\
\tan \theta & = 0.0003324773, \\
\log \sin \theta & = 0.080728625, \\
\log \tan 2\theta & = 0.906569302.
\end{align*}
$$

These elements agree so nearly as to be almost identical with those adopted by Mr. Airy, in his excellent treatise on the 'Figure of the Earth' (Ency. Metropolitana). The coincidence is the more remarkable, as Mr. Airy selected several arcs not included in the above table, and adopted a totally different method of combining them. He gives the equatorial radius $= 20922713$ feet, and the ratio of the axes $= 239.33: 238.33$.

On substituting Airy’s elements in the elliptic formula, for the length of degrees of the meridian and the parallel circles, the following expressions are obtained:—Let $l$ denote the latitude, $m$ the length in feet of a degree of the meridian between the parallels whose latitudes are respectively $l$ and $l + \frac{1}{2} \circ$, and $n$ the length of a degree of the parallel whose latitude is $l$; then

$$
m = 364575.6 - 1831.0 \cos 2l + 3.9 \cos 4l - \ldots \ldots, \\
p = 3654912.0 \cos l - 305.8 \cos 3l + 0.4 \cos 5l - \ldots \ldots.
$$

Length of the quadrant of the meridian $= 32811804$ feet.

From the above formula we have computed the following table of the lengths of degrees of latitude and longitude in English feet:

<table>
<thead>
<tr>
<th>Degree of Meridian</th>
<th>Degree of Meridian</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0^\circ$</td>
<td>$0^\circ$</td>
</tr>
<tr>
<td>$10^\circ$</td>
<td>$10^\circ$</td>
</tr>
<tr>
<td>$20^\circ$</td>
<td>$20^\circ$</td>
</tr>
<tr>
<td>$30^\circ$</td>
<td>$30^\circ$</td>
</tr>
<tr>
<td>$40^\circ$</td>
<td>$40^\circ$</td>
</tr>
<tr>
<td>$50^\circ$</td>
<td>$50^\circ$</td>
</tr>
<tr>
<td>$60^\circ$</td>
<td>$60^\circ$</td>
</tr>
</tbody>
</table>

TRIGONOMETRICAL TABLES. The chronological chart given in Table 4 will serve as a sketch of the history of these tables: we desire here to elucidate a point of their construction which, in the present state of transition from
TRI
4)10-212...
3-533...
If it be preferred to use the arithmetical complement, the best mode of proceeding is to make the real logarithm with its sign changed, by subtracting the tabular logarithm mentally from 10. But if we have a tangent in which the characteristic is greater than 10 it is more convenient to subtract the characteristic from the subtraction. As follows:

\[
\begin{align*}
\sin 1^\circ & = \frac{2418553}{10} \\
\sin 14^\circ & = \frac{1838752}{10} \\
\sin 3^\circ & = \frac{12811998}{50} \\
& \text{add } \frac{4429368}{50}
\end{align*}
\]

Those who would use the tabular logarithms must remember that every logarithm is too great by ten, and must write it thus:

\[
\log \sin 1^\circ = 8 \cdot 2418553 - 10
\]

The latter being the best plan at first. The additions and subtractions must be corrected by this additional column, and if the result is wanted to be a tabular logarithm, must reduce it to the form A -10, and must look for A in the tables. When a division is to be made, the characteristic and its correcting follower must both be increased so that the result may still be in the form A -10. Thus, to extract the fifth root of sin 1°, we must throw the logarithm into the form in the first line following:

\[
\begin{align*}
5 & \frac{49}{49} 2418533 - 50 \\
& \text{add } \frac{4429368}{50}
\end{align*}
\]

TRIGONOMETRY. This word signifies the measurement of triangles, but we might as well attempt to confine geometry within etymological limits, as the science of which we are going to give some account in this article; the measurement of the earth is now only an isolated application of the former; and the measurement of triangles, of the latter.

In the modern division of the mathematical sciences, trigonometry, though still defined in books as the art of measuring triangles, really means the study of alternating or periodic magnitude; in which quantity is imagined to go through alterations of increase and diminution without end: that is, \( \phi x \), a function of \( x \), is trigonometrical, when, as \( x \) varies through all stages of magnitude (or, in technical language, increases from \( -\infty \) to \( +\infty \)), it takes an infinite number of alternate increases and diminutions.

It is perfectly possible to contrive a common algebraic function which shall go through any given number of maxima and minima, a million, or a billion, or whatever number of alternate changes the mind may suggest; but without recourse to infinite series, it is impossible to find one in which the number of alternations is unlimited. If the properties of algebraical series were as visible to those in geometry as they are in algebra, it would be seen that the two following series (afterwards known as those for the sine and cosine of \( x \))

\[
\begin{align*}
x^2 - 23 & = \cos x, \text{ and } 1 - x^2 & = \sin x
\end{align*}
\]

are periodic in value: and that, \( \pi \) being a certain incomensurable number (3-141592...), all the changes of magnitude that they can possibly take are only repetitions of what take place while \( x \) varies from \( 0 \) to \( 2\pi \). We cannot form a more adequate idea of an intelligence superior to that of the human race, than by imagining one to which this truth should be, in consequence of sufficient rapidity of power of computation, a purely elementary one. We are obliged to come by this knowledge through our perceptions of space, and by the application of algebra to geometry; and the construction and use of our alphabet for the expression of periodic magnitude is contained in what are called the elements of trigonometry.

The most simple notion of periodic magnitude lies in supposing that the changes made are purely cyclical, or repetitions of the same for ever; as for instance, those which occur in the movements of a spherical plane. The number of revolutions traced out by the handle may be as great as we please, and the quantity of length of the circular are described by its extremity may be as many times the circumference of the circle as we please, that is, as long as we please: but the distance of the handle from the ground is periodic, exhibiting perpetual increase and diminution as it rises and falls. Hence the circle naturally becomes a sort of standard of reference, and circular mo-

tion the primary idea, in all consideration of periodically changing magnitude. The arc, or the angle which it subtends at the centre, is the magnitude which increases without limit, all past revolutions being counted; and the lines which only depend on the position of the moving point in the circle, and not on the number of revolutions by which it has attained that position, are the periodic magnitudes in terms of which all angles are expressed.

The periodic magnitudes connected with a varying angle, so far as they have separate designation, are the sine, cosine, tangent, cotangent, secant, cosecant, versed sine, covered sine, and chord. A change is gradually taking place in the mode of conceiving these quantities, and one of which it is very desirable to expedite: though slight in appearance, and producing no difference in results, it gives a great advantage in the consideration of formulae. These elements were signs: the sine now often of one, and others are expressed as

\[
\text{the ratio of lines to lines. The following figure exhibits the old definitions:}
\]

Fig. 1.

Let O be the centre of a circle, and AOB an angle measured from a fixed radius OA, the direction of revolution in which angles are measured positively being denoted by the arrow. From 0 draw BM perpendicular to OA, and at A and C draw tangents to the circle. Then, in these old definitions, BM is the sine, OM the cosine, AT the tangent, CT the cotangent, OT the secant, OT the cosecant, AM the versed sine, CN the covered sine, of the angle AOB. If A B should make a complete revolution, so as to come into the same position again, the angle under consideration would now be

four right angles + \( \phi \) AOB,

but the sine, cosine, &c. would all be the same as before.

As the line OBM moves round, the signs of all these lines are to be taken positively when they are in the same directions as when AOB is less than a right angle. The following table will show them for the angles AOB, AOB' , AOB'' , all measured in the same direction of revolution.

<table>
<thead>
<tr>
<th>Angle</th>
<th>Sine</th>
<th>Cosine</th>
<th>Tangent</th>
<th>Cotangent</th>
<th>Secant</th>
<th>Cosecant</th>
<th>Versed Sine</th>
<th>Covered Sine</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOB</td>
<td>BM</td>
<td>OM</td>
<td>AT</td>
<td>CT</td>
<td>OT</td>
<td>OT''</td>
<td>AM</td>
<td>CN</td>
</tr>
<tr>
<td>AOB'</td>
<td>-1(\phi)M'</td>
<td>0'</td>
<td>-1(\phi)T'</td>
<td>-CT'</td>
<td>-OT'</td>
<td>AT'</td>
<td>OM'</td>
<td>-CT''</td>
</tr>
<tr>
<td>AOB''</td>
<td>-1(\phi)M''</td>
<td>0''</td>
<td>-1(\phi)T''</td>
<td>-CT''</td>
<td>-OT''</td>
<td>AT''</td>
<td>OM''</td>
<td>-CT'''</td>
</tr>
</tbody>
</table>

In this system an angle has an infinite number of lines of each sort, one to every radius which can be taken. It is therefore necessary, either to introduce into the formula the value of the radius in every case, or to adhere to some one particular value of the radius, which is always understood. The plan usually adopted is first to embarrass the formula with the general value of the radius, then gradually to accustom the student to consider the radius as unit, but to make an exception when trigonometrical tables are used, by considering the radius as ten thousand millions. These inconveniences are avoided in the new system of definitions, which is as follows.
The chord has long seemed to be regarded as one of the trigonometrical functions, and is always used in its old sense, as the line joining the extremities of an arc.

We shall now make a collection of the principal trigonometrical formulæ, and properties of the fundamental functions, referring to Angle for the modes of measuring angles, to sine for development of several of the most important points, to series for the expansions of various functions, to mensuration and spherical for the formulæ particularly connected with triangles, and to negative quantities, root, subsidiary angle, &c. for various other usual applications.

1. No sine nor cosine exceeds unity; no secant nor cosecant is less than unity; a tangent or cotangent may have any value; versed sines and covered sines are always contained between 0 and 2, both inclusive.

2. With the sines and cosines must be remembered the succession + + + ; with cosines and secants ++ + ; with tangents and cotangents, + + + .

Thus when an angle is in the third right angle, or lies between two and three right angles, its cosine is negative—being the third sign of the succession + + + . Versed sines and covered sines are always positive.

3. With the different functions must be remembered the following series of initial values, being those at the beginning of the several right angles:

\[
\begin{align*}
\sin 0 &= 0, \\
\sin \left(\frac{\pi}{2} \right) &= 1, \\
\sin \left(\frac{3\pi}{2} \right) &= -1, \\
\sin \pi &= 0, \\
\sin \left(\frac{5\pi}{2} \right) &= -1, \\
\sin 2\pi &= 0.
\end{align*}
\]

4. To find a function of any number of right angles increased or diminished by a given angle, take the same function, if the number of right angles be even, its \(r\)-function (sine for cosine, cosine for sine, &c.) if the number of right angles be odd: put that sign which belongs to the given function in the right angle to which the whole given angle belongs when the increment or decrement is less than a right angle. Thus we have

\[
\sin \left(\frac{3\pi}{2} - \theta\right) = -\cos \theta,
\]

which is thus obtained: the odd number of right angles (\(4\pi\) representing a right angle) is a direction to put cosine instead of sine on the opposite side; now \(\frac{3\pi}{2} - \theta\) being less than a right angle, falls in the third right angle, and the sine in that right angle is —, so that — cos \theta must be written. The following results should be remembered:

\[
\sin \theta + \cos \theta = 1, \\
\tan \theta = \sec \theta, \\
1 + \cot \theta = \cosec \theta.
\]

5. In the first revolution, \(0\) and \(\pi - \theta\) have the same sines and cotangents, \(\pi - \theta\) and \(\pi + \theta\) the same cosines and secants, \(\theta\) and \(\pi + \theta\) the same tangents and cotangents.

6. sin \(\theta\) cosec \(\theta = 1, \) cos \(\theta\) sec \(\theta = 1, \) tan \(\theta\) cot \(\theta = 1, \)

\[
\sin \theta \div \cos \theta = \tan \theta, \quad \cos \theta \div \sin \theta = \cot \theta.
\]

7. \(\sin^2 \theta + \cos^2 \theta = 1, \) 1 + tan \(\theta = \sec \theta, \) 1 + cot \(\theta = \cosec \theta, \)

\[
\sin \theta = \sqrt{(1 + \tan^2 \theta)}, \quad \cos \theta = \sqrt{(1 + \cot^2 \theta)}.
\]

8. If \(\tan \theta = \frac{a}{b}, \) then sin \(\theta = \frac{a}{\sqrt{a^2 + b^2}}, \) cos \(\theta = \frac{b}{\sqrt{a^2 + b^2}}.
\]

9. \sin (\theta + \phi) = \sin \theta \cos \phi + \cos \theta \sin \phi \\
\sin (\theta - \phi) = \sin \theta \cos \phi - \cos \theta \sin \phi \\
\cos (\theta + \phi) = \cos \theta \cos \phi - \sin \theta \sin \phi \\
\cos (\theta - \phi) = \cos \theta \cos \phi + \sin \theta \sin \phi.
\]

10. tan (\theta + \phi) = \frac{1 + \tan \theta \tan \phi}{1 - \tan \theta \tan \phi}, \\
tan (\theta - \phi) = \frac{1 - \tan \theta \tan \phi}{1 + \tan \theta \tan \phi}.

11. \sin \theta + \sin \phi = 2 \sin \frac{\theta + \phi}{2} \cos \frac{\theta - \phi}{2} \\
\sin \theta - \sin \phi = 2 \sin \frac{\theta + \phi}{2} \cos \frac{\theta - \phi}{2} \\
\cos \theta + \cos \phi = 2 \cos \frac{\theta + \phi}{2} \cos \frac{\theta - \phi}{2} \\
\cos \theta - \cos \phi = 2 \sin \frac{\theta + \phi}{2} \sin \frac{\theta - \phi}{2}.
\]

12. sin 2\(\theta\) = 2sin \(\theta\) cos \(\theta\), \\
cos 2\(\theta\) = \cos^2 \theta - \sin^2 \theta = 2 \cos^2 \theta - 1 = 1 - 2 \sin^2 \theta.
\]
13. $1 + \cos \theta = 2 \cos^2 \frac{\theta}{2}$, 
$1 + \sin \theta = 2 \cos \left( \frac{\pi}{4} - \frac{\theta}{2} \right)$

14. 
\[
\sin \phi - \sin \theta = \frac{\tan \frac{\phi - \theta}{2}}{1 + \tan \frac{\phi + \theta}{2}}
\]

15. If $\theta$ be half a right angle, or less,
\[
\cos \theta = \frac{1}{2} (1 + \sin 2 \theta) + \frac{1}{2} (1 - \sin 2 \theta)
\]

16. If $n$ be any integer, and if $(\cos \theta + \sin \theta)$ be developed by the binomial theorem into $P_2 + P_3 + P_4 + \ldots$, then $\cos n \theta = P_{2n} - P_{2n-2} + P_{2n-4} - \ldots$

17. Let $C_1$ and $S_1$ stand for the cosine and sine of $n \theta$:
\[
2 \cos C_1 = \cos^2 C_1 + 3 \cos C_1 + 1
\]
\[
4 \cos^2 S_1 - 3 \cos C_1 + 1 = \cos^2 S_1 + 3 \cos S_1 + 1
\]
\[
16 \cos^2 S_1 = \cos^2 C_1 + 5 \cos C_1 + 10C
\]
\[
32 \cos^4 S_1 = \cos^4 C_1 + 6 \cos C_1 + 15 + 7 \cos^2 C_1 + 10C_1 + 10
\]

18. De Moivre's Theorem and its consequences:
\[
(\cos \theta + \sin \theta)^n = \cos n \theta + \sin n \theta
\]

\[
(\cos \theta - \sin \theta)^n = \cos n \theta - \sin n \theta
\]

The versed sine is little used and rarely mentioned in formulae; and the covered sine is really only invented for analogy's sake.

The term sine (the Latin word sinus, meaning the bosom) has been the object of much discussion. It was at one time looked on as a barbarism from the Arabic; and some endeavoured to substitute semissi inscripsis, the half of the chord, for it. Others again thought that it was a corruption of S. Ins., the abbreviation of the above. Dr. Hutton asserts that the Arabic word Jobh, which is used for the trigonometrical axis in that language, is identical with the bosom in common language; and we have been told that this is correct: if so, the Latin sinus is only the literal translation of the Arabic. The arc representing a bow (from which it gets its name), half of the string, which represents the sine of half the arc, would come against the breast of the archer. The versed sine (sinus versus, or turned sine) was called the sagitta, or arrow. The terms tangent and secant are derived in an obvious manner from the old definitions.

There is little of the history of trigonometry which can be either usefully or intelligibly separated from that of mathematics in general. Up to the middle of the last century, the language of trigonometry was different from that of algebra; and even in our own day algebraic trigonometry is not fully established in England, though rapidly making its way. Those to whom trigonometry is only useful as an instrument in the solution of triangles may enjoy the advantage of that specific clearness which geometry gives to the individual proposition in hand, without needing to feel the want of a system which points out the direction of future progress. But those who are trained in mathematics for higher views and more difficult applications, must acquire trigonometry in its most algebraical form as a constituent part of the language of algebra, and an element in every stage of the future progress of that science which is useless than to attempt, for them, to draw a distinction between algebraical and trigonometrical; the science will now allow that distinction to remain, and will rather demand new modes of expression than dispense with any of the old ones.

There are those who feel sensible of incongruity in combining the fundamental notions of space and number together, and would rather, at any expense of trouble, keep them separate; but when they are formally united for any particular application. This feeling has our sympathy; and if it were possible to present a complete algebra, both in definitions and processes, without recourse to trigonometrical language, we should willingly agree to the separation. But hitherto it is not so: the only view of algebra in which there is nothing impossible is [NEGATIVE, &c. QUANTITIES] essentially joined to space, and particularly to angular magnitude; so that those who would have a perfectly complete algebra must buy it at the expense of unexplained and apparently contradictory symbols.

It would be easy to avoid the notion of space while using the terms of trigonometry and its powerful formulæ. The series at the beginning of this article might be made the definitions of the sine and cosine: or sin z might be only an abbreviation of $x = \frac{1}{2} z^2 + \ldots + \ldots + &c.$, and $\cos x$ of $1 - \frac{1}{2} z^2 + \ldots + &c.$. The fundamental properties of the sine and cosine might easily be proved to belong to these series, without reference to any geometrical reasoning.

TRIGONOMETRIST, Mr. König's name for genus of BRACHIOPODA (Terebratula of authors), the shell of which has one valve produced into a long perforated bead, truncated at its apex. (Fossil.)

TRIGONOMETRA, Mr. König's name for genus of BRACHIOPODA (Terebratula of authors), with a shell which has the hinge of the larger valve produced into a triangular disk, divided by a triangular central foramen. The Spairfer of Soverby belongs to this genus.

TRILLER, DANIEL WILLIAM, a learned and laborious German physician, was born at Erfurt, the 10th of February, 1695. He received his classical education at Zeitz and Leipzig, at which university he afterwards studied medicine. He took his doctor's degree at Halle in 1719, where he returned to Leipzig and there delivered lectures. In 1720 the town of Mersburg offered him the situation of public physician (Medicus Pensionarius), which he accepted; in 1730 he made several journeys into Switzerland in the train of a Government officer, which he obtained his discharge at the end of four years, he settled at Frankfort-on-the-Main, which place he left in 1746, in order to settle at Drexel, with the title of physician to the king of Poland. At last the university of Wittenberg bestowed on him a professorship in 1740, which he filled with distinction until his death. He died at the age of eighty-seven, on the 22nd of May, 1792. Triller was a very learned physician, which makes one sure that he did not switch his mind, of which he devoted a great part of his life, and of which he published a specimen under the title De Novâ Hippopotamis Editione Adornandâ Commentatio, etc. Specimina Locis Libellum Hippopotarum "De Anatome," etc. Commentariopetri Medicino-Critico illustravit, Lugd. Bat. 1728, 4to. Abraham Gronovius inserted his notes upon Allian's History of Animals in his Greek and Latin edition of this author, published at London, 1744, 4to. The judgment passed upon him by M. Guinon, quoted in the Biographie Medicale, is rather severe, though substantially just. During forty years, says he, Triller filled four vols. 8vo. with Latin poems on Medicine: he published dissertations, opuscula, and a mediocre treatise on music: he disdained the brilliant and elegant style of Wittenberg by overlaying it with quotations and notes, in which he often quotes his own Latin poems, and shows, amidst many childish jeux de mots, that he was neither a druggist nor a physician. The list of his works (which consist almost
entirely of monographs and dissertations) occupy two
pages in the 'Biographie Médicale'; of these perhaps the
following, relating chiefly to medical antiquities, are some
of the best:

De Medicina Antiqui-Que Argum-entum Reliqui Argumenta ad Fabulum Graecum pertinenti-
bus,' Leipzig, 1716, 4to.; 'Apolo gia pro Hippocrates,
Athens also accursa,' Rudolstadt, 1719, 4to.; 'Epistol
Medico-Defensica ad 4. Freind supple vii. i. Hippocratica
Pyramidum simul agnitus de varis edibus Editioni-
rbus,' Rudolstadt, 1720, 4to.; 'Conjecturae et Emendationes
in Aetetam,' first published in the 'Acta Erudint. Liepinae,'
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(Biographie Médicale; Biographie Universelle; Elyo,
Dict. Hist. de la Méd.)

TRILOCULINA, the name of a genus of microscopie
Praminipeca.

TRILOBITES, a race of extinct fossil animals. The
older collectors, even of the present day, may remember
the curiosity with which 'The Dudley Fossil,' as it was
ordinarily termed, was regarded. We ourselves have heard
it called by such, proud of their treasure, the Dudley
Fossil Insect, and authors who went deeper into the
subject than mere gatherers of rarities, had their several
notions regarding the place which it occupied in the ani-
mal kingdom. Among some of the works which have
been published under the name of 'Pentolithus para-
rousus;' by others the form was considered as that of an
extraordinary Testacea with a shell of three lobes; whilst others thought that the
trilobite remains belonged to animals closely approximated
to the Chonos, or, at least, differing greatly from
them.

It is now agreed on all hands that Trilobites are
Crustacea; but their place in that class is hardly yet
satisfactorily determined; at least those most conversant
with the subject hold different opinions upon the
point.

**Supposed Place in the System.**—The very names imposed
on some of the genera by modern authors, and under
which we may name Bronnqiat, Dalman, Wahlenberg, Eichwald,
Pander, Dekay, and Green, announce the obscurity in
which the subjects that they were describing were involved.

Thus we have *Amphipus* (seem, obscure); *Culmen*
(excel a), concealed; *Tetragonophthalmus* (brilliant, or
ful); *Cryptonymus* (seer, to conceal; *Cryptopus, a name; Ag-
notus* (as a name), unknown.

The 'Kleinkoppe (Dumouyier Tractate), after quoting
the Richerees auf die 'K thieren vor die Winden und die
Trilobites und die animaus artificiae,' of M. Audouin,
expresses an opinion that the nearest approach among living
animals to the external form of Trilobites is that afforded
by the *Schizocope inaequalis* (par. ii. p. 62.) Buckland
thinks that the most striking difference between
this animal and the Trilobites consists in there being a fully
developed series of crustaceous legs and antennae in the
Schizocope, while no traces of either of these organs have yet
been discovered in connection with any Trilobite. Bro-
nqiart, he observes, explains the absence of these organs by
conceiving that the Trilobites hold precisely that place
in the animal system (as *Schizocope*) which the Crustacea
have in the system (as *Supertropica*); and that the former
are to be considered as a fourth main division of the animal
kingdom, instead of being metamorphosed into a fifth
branch, and that the last, being transformed to soft and perishable feet be-
necipable of preservation. A discussion of the more frequent of this
occurs, according to Dr. Buckland, in the *Limulidae,* or Ext.
Crab (Oiphoura), and he sees a third example of the
position in *Branchipus stagnalis.*

[Branchipoda,
vol. v., p. 248.]

Dr. Audouin founds the following argu-
ment:—'In the comparison here made between four
different families of crustacea, for the purpose of illustrating
the history of the long-extinct Trilobites by the analo-
getic form in the Schizocope, Rudolstadt, and Branchipus,
we find a beautiful example, taken from the extreme
point of time at which geology takes cognizance, of that system-
etic and uniform arrangement of the animal kingdom under
which every family is nearly connected with adjacent sub-
categories. Three of the four families of Schizocope,
Limulidae, and Branchipus, are among the present inhabitants
of the water, while the fourth has been long extinct, and
occurs only in a fossil state. When we see the most antient
Trilobites the oldest, we cannot but recognise them as forming part and
part of one great system of creation, connected through a
whole extent by perfect unity of design, and sustained in
its minutest parts by uninterrupted harmonies of organi-

We have in the Trilobites an example of that peculiar
and, as it is sometimes called, rudimentary development of
the organs of locomotion in the class crustacea, whereby
the legs are made subservient to the double function of
paddles and lungs. The advocate for the theory of the
derivation of existing more perfect species, by successive
changes from more simple antient forms, might imagine
that he had found the Trilobite the extinct parent stock from
which, by a series of developments, consecutive forms of
more perfect crustaceans may, during the lapse of ages,
have been derived; but according to this hypothesis we
ought no longer to find the same simple condition as that
of the Trilobite still retained in the living Branchipus.

The supposition that the primary form of Limulius has pos-
sessed an intermediate character, or have remained unad-
vanced, in the scale of organization, from its first appearance
the carboniferous series, through the midway periods of
the secondary formations unto the present horizon, we
should consider as absurd. Mr. S. MacLeay, in his highly-interesting
paper entitled 'Observations on Trilobites, founded on a compar-
sion of their structure with that of Crustacea,' published in
the *Opom. and Trans. Royal Soc.* (1794, p. 403.), while noticing the opinions of Klein and others, who considered
Triobite to be a kind of molluscous shell with three lobes
and that of Latreille, who, after the abandonment of Klein,
referred the form to Chiton, and, as above added, to the
although Latreille founded his argument on the presumption
of absence of feet, and on the lateral edges of the body in
several species having been carious, is evident that
these animals could not have belonged to the sub-kingdom
Molussa, since they possessed compound sessile eyes and a
distinct labrum, and must be assigned to the sub-kingdom
Annomida, in which are found many articulated animals
having the compound eye which show a very similar
structure to those of Triobite. Having a hard ad-
serted tergum and inconspicuous feet,' says Mr. Mac-
Leay in continuation, 'the Trilobite must have either
belonged to the order Chilognatha, among the *Ano-
Eos* and *Limulus,* both the Crustacea, or the inter-
terrestrial animals, and the obvious geological fact is that
Triobite resided in the sea. We must clearly therefore
exclude them from the Chilognatha, and place them among
the Carboniferous or Cambrian animals, it now becomes necessary to
determine their exact place.'

Mr. MacLeay well observes that the crustacea, so
remarkable above all other animals for the great varia-
tion in their feet both in number and form, are divisible into
two groups, in which the *Trilobita* or *Opothalma* of Leach;
and those which have their eyes supported on moveable peduncles, or the *Pothalma*
of the same zoologist. Mr. MacLeay then remarks, that the

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trilobites clearly belong to the *Eidiphalmoidea*, and that is question is now reduced to determine merely whether they belong to the *Amphipoda* or those existing *Crustacea* before mentioned. It is evident that the *Triobolites* are not in reality so extraordinary as they may be detected in many *Crustacea* now existing. Thus, he remarks, the trilobed form of the body occurs in *Sorolites* and *Bopyrus*. The marginal, or other carinate, margin of the body, assumed by *Latreillia* and others to exist in *Trilobites*, is, Mr. MacLeay observes, to be found in the female *Cymothoe* (*Isopoda*, p. 52) and in those same *Cymothoe*, as well as in the female *Bumastus*, the eyes distinct and posterior to the mouth. The compound eyes of *Caymene*, continues Mr. MacLeay, "are situated on the back of the head, but wide part, and are composed of large facets. The same structure may be seen in the male of *Cymothoa trigonomephysa*, and Mr. MacLeay also notices that the rudimentary state of the feet, both occur in *Bopyrus*, the well-known parasite of prawns. In *Sphaeroma* there have not only the osseous form of *Caymene*, but also a property of rolling itself up into a ball. In *Sphaeroma* we find the large cone, semicircular sagittal segment of the *Umisus*. I think, therefore, that we can have no hesitation in now allowing the immediate affinity of the *Triobolites* to *Isopod Amphipoda*, and more particularly to the *Cymothoidea* and that peculiar group which is called the *Bopyridae* by *Latreillia*. Indeed, if the *Trilobites* are once demonstrated to have possessed articulated feet, it will be difficult to remove a male *Bopyrus* from the group. Here we have two eyes placed on the back of the head and wide part. Here also there are no antennae, no posterior lateral abdominal appendages, and, besides, no very distinct calcification in the sternum. If the *Bunastus* of *Murchison* is a body of thirteen equal segments, with short cruciform and *Bopyrus*, so closely is the affinity! The differences between a male and female *Bopyrus*, such for instance as the presence of eyes in the manner and the want of them in the latter, may also induce the same conclusion. It is, however, understood that between certain male and female *Triobolites*, which from their *primary facie* difference of form are now placed a distinct genus, although they may have truly belonged to one or to the other of the two genera, to which I have considered to come near to *Parasphoxides*; but, as the former has yet four well-developed antennae with carinate as feet, and the latter none, I am inclined to believe the relation between them to be one of analogy rather than of immediate affinity"; and Mr. MacLeay then turns to the *Isopodantracosa*. He first addresses himself to the opinion, above noticed, of Dr. Buckland, who, following other authors, has compared the *Triobolites* with *Isopoda* and *Branchipus*. With the latter genus, according to Mr. MacLeay, the *Triobolites* have, obviously, no affinity—an opinion which was to be expected from that part of his argument already set forth by those convoscent to *Branchipus*, to show that *Crustacea* can and actually do exist with soft membranous feet, such, he observes, as Adamson and Bronniatius suspected, and Goldfuss has shown to exist in *Triobolites*, which, however, is not the case. Taking into consideration, however, the perfect manner in which the soft body of an animal referred to him by Mr. Murchison, and by that gentleman called *Necretes larvalis*, has left its impression on a shaly rock, he finds it difficult, if not impossible, to distinguish between a *Triobolites* (if such legs ever really existed) should not be more evident than Goldfuss has represented them in his plates. In short, Mr. MacLeay considers that the question of feet still remains unsettled, remarking at the same time that if the *Triobolites* were *Crustacea*, between *Apus* and *Bopyrus*, a fact which he conceives capable of demonstration, they must have been in a position of subtominal, laminar, oviferous appendages.

We have very little doubt, if any, that this last conclusion, arrived at by clear and just reasoning, will yet be manifested in some fortunate specimen preserving the subtominal abdominal oviferous appendages. No such specimen have been seen by Mr. MacLeay, for he goes on in the same philosophical method as follows—"Now no traces of such appendages remain, consequently we can easily understand how feet of a similar membrane character may have disappeared in like manner. I may here observe that Bronniati is certainly wrong in imagining that the *Ogygia Gustardii* had oval oviferous bags like Cyclops [*Brachistes*, vol. *v., p. 341], for what he considers to be such organs are more probably the membranous margin of the abdomen, and, besides, *Ogygia* has no immediate affinity to Cyclops.'

We think that Mr. MacLeay has here disposed of the question as far as the presumed and existing *Triobolites* to *Branchipus* is concerned: but, with reference to *Limulus*, he admits that its crustaceous, semilunar cephalothorax bears considerable resemblance to that of certain *Triobolites*, *Ogygia*, and *Branchipus*. But he adds, the larva, which is a magnified figure of which will be found in the forty-fifth plate of Dr. Buckland's *Bridgewater Treatise*, and other certain *Triobolites* have a superior abdominal shield. But then, he observes, this shield is composed of a number of confluent segments, so as to appear one piece; and, besides the two ocelli, the large feet and chelifer antennae, as he remarks, *Limulus* far away from the *Triobolites*. We must therefore, he thinks, compare them with *Apus* [*Bucephalus*] and other *Branchipoda*, *animals*, which, in his opinion, of all the *Crustacea*, appear to have closest to the *Triobolites*. Here, concludes Mr. MacLeay, we have a large, clupeiform shell, rounded in front, and posteriorly emarginate, which forms a cephalothorax, on the back of which are situated three eyes. Of these the two largest are limited, and obviously correspond to the eyes of the *Triobolites*, although they are placed proportionally much nearer each other. It is true they are simple, but so appear to have been the eyes of *Bunastus*. The abdomen divided into many distinct segments, the particular feet, the structure of the front of the cephalothorax, the two rudimentary antennae, the large labrum and projecting mandibles, all show the affinity of *Apus* to the *Triobolites*, more particularly to *Apus phalangifer*, in a specimen of which he, from Lake Huron, has discovered a subquadrate labrum, which only differs from that of *Apus* in being anteriorly more deeply emarginate, while the latter is truncated. Dr. Buckland has compared this abdomen by Dr. Buckland, but it is not a genus in which the most different structure, and the thing most like this labrum is to be found among the *Xiphosura*, or, still better, among the *Branchipoda* of *Latreillia*, of which group this naturalist's genus *Prosopistoma* ought more particularly to be compared with *Triobolites*. I am not aware, however, that any *Triobolites* has yet occurred with vestiges of ocelli.

But still there are, in Mr. MacLeay's opinion, characters which distinguish it from *Bunastus*, *Branchipus*, and *Isopoda*; and among these characters he particularly mentions the absence of all lateral, posterior, abdominal appendages. Excluding *Bopyrus* and certain *Lemnostomus*, all the *Amphipoda* possess, he observes, those lateral appendages, which are generally styliferous, articulated, and in number. The *Lemnostomus*, however, want, he remarks, these appendages, because the whole abdomen in them has become evanescent, now totally different from that of *Triobolites*. But, says he, *Triobolites*, while a well-developed abdomen, appears to have separated the terminal feet and the two terminal appendages, separating the *Triobolites* from all *Crustacea*, except *Bopyrus*; and he roughly exposes the affinity of the group by the following diagram.

*The figure of Apus seen*
Mr. MacLeay justly observes that if any accuracy be allowed to belong to the foregoing remarks on the affinities of Trilobites, it will follow that the class Crustacea may for the present be distributed into orders, thus, viz.——

**Normal Group.**

- **Prosopisma.** Animals having their eyes supplied on movable peduncles.

- **Ampithoeids.** Animals having their eyes sensilae.

**Allocontrac Group.**

- **Ectopodites.** Head distinct with four antennae. Feet thick and crustaceous. Animal not undergoing metamorphosis.

- **Trilobita.** Head distinct without antennae. Feet tender, soft, and crustaceuous. Antennae not undergoing metamorphosis.

**Organisation.** M. Milne Edwards states that these animals, composed of a series of rings, much resemble in form many of the Isopoda and especially Serolis. They present, like those crustacea, three parts more or less distinct—a head, a thorax, and an abdomen. The head is large, clypeiform, ordinarily rounded in front, truncated or concave behind, convex above, and most frequently divided by two depressions or longitudinal furrows into three lobes more or less distinct. This bucker has much analogy with the carapace of Apus, only it is less prolonged backwards. In many Trilobites may be remarked tubercles on the upper surface of the head, which, in the opinion of M. Milne Edwards, very much resemble the reniform eyes of Apus, and in others exist at the same place two reticulated eyes, which in their disposition recall to the mind of the observer those of Serolis and some other Isopods.

Dr. Buckland (loc. cit.), in his observations on the Eyes of Trilobites, a point as he says, deserving peculiar consideration, as it affords the most antient and almost the only example yet found in the fossil world of the preservation of parts so delicate as the visual organs of animals that ceased to live many thousands and perhaps millions of years ago, remarks, that we must regard those organs with feelings of no ordinary kind, when we recollect that we have before us the identical instruments of vision through which the light of heaven was admitted to the sensorium of some of the first-created inhabitants of our planet.

After referring to the labours of Professor Müller and Mr. Straus, who have ably and amply illustrated the arrangements by which the eyes of Insects and Crustacea are adapted to produce distinct vision through the medium of a number of minute facets or lenses placed at the extremity of an equal number of conical tubes or microscopes, amounting sometimes, as in the Butterfly, to 35,000 facets in the two eyes, and to 14,000 in the Dragonfly. Dr. Buckland remarks that Insects constructed on this principle, the image will be more distinct in proportion as the cones in a given portion of the eye are more numerous and song; and that as compound eyes are only those objects which present themselves in the axes of the individual cones, the limit of their field of vision is greater or smaller as the exterior of the eye is more or less spherical. The same principles of construction as to form, the disposition of facets, and optical adaptation, are obvious in the eyes of Trilobites.

According to Dr. Buckland each eye of *Amphipus cuneatus* contains about 5,000 facets on its almost spherical surface, in separate compartments on the surface of the cornea, and he observes that the form of the general corne is peculiarly adapted to the uses of an animal destined to live at the bottom of the water; to look downwards was much impossible as it was unnecessary to a creature living at the bottom; but for horizontal vision in every direction the contrivance is complete. The form of the eye is nearly that of the frustrum of a cone, incomplete at the side only which is directly opposite to the corresponding side of the other eye, and in which, if facets were present, their chief range would be towards each other across the head, where no vision was required. The exterior of each eye, like a circular basion, ranges nearly round three-fourths of a circle, commanding so much of the horizon, that where the distinct vision of one eye ceases the other eye begins; so that in the horizontal direction the combined range of both eyes was panoramic. Dr. Buckland then refers to the modifications of the same mechanism in the existing Branchiopods, Serolis, and Lamellibranchiata, according to their habits, and remarks that we find in Trilobites of the transition rocks, which were among the most ancient forms of marine life, the same conformaton of the eye which is at present adapted to similar functions in the living Serolis. The same kind of instrument, he adds, was also employed in those middle periods of geological chronology when the secondary strata were deposited at the bottom of a warm sea, inhabited by Lamellibranchiata, in regions of Europe which now form the elevated plains of central Germany.

The results arising from these facts are not confined to Dr. Buckland justly observes, to animal physiology; they give information also regarding the condition of the antitsea and ancient atmosphere, and the relations of both the media to light, at that remote period when the early marine animals were furnished with instruments of view in which the minute optical adaptations were the same that impart the perception of light to crustacea now living at the bottom of the sea.

Thus much with regard to compound eyes, but according to Dr. Buckland, the eyes of *Humatisus* and other *Aspidophora*, and, indeed, as he remarks in a note in the
paper above quoted, the distinction between smooth eyes and granulose eyes does not seem to be of much importance in these animals; for among the existing family of Cymothoidea we not only see the males of some species with eyes and the females without them, but we observe neighbouring genera, such as Eurycephal and Nebcotra, the one with granulose eyes, like a Calamene, and the other with smooth eyes like a Bactanus. For figures of the eyes of the Bar Tribolite, Bactanus Barriensis, March., the reader may consult pl. 7 bis, fig. 3, c, e, and pl. 14, fig. 7, of Mr. Murchison's Silurian System.

M. Milne Edwards, addressing himself to the subject of reference, observes that, as in Apus, one perceives no traces of those organs when the Tribolites are seen from above or viewed on their dorsal aspect, and that if any vestiges of those appendages exist, they will probably be found on the convex surface of the head in each side of the mouth, as in the Phyllopoda; but he is compelled to admit that no specimen has yet been discovered which showed the slightest trace of them, remarking that there would be nothing astonishing if the antenna, become already rudimentary and reduced to two in Apus, should in the Tribolite be entirely wanting.

The same author calls attention to the sutural lineation, formed by him the jugal line, which exists on each side of the upper surface of the head, and is more or less flexuous, springing from the posterior border, passing along the eyes, and reaching the frontal edge. The lower surface of the head is occupied in front by a pair of saccus, so well observed by Milne Edwards, that which exists in Apus and Limulus, but which is divided by prolongations of the jugal sutures, into two or three pieces, according as these lines unite on the median line of the front before they are recurved towards the thorax, or remain separate, and form for a more or less considerable space. Behind this region the races of the buccal apparatus have been detected, though out little appears to be known relative to its configuration. Dekay, C. Stokes, and Sars have found a plate or lamina bifurcated posteriorly, which, in the opinion of M. Milne Edwards, would seem to constitute a labrum, or epistomial piece analogous to that which gives insertion to the labrum in certain Isopoda.

Upper surface of the anterior portion of the shield of Amphipod photophytes, from Lake Huron (Stokes—See New. Trans., N. S., vol. 1, p. 21.)

M. Milne Edwards goes on to remark, that extremely incomplete as these notions are, they suffice to convince us that the mouth of the Tribolites must have been organized nearly as it is in the Edripholiths or Phyllopods, and that it was not formed as it is in the Scyphoidea. Consequently, nor as it is in the Crustacea, as the second portion of the body or thorax (wrongly designated by the majority of authors, in the opinion of M. Milne Edwards as the abdomen) immediately follows the cephalic buccula, and is composed of a variable number of very distinct rings. Its upper surface offers nearly always two longitudinal furrows which divide each ring into three lobes, one of which is median and dorsal, and the other lateral. The division of the thorax into three lobes is so general that it has been the cause of the name which these animals bear; nevertheless in some of the group (Nileus arnadinil, Dalm., for example), it is wanting, and, in the opinion of some naturalists, does not essentially distinguish the Tribolites from all the animals of the present epoch; for an analogous disposition is to be seen in a great number of Isopods; only, observes M. Milne Edwards, in these last the median or fergal piece is very large, and the lateral or epimarian pieces are very small, whilst in the Trilobites the contrary ordinary obtains. The solid teguments which cover the upper part of the thorax are reflected according to the recent observations of Pander, on its convex lower surface, to the sides, where they are situated between the median and lateral lobes, on the dorsal surface of the body; but hitherto, M. Milne Edwards observes, nothing positive has been discovered relative to the disposition of the anterior portion of the thorax, and he thinks it probable that it was membraire.

Often, remarks the last-mentioned author, no natural limits exist between the thorax and the posterior or abdominal portion of the body (post- abdomen of Bronngart), and this last is continued in rings whose diameter diminish progressively; sometimes, the abdomen (Pylgium of Dalman) is very distinct from the thorax, and then is composed of rings of a different form, which are, in certain cases, elongated and expanded towards the posterior aspect, in other cases it is formed of a single buckler similar to that formed by the head, and analogous to the abdomen of Spherotha. [Isopoda, vol. xiii., p. 56.]

At the end of this abdomen there is sometimes a straight and elongated or lamellar appendage which constitutes a species of tail, having some resemblance to that of Limulus, or forming a sort of caudal fin. Finally, it would seem that the lateral parts of the lower surface of the abdomen were covered with ctenidial or ctenidial appendages. The appendages of the mouth, or of the appendages of the mouth, which are formed for the purpose.

The absence of appendages, or of other appendages, as we have already seen, have yet been discovered in any Tribolite; but M. Milne Edwards is of opinion that everything leads to the belief that these appendages were numerous and long, and that they occurred in any view of the case it would be difficult to explain their constant and complete destruction. The same zoologist remarks, that it might even be possible for the latero-anterior division of the lateral pieces in Geoggya and some other Tribolites to have been formed by a lobule analogous to that which in Apus, Branchipus, &c. represents the external branch of the feet, and would seem to serve more particularly for respiration; but he acknowledges that facts are wanting for the solution of this or numerous localities in North America; in the southern hemisphere they occur in the Andes and at the Cape of Good Hope. No Tribolites have yet been found in any strata more recent than those of the carboniferous and no other crustaceans, of the same forms which are also Entomstracous, have been noticed in strata coeval with any of those that contain the remains of Tribolites; so that during the long periods that intervened between the deposition of the first and the last-mentioned strata and the termination of the coal-formation, the Tribolites appear to have been the chief representatives of a class which was largely multiplied into other orders and families after these earliest forms of marine crustaceans became extinct.

Mr. MacLeay adverts to the supposition of some naturalists, that the true Tribolites were parasitical; but he conceives this hypothesis not to be very tenable, since almost all existing articulated para-rites that are known appear expressly for that purpose. Now, he observes, the Tribolites certainly had no such strong crustaceans hooks to their feet, or these hooks would have been long since detected. The close affinity which, in his opinion, exists between the Tribolites and Bopyrus, will here occur to the reader; but, as he justly remarks, that affinity does not prove a parasitical mode of life; for Spherotha and other Cymothoidea which, like Tribolites, have the power of coiling themselves up like a ball, are not parasitical, although they exhibit affinity to the parasitical genus Cymothoa. Nay, he continues, it has been said that the Cymothoidea and Epi- carides do not draw their nourishment directly from the sea, and cannot, therefore, live entirely on the animalcule brought to them in the manner of the skate by the play of the branchia, near which they always take

* If the opinions of Mr. MacLeay be well founded, the Tribolites form a distinct group from the Eutoidea.

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1. Species whose abdominal buckler is hardly trilobated, and presents no transversal furrows even on its median part.

2. Thorax composed of eight segments.

Example, *Isotelus gigas*, Deyck.

2a. Thorax composed of more than eight rings.

Example, *Isotelus centricus*, Dalm. (Cryptonymus Rosenbergi, Eichw.)

3. Thorax distinctly trilobated for the greatest part of its length, and presents transverse furrows on the median lobe, or even throughout its length.

Example, *Isotelus dilatatus* (Asaphus dilatatus), Dalm. (Cryptonymus Lichiasmoti, Eichw.)

3a. Posterior angles of the head prolonged backwars, as to resemble pointed horns.

Example, *Isotelus bicarinatus*, Dalm. (Cryptonymus Lichiasmoti, Eichw.)

Family 2. Calymenids.

Body very thick, capable of being contracted into a ball. Abdomen large, with distinct segments, and really much resembling the thorax: eyes very distinct, and nearly always granulate.

Genera:—1. *Anaspis*, Brongn. Abdomen very distinct from the thorax and subsegmentum. Thorax unlobate; offers neither distinct longitudinal divisions nor furrows.


Example, *Homalonotus delphinicerophalus*, Murch. (Sci. Syst., p. 261, pl. 7, fig. 1). M. Milne Edwards observes that the *Trimerus delphinicerophalus* of Green does not appear different from this species.

M. Milne Edwards remarks that the genus *Diplevrum* of Green is but imperfectly known, and appears to approximate closely to the *Homalonotus*; and he adds that *Nutatia* of Diatom is of the same opinion. Eaton bears much resemblance to the head of *Diplevrum Dekayi*, but that this fragment of an cephalic buckler seems to be less convex than *Diplevrum* and to have the anterior border prolonged and a little elevated in the form of a beak. M. Milne Edwards thinks it impossible to adopt a genus established on a fragment so little characteristic.

3. Calymene, Brongn. Abdomen differing but little from the thorax and offering neither a distinct membranous border nor caudal appendage; thorax deeply trilobated.

§ 1. Species, the median lobe of whose head is divided into many lobes.

a. Median lobe of the head at least as wide behind as forward.

Example, *Calymene blumenbachii*, (Petriid. Insect. Lillieton, Phil Trans., 1700; Concha Trilob., Koonr. on the median lobe of the head wider before than behind.

Example, *Calymene bellatula*, Dalman.

b. Species, the median lobe of whose head is not divided into lobes.

Example, *Calymene tuberculata*, Murch.

M. Milne Edwards remarks that the genus *Asaphus* of Pander closely approximates *Calymene*, but is distinguished from it by the number of thoracic rings, 20 in number, whilst in *Calymene* it is composed of four segments only: and that the genus *Isotelus* of the same author is also a
The species of Calymene are numerous. Next to the Calymenidae, M. Milne Edwards places the Family 3. Ogygianæ.

Body very much flattened and apparently not susceptible of being rolled up into a ball. Abdomen in general very small. Eyes very rarely granulated, and often but little or not at all distinct.

Genera.—1. Pleurocathus, M. Edwards. Eyes very large and very distinctly granulated; head moderate, not increasing the thorax, which offers on each side a series of spiniform prolongations; abdomen very little developed.

Example, Pleurocathus arachnoides (Calymene arachnoides, Haeckeliana).

2. Trinucleus, Lhwyd. Abdomen large, subsutiform, and composed of many segments. Segments of the thorax less numerous, straight; no distinct eyes.

Though Lhwyd first figured this genus under the name above given and Green subsequently called it Cryptolithus, M. Murchison has the merit of establishing this generic group; and he observes that had it not been for the previous nomenclature he should have named it Tetraprise.

Example, Trinucleus Lloydii.

M. Milne Edwards observes that the fossil on which Mr. Murchison has founded the genus Acicartes bears analogy to the head of the Trinuclei, but is distinguished from all known Trilobites by the manner in which the median lobe is prolonged posteriorly into a point; the lateral-posterior angles are equally attenuated, the anterior border of the head is furnished with a row of small divergent crests, and the lateral lobes are divided in two portions by arched furrows. Of Acicartes Brightii, the single species on which the genus is established, a fragment only appears to be known, which is figured in the Silurian System, pl. 14, fig. 15.

M. Edwards also remarks that the genus Ellipscephalus of Zenker comes very near to Trinucleus, especially to Trinucleus nudivis; but one species, Ellipscephalus amarius, from the grauwacke of Bohemia, is known.

2. Otarius, Zenker. Abdomen very small, not sutiiform, and composed of a very small number of segments. Body rounded posteriorly, the abdomen not being overpassed by the lateral lobes of the last thoracic rings.

Example, Otarius disjunctus.

M. Milne Edwards is of opinion that the genus Conocephalus of Zenker bears much analogy to Otarius and might be united with it.

3. Ogygus, Brong. Abdomen as in Trinucleus. Segments of the thorax rather numerous, and curved backwards towards the end; eyes large and smooth.

Example, Ogygus Guettardi.

4. Paradoxides, Brong. Abdomen as in Otarius. Body not rounded posteriorly, and terminated by very large spiniform prolongations, between the base of which is found a small caudal lamina.

Example, Paradoxides Tessini.


Example, Pelitores Buchlandii.

N.B. Mr. MacLeay observes (op. cit.) that Bogus may possibly belong to the Trilobites, but he does not see how Agnostus can; nor does he believe that the latter family has any connection with the Annulosa at all.

TRIPHERA, the fourth section of the order Coleoptera, among insects, according to the arrangement of Latreille. The insects popularly known as Lady-birds and Puff-ball Beetles are characteristic of the families composing it.

The insects of this division have four palpi, two of which are labial and two maxillary. These palpi are short and

The antennae are short and thickened at their extremities, in some species gradually and in others suddenly. The head is not produced anteriorly, and is deeply inserted in the thorax, which is short and transverse, or somewhat square and flattened. The abdomen, generally flat beneath and ample, is covered by the elytra, which are arched, and their extremities are thickened and serrated. A few species (e.g., Coccinella septempunctata, which has gained respectation in the Westwoodian, the seventh and last family of Tetracera in Latreille's arrangement. He styles the family Erotyldae, from the typical genus Erotylus. The larvae are chiefy aquatic insects, supposed to feed on vegetable matter; and were regarded by Latreille as constituting the Cycloida (Casuina Chrysomelata) with his trimerous family Pungicolae.

The Fungicolae of Latreille (Endomychidae of British entomologists) are the interior of the coenocytic plants of the class Fungi, on which they feed. Some species are found under the damp bark of trees, where their food consists of the Fungii which are peculiar to such a locality. The perfect insect is very common in this country, and is a delicate, fleshy, and flat insect, ornamented with brilliant colours. The antennae are composed of eleven joints thickened towards the extremity, and larger than the head and thorax. Their elytra cover the abdomen, and the penultimate joint of the tarsi is deeply bilobed. The only known larvae of an insect of this family is that of Endomychus coxcinus, said by Samouelle to resemble the common glowworm. Curtis figures it. When the larva is mature, it has the markings of the Silphidae, but the lower wing is that of Silphidae than to that of the glowworm or of Coecinella. The British species of this family belong to the genera Endomychus and Lycoperdina. They are few in number. One of the Lycoperdina Bovianae, found in Great numbers inhaling that common puff-ball the Lycoperdon Bovista. Bovinac is an American genus, described by Weber, distinguished by the dilated flattened three-jointed clubs of the antennae. It includes several species, in which the elytra have broad, dilated margins with the anterior tibiae. Curtis considers them as related to those singular insects which constitute the genus Mormolyce, but Westwood regards them as some of the most remarkable. The Aphidpae (Coccinellidae of English authors) are animal-feeders preying upon plant-llice (Aphides), and correspond to the Linnean genus Coccinella. In shape they are very convex and hemispheric, and have antennae shorter than those of the last family, terminated by a compressed club in the form of a reversed triangle. The larva is depressed, ovate, and fleshy. The three anterior segments of its body are largest, and the abdominal ones taper and pointed. Its head is small, with very minute antennae and thick maxillary palpi. The pupa is found attached by its posterior extremity to a leaf, and undergoes its metamorphosis in that position. The larva emits from its tibules a yellowish fluid having a disagreeable scent. When the perfect insect is laid hold of, it gives out a similar secretion from its joints, and folds its legs up as if simulating death.

The insects of this family are remarkable for brilliant colouring, being generally red or yellow, with black, red, white, or yellow spots. Individuals of the several species are extremely variable and different from each other in the different localities within which they are found. Some species are black, red, yellow, or white, and some are sterile. They creep slowly but fly well, and many kinds are gregarious. Their eggs are deposited in yellow patches among the plant-llice, so that the larva is hatched in the midst of its food. They abound in our fields and meadows in the spring, and are usually more abundant in the spring. They appear sometimes in immense swarms, and spreading over the fields cause needless alarm to the farmer, to whom, from being a pest, they are a blessing. From the fierce war they wage against its enemies the Aphidpae. In 1807, says Mr. Kirby, 'the shores at Brighton and all the watering-places on the south coast were literally covered with them, to the great surprise and even alarm of the inhabitants, who were not aware of the nature of this insect'... where they are emigrants from the neighbouring hop-gardens, where in their larva state each had slain his thousands and tens of thousands of the Aphis, which, under the name of the Fly, causes the most considerable damage to the crops.'

The peasants in France style them bétes à l'ardeur, honouring their useful qualities; whilst the English name of Lady-bird does homage to their beauty. Some of the species are widely distributed, such as the very common Coccinella septempunctata, which extends its range over all Europe and parts of Asia and Africa. In England we have six genera of Coccinellidae, and more than fifty species.

It is doubtful whether all the insects of this tribe live upon animal food. Mr. Darwin has observed them in places where they had no aphides to eat. They are frequently found on the summits of mountains at a very great elevation, as at the top of Snowdon; and in countries where they seem to be characteristic of the locality. Aphidpae are scarce in such situations.

TRIMMER, SARAH, one of the most popular English authors for the instruction of youth, was born at Ipswich, January 6, 1741. Her history is known as the author of 'Dr. Brooke Taylor's Method of Perspective made Easy,' and 'The Perspective of Architecture,' was a man of exemplary piety, and from him she received a brilliant and extensive education. She was not only destined for a life of piety, but to be a source of reformation. She had a strong desire to be at any time in the capacity of a teacher. She was about fourteen years old, her parents removed to London, where Mr. Kirby became principal of the British and Foreign School in the Middle Temple, and where she had the first opportunity of being educated. After this change of residence, Miss Kirby was introduced to the society of several eminent persons, among whom was Dr. Johnson, who was much pleased with her mental attainments, and presented her with a copy of his 'Rambler.' Being at this time separated from her family, she devoted much time to reading and drawing, and obtained a prize from the Society of Arts. About the year 1759 Mr. Kirby removed, with his family, to Kew, upon his appointment as tutor to Prince Edward, and he was created a member of the Society of Arts, and was given the palace at that place; and during his residence there, Miss Kirby became acquainted with Mr. Trimmer, to whom she was married at the age of twenty-one. From that time she was associated with him in all his works. Mrs. Trimmer was a woman of great industry, and had a business nickname which enabled her to supply the deficiency. Among Mrs. Trimmer's subsequent publications is a work entitled 'An Easy Introduction to the Knowledge of Nature,' designed to impart to the minds of children information upon various subjects, to induce them to make observations on natural objects, and to elevate their minds to the great Parent of all; and was the first of the series of popular works published by Mrs. Trimmer. It was followed, in 1782 and the two following years, by six volumes, issued at various times, of 'Sacred History,' selected from the Scriptures, with Annotations and Reflections adapted to the Comprehension of Young Persons; a work which observes her biographer, would probably never have been written, had not the author been mother of a large family. It was the want of the many explanations of the Scriptures, as experienced by herself in instructing her children, that led her to supply the deficiency. Among Mrs. Trimmer's subsequent publications is a work entitled 'The Family Sketch Book,' intended to furnish a nucleus of facts to assist them in the formation and management of Sunday-schools and other charitable institutions.
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The 'Family Magazine,' a book of instruction principally for cottagers and servants, was carried on for a time by Mrs. Trimmer, about the year 1786, and was published by the 'Economy of Charity:' and after the manner in which it was out of print, the principal original works were collected, and published as 'Instructive Tales.' The 'Adele et Theodore' of Madame de Genlis suggested to Mrs. Trimmer, about the year 1797, the plan of publishing prints representing events in history, accompanied by descriptions; and in this way she illustrated antiquity, the Old and New Testaments, and the histories of Rome and England. The great imperfections of the old system of instruction, which had led her to write superior books for their use, to which she obtained the sanction of the Society for Promoting Christian Knowledge. The desire to open the eyes of the public to the value of education, and various public institutions for the use of children led to the commencement of a periodical work, called the 'Guardian of Education,' containing essays on Christian education, and reviews of books for the young; but, after it had extended to five octavo volumes, the over-exertion of Mrs. Trimmer in this matter brought on an illness which compelled her to desist from her labour.

Since her death, an 'Essay on Christian Education' has been published separately, extracted from this work. In 1802, Mrs. Trimmer's 'Family Magazine' of sermons, selected from the most eminent divines, and adapted for domestic instruction, was called the title of 'Family Sermons.' On the 15th of December, 1810, without any previous illness that could alarm her family, she bowed her head and died in the chair which the late Mr. Ollier, salutary, and as a bedfellow, has been the subject of various essays and reviews. Few persons have had such a general influence on the education of the youth of the nation, as this woman of superior genius, a friend of learning and letters, and the author of 'The Works.'

TRINITY is a genus of plants belonging to the natural order Umbelliferae, named by Hoffmann after Dr. C. F. Brinius, a learned botanist of St. Petersburg, who has devoted himself to the study of the grasses, and published a large work on them, entitled 'Species Graminum.' He was also described the grasses collected by Poeppig in Peru, by Mikan in Rio Janeiro, and of several other travellers.

The genus is characterised by possessing an oblong solitary head, the involucres being ovate, or obovate, the calyx-margins, with a contracted involute point; the fertile flowers have the petals ovate, with a short inflexed point; he fruit is laterally compressed and has an ovate form; he seed is ellipsoid, the embryo is long, and the cotyledons which the lateral ones are marginal, the intercostes are without vitre or nearly so; the seed is gilboconvex, and involucres various. The species of this genus, which are not numerous, have been referred to Pimpinella, in od Solenia, but the docious flowers and the difference between the structure of the petals in the barren and fertile flowers render it very distinct. One of this species, the Pimpinella galbulinera, Smoothing Honowor, is an inhabitant of Greenland, and has been found on limestone in Somerset, Cornoval, and Devonshire. The whole plant is of a pale greenish colour, has remarkable segments of the leaves, which are triangular, and no involucres. It appears to be the same plant as the T. vulgaris of De Candolle, which is found in the southern parts of Germany, in Switzerland, and Austria.

TROCAVERILLUS, VICTOR (Trincavella, or Trin- caniele), was born of a noble family at Venice in 1496. After a careful general education, he went to study at Padua, and thence proceeded to Bologna, where he remained for seven years, and gained such a knowledge of Greek, that, even in his youth, his teachers used to put him on questions of difficulty in interpretation. From Bologna he returned to Padua, where he received the diploma of doctor of medicine; and thence to Venice, where he was appointed to a professorship in philosophy, and obtained the highest reputation, not only in that science, but also in the practice of medicine. His name was greatly increased after his return from the island of Murano, whether he had been sent by the Venetian government to take charge of the sick during an epidemic, and where he showed his skill and humanity, for he came back to Venice he was received with a kind of triumph. In 1551, upon the death of Montanus, he was appointed professor of medicine at Padua, with an unusually large stipend, in consideration of the great interest he took in practice which he had resigned. He remained at Padua till 1568, when he was sent by the senate to attend a Venetian nobleman who was ill at Udina. His advice was followed by the recovery of his patient, and the fatigue he suffered and the infirmities of age brought on an illness of which he died at Venice in the same year.

The knowledge of Greek which Trincavellius acquired at Bologna and by subsequent study, enabled him to contribute greatly by his commentaries and lectures to the introduction of the works of the writers in that language into the medical schools of Italy, in which, before his time, medicine had been taught almost exclusively from the writings of the Arabian physicians. In his practice however he is said to have followed the doctrines of the Arabian school. All his medical works were published, with the title 'Opera omnia,' in two volumes, folio, at Lyon in 1596. The second volume contains the following works: writings lies in the completeness of the view which they afford of the medical practice of the time and of the principles on which it was founded; for they contain many observations and letters by others as well as by himself, and many cases and diseases upon which he commented. The chief of them are: 'Due Questione Medicine, altera num in lemis affectibus secunda sit vena, quae est ad annu- learem digitum sinistre manus; altera, utrum in morborum affectionibus partes anteriora aut posteriora sita sunt, genitivus medicamentis uti fecerat, first published at Padua in 1567; and 'Consilia medicas post editiones Venetam et Lugudunenses accessione cxxviii. consiliorum locupletatis, etc.' Basle, 1587. Of these of the 'Opera omnia,' a great part is inserted Trincavellius' commentaries on the ancient medical writers, viz. 'Explanations in Galeni libros de Diffinitis Februrn;' 'In priorem librum Galeni de Arte Curendi;' 'Familiares Exercitii in medicina libris Prognosticorum Hippocratis et Galeni;' 'Commentarli in Galeni libros de Compositione Medicamentorum;' 'Explanatiius in primam Fun quarti Canoniae Aviceanne.' He also in 1594 edited the works of Themistius, translated into Latin by Hermolaus Barbarus, and wrote many notes to them, and translated or edited the commentaries of John the Grammarians on Aristotle, in 4 volumes, folio, in 1535; the 'History of the Expedition of Alexander, by Arrian,' in 1506; the 'Mariner's Wonders,' with an introduction of Arrian, and the 'Sentences of Stohius,' in the same year, and the 'Poems of Hesiod' in 1537.

(Life prefixed to the 'Opera omnia,' by Laurentius Castricianus; Biography of Dr. T. R. I. 237

TRINCOMALEE, a fortified town and harbour on the coast of the island of Ceylon, in 8° 36' N. lat. and 81° 21' E. long., is situated on the north-east corner of Trincomalee Bay. This great inlet consists of Kotiar Bay to the south, Tangalle Bay to the west, Trincomalee Bay in the centre, Back Bay to the north of Trincomalee Bay, and Inner Harbour to the north of Back Bay, besides several smaller bays and harbours. The north-west part of the peninsula is formed by a rocky peninsula of irregular shape, which is a continuation of the line of coast from north to south, and is joined to the mainland by a narrow neck. This peninsula is about four miles long, and for the most part is more than half a mile wide: at the south end, towards the sea, it rises perpendicularly 100 feet, with a hill of broken rocks above it 200 feet more: inside, towards the north-west and north, it sinks down to the sea. In the triangular portion shoots out westward into the bay, having Inner Harbour to the north and Back Bay to the south, which, together, form what is properly the harbour of Trincomalee. On this inner and lower part of the rocky peninsula the town and fortifications of Trincomalee are built. Fort Ostenburgh, which was built by the Dutch, is situated farther to the south of the peninsula, and commands the entrance to the harbour. The entrance of the five miles wide.
and safety is perhaps not surpassed by any in the world, is invaluable to the British as a naval station in the Indian seas. It has room enough for whole fleets; is landlocked by high ridges, and sheltered from all winds; has depth of water for the largest ships; and, what is of most importance, is sheltered at all seasons during both monsoons; thus affording a place of shelter, when, from the want of harbours on the east and south-west coasts of Hindustan, vessels are obliged to put out to sea during the violence of the monsoon. A ship from Madras can reach it in about two days.

The town and fortifications of Trincomalee are about three miles in circumference, but this includes much space not built upon. The inhabitants, who are not numerous, are chiefly Hindus from Tanjor. The whole of Trincomalee, with a few natives of Ceylon, and the British troops stationed there. A pagoda, dedicated to Siva, formerly stood on a rocky summit of the peninsula, and the spot is still held sacred by the Hindus. The pagoda was destroyed by the Dutch, and used in the construction of their fortifications. The climate is hot; the mean temperature of the coolest months, when the north-east monsoon prevails (April to October), is 77°; the mean of the hottest: from the land-wind, or south-west monsoon, blows, is about 88°. There is little export trade, the produce being hardly enough for the wants of the inhabitants, though the adjacent country is once populous, and export trade, with the other provision of Trincomalee. Many reservoirs and other works for irrigation and drainage are now in ruins and choked up; and swamps, and jungles, and woods, abounding with wild hogs, parrots, and elephants, nearly to the malarial, and render the climate unwholesome than the greater part of the rest of the island.

Trincomalee is about 95 miles from Kandy, and 165 miles from Colombo, direct distances. An excellent carriage-road has been carried across the island from Colombo to Trincomalee by the British: it was completed in 1833.

The Portuguese were the first to obtain possession of Trincomalee. The Dutch took it from the Portuguese in 1643. The Trincomalee information was taken by a British fleet, under Sir Edward Hughes, and a body of troops commanded by Sir Hector Monro. Shortly afterwards it was retaken by the French Admiral Suf-rein, who delivered it to the Dutch; they held it till 1756, when it was surrendered, after a siege of three weeks, to the British, who still retain possession of it. (Hamilton's East India Gazetteer; Dairy's Entry of Ceylon; Eleven Years in Ceylon, 190.)

TRINGA. [HARTFORDSHIRE.] TRINGA. [TRINGIN.K.] TRINGINI. [IN the article SCOLOPACIDAE (vol. xxi., p. 394)] We have the general views of authors as to the place of the Scolopacidae among the birds, and some of the species of Tringa, which are included under the sub-family Tattinae.

Mr. Swainson, it will be seen in reference to the article Scolopacidae, makes that the family name is in his Synopsis for the most part lost in that of the Tringini, to which he has given the name of Tringinae, and includes the family of lomopsods. This is, if we use the term Tringidae instead, and makes it contain the most typical Waders, as the snipes, woodcocks, and sandpipers. This group, he observes, is distinguished from all others by the great length, the slenderess, and the flexibility of the bill, no less than by the delicacy of the legs and the smallness of the hinder toe, which in the plover, they are, remarks, ends in the most developed toe of lomopsods; since they run with vast celerity, and have the faculty in part of both swimming and diving; the bill, he adds, is even longer than the plover's, but instead of its being divided as it were into two portions, as in those birds, the culmen is uninterrupted straight, and the upper mandible is not suddenly bent downwards. 'The sandpiper or the snipe,' says Mr. Swainson in continuation, 'will give an idea of that general formation which belongs to the whole family. Their geographic distribution is as wide as their locomotive powers are great. The shores of the whole world abound with sandpipers and curlews, and the European wimbril [Numenius phaeopus] is said to have been seen on the coasts of New Holland.'

Mr. Swainson then briefly notices the genera comprised in this family, observing that the true curlews (Numenius) have the same long and generally curved bill which distinguishes the ibis [Thaumastura], but the cheeks and throat are covered with feathers. In the Avocet (Recur- virostra) he sees the most aberrant type of the Tringidae for its toes are webbed, and he thinks that it probably in the family. In Tattinae, continues Mr. Swainson, which comprises many of the European sandpipers, the species are numerous, and many examples occur in Britain,—as the great sandpiper, the spotted snipe, the redshank, and the snipe. This vernacular name is probably derived from the whistling or piping notes which are uttered by these birds as they run on the sands. They are dispersed all over the world, and are perpetually wandering from one country to another, but sometimes in species which lead off to other genera there is a small membrane.' Mr. Swainson then adveris to the snipes (Scolopax). 'The woodcocks, wrens, are observed, are found in Europe, America, and Asia; and seem to be further represented in the hot latitudes by the Old World by the elegantly-marked genus Rhynchoc.' Mr. Swainson concludes by an allusion to the Phalopus or 'hooe-footers,' generally placed near the above genera. (SCOLOPACIDAE, vol. xxi., p. 88.)

In the part (ix.) just out of Mr. Gould's great work the Birds of Australia are beautiful figures of Rhynchoc., and specimens of its different species. 'The moist season of 1839 in the district of the Upper Hunter particularly in the flats of Segenho, Aberdeen, shows the effect of the great sandpiper on the swans, which are in the immediate locality, as, on dissecting a female, an ova was found in the ovarium nearly of the full size, and ready to receive its calcarious covering or shell. In its habits and disposition this bird partakes both of the true snipe and sandpiper: it neither lies in the crouching manner of the true snipes, but exposes itself to view like the sandpipers, running about either among the rushes or on the bare ground at the edge of the water: or, when it is generally fed towards the brush, seeking shelter among the low bushes, from which they were not easily driven or forced to take wing. It flies straighter, slimmer, more laboured, and nearer to the ground than the true snipes. Considerable confusion has always existed respecting the members of the group in which this bird belongs, the opposite sexes of the species having been described as distinct; from actual dissection, however, of numerous examples, and from more intimate knowledge of the subject, I am enabled to affirm that the figures in the accompanying plate are separate representations of the male and female. This species is found on comparison to possess, among other characters, a peculiar disposition of the feathers covering the feet, which is almost nearly allied to the great elongation of the trachses, which pass down between the skin and the muscles forming the bone of the whole length of the body, making four distinct evolutions before entering the lungs. On discovering this extraordinary formation, I immediately placed the body in spirits for the examination. After the name of Mr. Zearll, who, as is well known, has paid great attention to this part of the organization of birds, and who informs me that the position and form of the trachses in Rhynchoc. are the same as those figured in the 5th volume of the Trans. Linn. Soc. lab. 11. The Australian swans, guans, but present us with species having the trachses singularly developed, several of them with extensive evolutions before entering the lungs; some with a respira- tory for its folds within the cavity of the first bone [Swans], while in others it is situated outside the pectoral muscles, immediately beneath the outer skin of the breast; but in no instance is it more extensively or more developed than in the Australian swans. The use of this conformation, so exclusively confined to our species, and that the female sex, I could not in any way discover or surmise. No note whatever was heard to proceed from either sex, on the wing or when flushed.' In the same part are accurate descriptions of the beautiful Recurvirostra rubricollis, or Red-backed Avoset, the Fygin-pong-ong of the aborigines of Two
The Sandpiper. —The Sandpiper (Tringa stagnatilis) is a medium-sized sandpiper, not so much longer than its head, with a short, straight, black bill. The upper parts are greyish-brown, tinged with greenish on the back; the under parts are white, with a grey line across the eye and the sides of the neck. The breeding plumage is darker, with more brown on the back and neck, and less on the under parts. In winter, the Sandpiper is grey, with a white rump and tail. The Sandpiper breeds in the high latitudes of Europe and Asia, and winters in Africa. It is a shy bird, and is often seen in flocks. It is noted for its agility and foraging ability, and is known to feed on insects, small crustaceans, and other small invertebrates. It is a strong flyer and is known to travel long distances in search of food. It is a social bird and is often seen in groups. The Sandpiper is a hardy bird and is known to survive in harsh conditions. It is a beautiful bird with a distinctive call, and is a favourite among bird watchers.
records of rewards to the fowler for bringing in Knots, as a proof of the high estimation in which they were then held. Nor is Drayton silent as to the fame of the species:

"The Knot, that called was Canticks bird of old," of which great numbers of Done his name to field and fold, his eyes to please, that farre and nearr were sought. For him, as some have said, from Denmark hither brought."

(The Polyolbion."

The Little Sandpiper.—Description.—Bill straight, longer than the head; tail double forked; lateral feathers brownish, all variegated with white; tarsi ten lines long.

Male and Female in Winter Plumage.—All the upper parts ash-coloured, and with blackish brown along the stems; sides of the breast ash-ruddy; a brown stripe behind the bill, middle of the breast, throat, eyeworns, front of the neck, all the lower parts, but only the lateral feathers of the upper coverts of the tail, pure white; lateral tail-feathers ash-brown, all variegated with white, the two middle ones brown, bill and feet black. Length about six inches.

Young before the first moult.—Feathers of the top of the head blackish, bordered with yellowish ruddy; forehead, eyeworns, throat, front of the neck, middle of the breast and the other lower parts pure white; a brown spot between the eye and the bill; sides of the breast inclining to ruddy varied with ash-y brown; feathers of the back, scapulars, and wing-coverts blackish-brown, those of the upper coverts of the back surrounded with a ruddy border, those of the scapulars by a wide yellowish white border, and those of the wing-coverts by a narrow band of yellowish ruddy; the two middle tail-feathers bordered with ruddy variegated with white.

Summer or Nuptial Plumage.—Top of the head black, with spots of vivid ruddy. Cheeks, sides of the neck, and sides of the breast bright ruddy sprinkled with small brown angular spots; eyeworns, throat, middle of the breast and all the lower parts pure white; feathers of the back, scapulars, wing-coverts, rump and two middle tail-feathers deep black; all with a large border and terminated by bright ruddy, only the lateral feathers of the upper coverts of the tail white with isolated spots; all the lateral tail-feathers ash-brown, but variegated with pure white. This, which is the smallest British sandpiper, with one exception (Temminck's Tringa), is the Tringa minuta of Linnaeus, Latham, and Pennant, according to the reference to the last-named zoologist by Mr. Yarrell, who considers it to be the Stint of Bewick, the Tringa minuta of Fleming, the Minute Tringa of Selby, and the Little Stint of Jennyus.

It is the Pigmy Sandpiper of Richardson; the Bécasseau d'Hasses of Temminck; Gambecco e Caldolet of the Italians; Der Hochbunige Stranderlaufer and Der Kleine Schlaunlaufer of Ziegenfuss; Stint of Zeelus of the Netherlanders; and Y Pibydd Hetaf of the antient British.

Geographical Distribution.—Dr. Richardson states that this species was seen abundantly in the autumn, feeding; during the recess of the tide, on the extensive flats at the mouth of Nelson's and Hayes rivers: he gives a description of a specimen from Hudson's Bay, now in the British Museum.

Tangiers, South Africa, Trebizond. The vicinity of the Caucasus. India, Persia, and had noted it as common to North America and Europe, and Latham in a note adds that a variety of it is seen in Indian drawings. All doubt as to the identity of the Indian bird (Bengal) with the British species is now ended by the united testimony of Major Franklin, Mr. Selby, and M. Temminck, the last-mentioned of whom states that it occurs, on its passage, on the banks of the German and French rivers; often in the great marshes of Holland, but rely on the sea-coasts, and very commonly on the shores of the Lakes of Geneva. He adds that it is very numerous in the salt-marches of Dalmatia, where it is seen in August and September, in its dress, in which it attains the full state of plumage the Indian specimens always are. In France the bird is generally seen, on its passage, in the full nuptial plumage. In the British Islands they have been noticed in the vicinity of the Solway, in the west of Lancashire; and on the coasts of Scotland, and occur in the autumn, and winter, in the vicinity of Mr. Yarrell, who gives these localities, states that the Rev. W. S. Hore and his friend Mr. Gutch saw from forty to fifty of them on the Lainus mud-banks near Plymouth: October, 1840, and shot ten or twelve of them. Mr. F. E. C. Yarrell that a flock of thirty was seen on Romney Marsh in October, 1839, and the last-named zoologist mentions that they are frequently observed on the sands of the coast of Sussex; and that he has obtained them in the London market once in the summer plumage, once in that peculiar to the winter, but more frequently in autumn, at which season a small number are seen ever year in Belfast Bay according to Mr. W. Thompson.

Habits, Nest, Food, &c.—This species haunts sand-shores, the banks of large rivers and salt-marshes. In this country it is mostly found in company with the Dunlin and Sanderling on the sandy sea-shore. No one seems to know anything of its nesting; but Mr. Gould describes its eggs as resembling those of the common sandpiper, with colour and markings, though they are much smaller. The food of the species consists of very small worms, river and marsh insects, small crustaceans and little mollusks. The flesh of the Little Stint much resembles that of its congeners, but it must not be confused with the Stone: the old feasts, which appears to have been the Dunlin or Purre.

At the 'interrogration' of Archbishop Nevell, temp. Edw. IV., 'Stintes' are mentioned in the particulars of such courses. In the second course of the marriage-feast Roger Rockley and Elizabeth Neville, daughter of Sir John Neville, of Chete, Knt., in January, temp. Henry VIII., find 'item, Stintes, 8 o a dish,' and in the accounts for the expense in the week for flesh and fish for the same marriage they find 'item, in Stinta, 5 doz., 84., 9 in. Northumberland Household-Book' it appears that Stintes were among the delicacies for the principal feasts of his lordship's own 'meats,' and they are charged in the accounts at sixpence a dozen.

Drayton thus celebrates it in the 'five-and-twenty' song of his Polyolbion:

'The Post, Godwin, Stilt, the paddled that swerre
The misterd and doe make a wasteful opus.'

Fossil Sandpiper.

Dr. Buckland figures a Tringa in the first plate illustrating his Bridgewater Treatises, among the fossil birds the first tertiary period.

TRINIDAD, an island belonging to England, in the Columbian archipelago, between 10°5' and 10°00', lat. and 61° and 62° W. long. It is separated from South America by the Gulf of Paria, which forms an immense harbour with good anchorage. The southern entrance of the Serpent's Mouth, is about 15 miles, the northern, or the Dragon's Mouth, is fifteen, but divided into four straits by three islands. The length of the gulf is about one hundred miles, with an average width of about 15 miles, and forms an irregular square. Its length from north to south is fifty miles, and its breadth in the central part about thirty miles. The irregularity of its shape is caused by two promontories on the southern and southern extremities of the island on the western side. The island is, as nearly as possible, the site of Norfolk, and comprises an area of 500

Little Sandpiper.

Lower figure in the left, winter plumage. Tringa, lower figure in the right, young of the year. (Gould.)
The western coast is low, and either swampy, but the three sides are rocky and elevated. A chain of mountains, consisting of about ten miles, and whose highest points vary from 1800 to 2400 feet, runs along the northern side of the island, close to the sea. On the south, parallel to this chain, are the rivers, which have numerous tributaries, and are navigable. As one of these rivers flows to the east and the other to the west coast, a project has been formed for uniting them by a canal, which would be a great improvement, and would be effected between the eastern and western coasts.

South of the above-mentioned plains is a range of hills, from 600 to 1000 feet high, which run across the island from south-east to north-west. Again, on the south, near the coast, are the sugar-plantations which have extended in a good deal broken, though it comprises considerable tracts of level country; and between this and the coast there is a chain of hills, none of which attain an elevation of a thousand feet. At the western extremity of the southern promontory there are volcanoes which throw up mud. South of Point Brea the sea in one spot throws up bitsmen. The most remarkable natural feature of Trinidad is the Pitch Lake. It is about a mile and a half in circumference. The pitch at the sides of the lake is perfectly hard and cold, but as one walks towards the middle with the shoes off in order to wade through the water, the heat gradually increases, the pitch becomes softer and softer, until at last it is so soft as to form a quantity of paraffin, which is then strongly impregnated with bitumen and sulphur, and the impression of the feet is left upon the surface of the pitch. During the rainy season it is possible to walk over the pitch, and it contains a part which is not to be approached.' (Sir J. Alexander, in Marin's Colonies, vol. ii. p. 235.) Attempts have been made to render the pitch applicable to some useful purpose, but so much oil was required to be mixed with it, as to render the experiment commercially unsuccessful. It has been employed in repairing the roads in that part of the island, for which purpose it answers remarkably well.

The excellent harbours are on the eastern coast there are only two, which are not very good. Chaguaramas, on the southern side of the island, near its western extremity, will admit the largest ships. On the south, at the eastern extremity, is Guaya-guayara, an excellent harbour, protected by Point Galeota. Fora d'Espana, on the western coast, is also a good harbour. Here stands the town called the Port of Spain, the capital of the island. On the northern coast there are three or four small harbours. Trinidad was discovered by Columbus in 1498, when it contained a numerous aboriginal population. It was first colonised in 1588, by the Spaniards; in 1670 it was taken by the English, and in 1797 it was taken by the British, and has remained in our possession. The present population of the island is 378,000, and of these 50,000 are negroes. The whole population was 2765. At this period the Council of the Indies issued an order encouraging the immigration of Europeans by securing persons from molestation for debt, from whatever country they came, during five years, and by granting the islands some commercial privileges.

In six years afterwards the population had increased to 10,422, and when the island came into our possession the number of inhabitants was 18,675. The population in 1846 was 38,000; in 1856 it was 50,000, and in 1866 it was 69,000. In 1832, the number of negroes in the colony was 15,000. In 1846, the number of slaves in Trinidad was 23,000, and of negroes 15,000, and of coloured free negroes, about 20,000. In 1866, the number of slaves was 80,000, and of negroes and coloured free negroes, about 60,000. In 1871, the number of slaves was 85,000, and of negroes and coloured free negroes, about 65,000. In 1881, the number of slaves was 90,000, and of negroes and coloured free negroes, about 70,000. In 1891, the number of slaves was 95,000, and of negroes and coloured free negroes, about 75,000. The commerce of the island now employs about 40,000 tons of shipping, and all the ships of the United Kingdom, but some part of the rum and molasses are shipped to the United States. Small quantities of guinever, arrow-root, indigo, and cotton are exported. The total value of the imports in 1856 was 408,000l., and of the exports in the same year 452,000l. The mother-country, the exceptions being fish from British North America and lumber from these colonies and from the United States.

Edwards's West Indies, vol. iv. p. 238; Geography of America, in Library of Useful Knowledge, p. 18.)

TRINITY (Greek, τρινταίς; Latin trimertia, or triminatalis) is a word used by theologians to describe the divine Being as consisting of three persons united in one God. In this, as in most other points of theology, it is necessary to observe the distinction between the teaching of Scripture, and the metaphysical development of the doctrine by theological writers and its dogmatic statement in ecclesiastical formularies.

I. The Scriptural View of the Trinity.—On this part of the subject the difference between those who receive the doctrine and those who reject it of course resolves itself into a number of questions in biblical criticism. Referring to the article Unitarian for the opinions of the latter party, we proceed to state the views generally held by the former of the scriptural statements concerning the Trinity.

In the Old Testament it is brought to hold a prominent place. The great doctrine therein taught is the unity of God as opposed to polytheism. This point having been clearly revealed in the books of the Old Testament, and having been practically intrenched upon by further revelation of the nature of God was made by Christianity, namely, that in

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* It is said to have been first used by Theophilus of Antioch, in the second century.
this one only God were mysteriously united three distinct 
persons, each of them divine, but yet are persons are passed 
of the doctrine in which the doctrine is generally 
thought to be obscurely revealed or incidentally implied. 
For example, the divine Being is described by nouns and 
pronouns in the plural number (Gen. iii. 22; ii. 7; Job, 
xxx. 6; Ps. 20:10, 11; Matt. xxvii. 39; etc.); God, when 
mentioned in a triple form (Num., vi. 24-27; Isa., vi. 3; xviii. 
12; Ps., xxxiii. 6); the word Jehovah, which is the peculiar 
title of the self-existent God, is applied to more than 
one, not when several persons are passed (Gen., xvi. 24; 
xxvi. 28, 29; xxvii. 1; Lev., x. 8-11; &c.): in other pas-
sages a person is mentioned as an 'angel of Jehovah,' to 
whom the name 'Jehovah itself is also given (Gen., xvi. 
7-13; xvii.; Ezek. ii. 9-15; John, xvi. 28, 29). These 
divine attributes are respectively ascribed to the promised 
Messiah (Micah, v. 1; Isa., v. 5, 6; Jerem., xxxii. 
6; Ps., cx. 1; &c.); and to the Spirit of God (Gen., vi. 3; 
Exod., xxxi. 3; Deut., xxxi. 12; xxv. 22; xxvi. 2). The opinions 
of the later Jews seem to show that they had derived 
some ideas of a Trinity from the Old Testament. (Locus.) 
The whole of this branch of the subject is discussed in Dr. 
J. P. Smith's Scripture Testimony to the Messiah, one of 
the most learned and most temperate theological works 
ever published.

But it is in the New Testament, if in any part of Scripture, 
that the chief proofs of this doctrine will be found. 
Here, however, we should search in vain for several of the 
typical figures and analogies to express the idea of the 
Trinity, such as persons (inwonde) same or similar in 
substance (γενόσις, φωτονομίας), or even the word Trinity 
itself. This circumstance is not, as it has been sometimes 
represented against the Christian school, but rather the 
an example of that freedom from dogmatic systems which 
characterises the theology of the New Testament. (Theo-
logy.)

The scriptural argument for the Trinity may be stated 
in the following manner:—Besides the many passages 
of the New Testament in which one supreme being (God) 
is spoken of, there are many others in which mention is 
drawn on the Father, the Son, and the Holy Spirit, or the Spirit 
of God, whose distinct personalities are passed in 
in which they are spoken of. To these three persons 
divine attributes are assigned where they are mentioned 
together, and also to each of them singly. Hence the 
scriptural proof of the doctrine of the Trinity is twofold: 
being derived, first, from passages in which the Father, 
Son, and Holy Spirit are mentioned together as God; 
and secondly, from passages which prove each of them to be 
divine. 

The former class of passages, two of the most 
remarkable are the baptismal formula (Matt., xxviii. 19), 
and the apostolic benediction (2 Cor., xiii. 13), to which 
may be added a great part of the 14th, 15th, and 16th 
chap. of the Gospel, and also passages in the gospels, and 
and also 1 Cor., iii. 3-6; Titus, iii. 4-6; 
I Pet., i. 2-3. A striking declaration of the same 
truth is generally thought to be set forth in the circumstances 
which attended the baptism of Christ (Matt., iii. 16-17; 
Luke, iii. 21-22; John, i. 36-34). The passage in 1 John, v. 
7-8, is now pronounced to be spurious by the almost 
universal consent of biblical scholars.

Besides this general assertion of the union of the Father, 
the Son, and the Holy Ghost in the Godhead, the following 
passages are produced to prove separately the person-
ality and the divinity of the Father: John, i. 14, 18; 
v. 17, 18; xv. 26, &c.; Heb., i. 2-8; Rom., xv. 6; 1 Cor., 
iv. 13, 14; vii. 10; 1 Pet., i. 22, 24; Rev., ii. 8; 1 John, 
vi. 3, 4. The Father is also expressly called 'God;' John, vii. 
46-49; xxvii., 13; Ephes., i. 17; 1 Pet., i. 2; Rev., i. 6. In all 
these passages the word Father is used with reference to the 
Son, the distinction to the Son. Those passages in 
which God is called the Father, in reference to created 
beings, are scarcely in point here.

The personality and Godhead of the Son are proved by 
the doctrine of Christ respecting his own nature, whether 
he is speaking of himself or others. Thus his person is 
described as consisting of two parts, the one human, and the 
other superhuman (Phil., vii. 11, 13; v. 3; John, xii. 32; 
compare John, i. 15, 30; iii. 31, &c.; 1 Cor., iv. 47-49; 
Rom., i. 3; ix. 5; 1 Tim., iii. 16; Heb., ii. 17). He is 
declared to possess an eternal existence, (John, i. 1-3;
xvii. 5, 24; 1 John, i. 2-5, 20; Heb., i. 10-12; Rev., xan- 


doctrine no attempt is made to reveal to 
us what constitutes the substance or essence of the Divine
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Being, or what is the *mode* in which three distinct persons are united in that substance. But little reflection is necessary to see the reason of this: we could not have understood, even if human language had been furnished the means of expressing it, which is more than doubtful. Controversial writers upon this doctrine seem often most strangely to have forgotten that *all our knowledge*, whether of spiritual or human beings, is arrived at by the new process of reasoning. The divinity of the Son and the Spirit, the threefold divine properties, not of essences. The essential nature of the Divine Being is not at all more mysterious to us than the essential nature of matter or of our minds, or of those principles which are in us, whatever be the life, motion, heat, light, attraction, and repulsion, since all these things are equally beyond the reach of human knowledge. In fact, while the Scripture holds forth most clearly the truth that the nature of God is entirely different from that of man, yet it teaches us all that it reveals respecting the actions and feelings of God by speaking of him as it were a man (*anthropomorphism*). This is simply a matter of necessity in the present state of men and their language. Therefore to expect of theologians that they should be able to give a perfectly intelligible account of the mode of the divine existence, or the nature of the divine substance, is a requirement the absurdity of which cannot be exceeded. It is, therefore, enough to comply with it. Hence the error of those who at times *cling* to the doctrine of the Trinity on the preliminary objection that it is incomprehensible. Such persons have to show, not only that it involves a paradox, but that it involves a necessary absurdity. In 1667, the Jesuits at Rome even forbade them to prove.—*Paraadox.*

The doctrine, as stated in Scripture, is not equivalent to the assertion that there is a being of which the whole is equal to each of three parts into which it is divided: such a statement would of course be self-contradictory if applied to physical existences, but as applied to the divine essence it is simply meaningless. The scriptural statement is that in the one undivided divine essence three distinct persons are united: three united distinct divine persons, who are revealed as such by their several operations, and each of whom possesses the same perfection of divine attributes which is possessed by the whole Godhead. This proposition is undoubtedly mysterious, but it cannot be proved to be self-contradictory until we have first learnt what the nature of the divine essence really is.

The only proper ground on which to rest the discussion is therefore the question whether the Scripture really teaches at the same time the Unity and the Trinity of the Godhead. If Christians had confined their attention to this point, there can be no doubt that the greater number of the divisions respecting the subject would never have arisen.

II. The History of the Doctrine of the Trinity.

The earliest controversies on this subject (such as those with the Episcopists and Duceaux) related to the person of Christ. The term *Trinity* is ancient; and it is evident that they retained this characteristic down to the time of the Council of Nice, as is strikingly shown by the absence from the Nicene Creed of any statement in reference to the Holy Spirit. In that creed, with the addition made by the Council of Constantinople respecting the Holy Spirit, we find the first dogmatic statement of the doctrine of the Trinity. [Nicene Creed.] The deviations from this statement in the early church were due either to an error in the terms *substance* and *person*, the distinct personality of the Father, Son, and Spirit was stated in such a way as to contradict the unity of substance, and to make it appear that there were three Gods instead of one, which is called *Trinitarian*; or the Father was regarded as the only supreme God, and as superior to the other persons of the Trinity, which is the doctrine called *Subordinationism*, and was held with violence by some of the Latins; or the doctrine of the Godhead was rejected altogether, and the Son and Spirit held to be the same person as the Father, revealed under different aspects, and of the same substance; or the *Spirit* were explained as signifying not persons, but other *modes* of the divine existence: this last is the *tenet* of the *Sabelians*. For the subdivisions of these opinions see, in addition to the articles referred to, *Heresy and Heretics*. Perhaps Trithemius ought hardly to be regarded as a real opinion, but rather as one which has been erroneously ascribed to some writers on account of their unguarded statements. Of the other two systems, both are attempts to escape from the difficulty of the doctrine: the one, by a separation of this *subterpren- divinity of the Son and the Spirit; the other, named *Sabelianism*, by denying their distinct personality. The discussion of these systems gradually led to the formation of the new *dogma* of the *Trinity*. Henceforth the whole Christian Church respecting the Trinity, in the celebrated Creed improperly termed *Athenasian*, in which the doctrine of the Nicene Creed is more minutely stated, and an attempt is made to explain more clearly the relations of the Father, Son, and Spirit, to each other, and to the world, and to the Church as a whole. [Athenasian Creed.] This creed and the Nicene form to the present day the generally-received symbols of the orthodox faith respecting the Trinity.

In the seventh century a difference arose between the Greek and Latin churches on the following point: — The Latin church had received the Nicene Creed, and had added to it a declaration respecting the Holy Spirit, which agreed for the most part with the Constantinopolitan addition to the same creed. But while the latter represented the Spirit as *proceeding* only from the Father ("ον θεόν ουκ ην πατέρα ηεσθοσεισμος"), the Latins held that the Spirit proceeded both from the Father and the Son ("ον θεόν πατρὶ και υιοῖς"), and the addition was condemned by a council of Toledo, in Spain, in the year 589. After several fruitless attempts to accommodate the difference, the result was that at the separation between the Greek and Latin churches obtained its own creed, termed the *Greek Church*. Between this period and the Reformation there is little worthy of notice in the history of the doctrine. As the Nicene Creed had defined upon the Bible, and the Athenasian on the Nicene, so the scholastic men refined on the Athenasian Creed, not without serious consequences to themselves. Abailard was compelled by the synod of Soissons (1122) to burn his book *De Trinitate* with his own hands, on account of its alleged Sabelianism, and several other schoolmen were condemned for Sabelianism or Trithelism.

At the Reformation the *Protestants in general* retained the doctrine of the Trinity as set forth in the Athenasian Creed. About the same time the rise of Socinianism gave a new form and strength to Anti-Trinitarian opinions. Other religions present traces of a doctrine somewhat resembling the Trinity; as, for example, in the Trinituris of the Indians (Braham, Vishnu, and Shiva), the Trinity of the Egyptians (Knep, Neith, and Pitha), and the Scandinavian triad of Odin, Braga, and Freia. All these triads however seem to have reference to a supposed trifoliate form of the power or essence of God, while in the doctrine of the Trinity rests entirely upon an historical basis, namely, the testimony of Scripture. Most of the writers on the Trinity worth consulting are referred to in the works mentioned in the following list: — *Lectures on the Trinity* of Bovet; *Trinitarian Discourses* of Kimms; *Lectures* of Gibbon; *Trinitarian Works* of Bishop Watson; *Theologcal Institutes* of Dr. J. P. Smith's *Scripture Testimony to the Messiah*; *Wardlaw's Discourses on the Socinian Controversy*; *Yates's Indication of Unitarianism*; *The Church Histories of Mosheim and Neander*; *Hahn's Lehrbuch des Christlichen Glau- bens*; *Hagenbach, in Ersch and Gruber's Encyclopædia*, art. "Trinity."
The government of the college is vested in the master and the eight senior fellows; and of the other members of the college, in order of seniority, the resident fellows next in order of seniority are considered as deputys. The fellows are chosen from the scholars, who are ineligible if they are M.A., or of sufficient standing to take degree. Any person whose name is subject to eligibility for a fellowship in this college; and all the fellowships are open without any exception. The scholarships are also open, but two or three are usually filled up annually by scholars chosen from Westminster School; and a total sum of £500, to be given to a native of Kent or Cambridgeshire alternately.

The exhibitions of this college are as follows:—four, Dr. Lewis, 2l. 6s. per annum each to four scholars, natives of North Wales; one, Mr. Elwes, 3d. for a scholar appointed by the master; five, Mr. Perry, 13s. 4d. per annum each, to scholars from St. Paul's School, London; three, Mr. Jeyton, 2l. 13s. 4d. each, for poor scholars; one, Mr. Hope, 2l. 8s. 6d., for scholars from Lynn School; two, Lady Verney (estate at South Littleton), for scholars from Cranbrook or Warwick school.

Lady Campden founded several exhibitions from St. Paul's School and Coll. Homes, which are 10s. per annum; and others of 70s. per annum; they are selected by examination from the foundation scholars of St. Paul's School.

Various benefactions to the amount of 136l. are consigned and divided among the resident scholars; to whom also all noblemen pay two guineas and fellow-commoners one guinea each per quarter. There are also sixteen scholarships upon the foundation, which are to be held by persons of any rank or estate in society; and the principal part of the emoluments is to be distributed among the scholars when they shall complete the third year of their residence in the college; and the other students are allowed a small allowance for the support of their persons.

Numerous annual prizes are distributed in this college, chiefly for literary compositions.

Several pieces of ecclesiastical preferment in the gift of Trinity College, rectories, vicarages, and perpetual curacies; eight of which are in Bedfordshire, two in Buckinghamshire, eleven in Cambridgeshire, one in Durham, two in Essex, four in Hertfordshire, one in Leicester, three in Lincolnshire, one in Middlesex, six in Nottinghamshire, four in Norfolk, one in Northumberland, one in Staffordshire, one in Suffolk, one in Warwickshire, three in Westmorland, one in the Isle of Wight, and three in Yorkshire. Three of the advowsons now vested in Trinity College belonged to Michael House, and five to King's Hall.

Among the many eminent persons who have been educated at Trinity College are Robert Devereux earl of Essex, Sir Robert Cotton, Sir Henry Spelman, Lord Chancellor Bacon, Sir Edward Coke, Dr. Donne, John Ray, Francis Willoughby, Dr. Isaac Barrow, Sir Isaac Newton, Roger Colles, Abraham Cowley, John Dryden, Andrew Marvel, and Dr. Conyers Middleton. Among the more eminent Masters of this college have been Archbishop Whigfield, Bishop Wilkins, Bishop Pearson, Dr. Isaac Barrow, and Dr. Richard Bentley.

Trinity College is situated between St. John's and Caius College, occupying the space between Trumpington Street and the river Cam. It consists of two large courts of unequal dimensions; the larger court is the principal circuit; the west side is the longest, is about 174 yards; the east side about 183 yards, the north 145, and the south about 141. This court is entered from Trumpington Street by a turreted gateway, said to have been formerly the entrance to King's Hall. The inner court is called Neville's, from Thomas Neville, master of the college and dean of Canterbury, by whose benefaction the principal part of it was built. The library, which now forms a part of the inner court, and was designed by Sir Christopher Wren; it is the only part of the College that has any architectural pretensions. A third court, adjoining Neville's court, was completed in 1825. There is some accommodation within the college walls for about 300 persons.

The chapel, which was begun by Queen Mary, and finished by Queen Elizabeth, is about 200 feet in length.

In the ante-chapel is a statue of Sir Isaac Newton, by Rosa Bolland, presented to the Society by Dr. Smith, who succeeded Dr. Bentley as master; and a bust of Porson, by Chantry.

The hall, which is about 100 feet in length, is in the mind of architect which began in the reign of Henry VIII.

The master's lodge, which contains several spacious apartments, has always, since the time of Queen Elizabeth (who was herself lodged in King's Hall), been suited for the residence of the king when the university has been honoured with a royal visit; and the judges always lodge there during the sessions. The sash-windows which disfigure this part of the court have just been taken out, and the windows have been fitted with sashes harmonising with the general appearance of the great court.

The master is appointed by the crown, and the king is visitor of the College, excepting with respect to the master who is visited by the bishop of Ely.

The copy of the statutes in the Trinity library, which the library-keeper believes to be the earliest printed, bears the date MDCCLXXIII. The statutes are printed in the 'Second Report from the Committee of the Lower Orders,' 1818, vol. iv., pp. 363-403, from MS. Donat. Brit. Mus. 659.

The number of members on the boards, March 12, 1842, was 1797.


TRINITY COLLEGE, OXFORD. This college was originally founded and endowed by Henry VIII., and the priors and bishops of Durham. It was under the patronage of the bishops of Durham, it obtained the name of Durham College, though dedicated from the beginning to the Holy Trinity, St. Mary, and St. Cuthbert. At the Reformation it was given to Mr. Thomas Pope, Knt., of Tittenhanger in Hertfordshire, 20th February, 1554-5, purchased the site and buildings of Dr. George Owen and William Mastyn, to whom a grant of them had been made by Act of Parliament. He founded the present college, dedicated to the 'Holy undivided Trinity,' for a president, twelve fellows, and several scholars.

The founder directs that the scholars shall be chosen from his kinsmen; but if no such candidates properly qualified appear on the day of election (Trinity Monday), then they shall be supplied from any county in England; not more than two natives of the same county can be fellows at the same time, except Oxfordshire, of which county five are allowed.

There is also a scholarship, nearly coeval with Sir Thomas Pope's foundation, founded by Richard Blount, Esq., of the college, who was connected by marriage with the founder; an exhibition called the Union Pension, given by Thomas Unton, clerk, of Drayton in Shropshire, in 1683; a second, called the Tynley exhibition, granted by Dr. Tynley, Esq., of Hants, in the year 1723; and a third, by the Rev. Edward Coblen, D.D., archdeacon of London, who, by will dated April, 1784, bequeathed the sum of 400l. to a certain fund of Winchester College, called the Superannuate Fund, to the intent that the interest thereof might be applied to found an exhibition in Trinity College, Oxford, for the advantage of the superannuated scholars of Winchester College aforesaid. This exhibition has been augmented from time to time by the liberality of the wardens of the college, and is now 1830. 630 yards in length.

The benefactions in the patronage of this college consist of the rectories of Farningham, and the vicarages of Navestock and Waltham Magna, in Essex; the rectories of Goring, Oddington, and Rotherfield Greys, in Oxfordshire; the benefactions of the Rev. Mr. Heber, the Rev. Mr. Bayley, the Rev. Mr. Hume, the benefactions of Mr. Heber, of Barton-on-the-Heath in Warwickshire; with the lecturership of St. Nicholas Abingdon, in Berks.

Among the more eminent persons educated in this college are Dr. James Hastings, the author of 'Theological Dictionary'; John Selden; John Evelyn; Archbishop Sheldon; Chillingworth; Dr. Ham, the author of the 'Physico-Theology'; the first Earl of Chatham; Lord North; and Thomas Warde, the author of the 'History of the World.'

The original buildings of this college were those which belonged to Durham College, and were repaired by Sir Thomas Pope for the use of his society. They consisted...
principally of a low quadrangle, with the hall, library, and chapel. About the beginning of the seventeenth century Dr. Ketel, then president, added garrets to part of the quadrangle, and erected some buildings near the kitchen, at the north end of the hall, which, however, the buildings became ruinous; and in 1664 Dr. Bathurst, then president, began his extensive designs with repairing his lodgings on the east side of the quadrangle, which he afterwards completed in 1697, at his own expense. The new college was projected in the Fellows' garden, the north side of which was finished in 1677. The west side was not completed till 1682; nor the north till 1726. Sir Christopher Wren was the architect employed on this work. The hall, on the west side of the first quadrangle, originally that belonging to Durham College, having fallen into decay, was rebuilt in 1618. The library, though it has undergone various changes, is in substance the oldest part of the college, having been erected in 1730. The present edifice of the chapel, originally that of Durham College, was erected between 1601 and 1694.

The bishop of Winchester is the visitor of this college.

The number of members on the books, December 31, 1841, was 296.


This college was a separate foundation, instituted in 1300, by William Bateman, bishop of Norwich. It is now more particularly appropriated to the study of civil law, and has twelve fellowships open to persons of every nation and condition.

Bishop Bateman, the founder and noble benefactor of this institution, originally intended to found twenty fellowships, but dying before the foundation was completed (x.d. 1303, at Avignon), his gift was only sufficient for the maintenance of a master, three fellows, and two scholars. The nine remaining fellowships were founded by the following benefactors: two by Simon Dalling; three by Bishop Nix; one by Robert Goodman; one by Dr. Hawke; one by Dr. Mowbray; the fourth, which we bear at present, is the gift of the fellows should be laymen and two in holy orders. Graduates in Arts, not of less standing than within one year of the time of incepting as M.A., and students of three years' standing in civil law, are eligible.

There are also fifteen scholarships belonging to this hall, namely: three of the first class, of fifty guineas a year each; three of the second class, of thirty guineas; and nine of the third class, of twelve. These scholarships are awarded according to merit, to undergraduates who distinguish themselves at the college examinations in the Lent and Midsummer Terms of their first year, and are tenable during residence.

This college possesses a provost, worth about 30l. a year, for a chapel-clerk, who is usually selected from the more distinguished of the scholars.

The benefits in the gift of Trinity Hall consist of the curacies of Wetherfield, in Essex; the vicarages of Feastington-cum-Hilton, Hemingford Grey, and Great Stukeley, in Huntingdonshire; the rectory of Swannington and vicarage of Wooladling, in Norfolk; and the curacy of Conning, with the rectory of Kentford and vicarage of Gazeley, in Suffolk.

Among eminent persons who have been members of this society are Stephen Gardiner, bishop of Winchester; Samuel Hoare, bishop of St. Asaph; and Philip Dornier, earl of Chesterfield.

This college, which is situated near the river, between Clare Hall and Gerrard-hostel Lane, consists of a small neat court faced with stone. The old hall was destroyed 1842.

The number of members on the boards of this hall, March 12, 1842, was 143.


PRIVATE HOUSE OF DEPTFORD STROND, THE CORPORATION OF—its full title is, 'The Master, Wardens, and Assistants of the Guild, Fraternity, or Brotherhood of the Most Glorious and Undivided Trinity, and of Saint Clement, in the parish of Deptford Strond, in the county of Kent,' an institution to whose members is intrusted the management of some of the most important interests of the seamen and shipping of England. Its duties and powers will best appear by a review of its history, and of the acts and measures connected with them. This institution has been in existence for a period, the exact limits of which are not precisely ascertainable, but which may be supposed to have a duration of several centuries; though the same name appears under certain old records in the thirteenth century. It is probable that the name is of Norman origin, and stems from the word 'strond,' meaning a promontory or place of refuge, and that the institution was formed for the shelter and protection of ships and sailors entering to and leaving the river Thames, and the sea beyond it, where the same existed. The earlier records, together with the house of the corporation, were destroyed by fire in 1714, so that the origin of the institution can only now be inferred from usage and tradition, and from some of its purport in documents of a later period. It seems, however, certain that the increase of shipping and the use of vessels of great burden having augmented the importance of a correct knowledge of the intricacies of the navigation of the river Thames, and of the Thames and its branches, an association of seamen was formed for the purpose of forwarding and assisting the attainment of that object. It was material also that this knowledge should be solely possessed by British subjects; and probably this was presented to the mind of Henry VIII., who, when earl of Richmond, with a very inferior fleet, had crossed the English Channel from Harleford, and effected a landing at Milford Haven, without molestation. This king bestowed great care upon the improvement of the navy, and it is presumed that with him originated the scheme, afterwards carried into effect by his son Henry VIII., of forming efficient navy and adularine boards, which then first dealt with public matters affecting the happiness and well-being of the nation. When the act of Henry VIII. the arsenals at Woolwich and Deptford were founded; and we learn from Stowe that the Deptford-yard establishment was subsequently placed under the direction of a certain cutter, who, by his knowledge of the navy provisions and stores, were the earliest official document now extant is a charter of incorporation made by Henry VIII. in the 9th year of his reign. The first master acting under it was Sir Thomas Spert, commander of the famous ship called Henry Grace a Dieu, built by Henry VII.

An exemplification of this charter was granted by George II. in the third year of his reign. In it Henry says, 'We, the account of the sincere and entire love and likewise devotion of our selves to the service of the same indivisible Trinity, and also to Saint Clement the Confessor, have granted and given license, for us and our heirs, as much as in us is, to our beloved liege people and subjects, the shipmen or mariners of this our realm of England, that they or their heirs, to the praise and honour of the said most glorious and indivisible Trinity and Saint Clement, may of new begin, erect, create, ordain, found, unite, and establish a certain guild or perpetual fraternity of sixty to seventy and other as well may there be, in the parish church of Deptford Strond, in our county of Kent.'

The brethren are by the same charter empowered from time to time to elect one master, four wardens, and eight assistants, to go to visit and survey the same, viz. the custody of the lands and possessions thereof, and have authority to admit natural-born subjects into the fraternity, and to communicate and conclude amongst themselves or with others, and the government of the same, and to make all articles concerning the society or art of mariners, and make laws, &c. for the increase and relief of the shipping, and punish those offending against such laws; collect penalties, arrest or distrain the persons or ships of offenders, according to the laws and customs of England or of the Court of Admiralty. The charter also grants to the corporation all liberties, franchises, and privileges which their predecessors the shipmen or mariners of England ever enjoyed.

The corporation, to the incorporation of the sea-people by Henry VIII. there was a station belonging to the association of seamen near the entrance of the river, for the purpose of supplying pilots to vessels inwards, as well as one at Deptford or London for the supply to vessels outwards.

On arriving at the reign of Queen Elizabeth it is impossible not to be struck by the wisdom and foresight of the measures taken by that queen through the agency of the Trinity House for forwarding the interests of the sea service, and the same to be regarded when brought into contrast with those of some of her successors. In the first year of her reign she recognised all the rights and immunities of the corporation (receiving a grant of the same privileges in the reign of Edward VI. and King Mary); and in the 8th year of her reign an act was passed enabling the corporation to preserve against sea-marks, to erect beacons, marks, and signs for the sea, and to grant licences to mariners during the interval of war.
their engagements to ply for hire as watermen on the river Thames. This act described the members of the corporation as the "masters and owners of ships, and all other those who trade in and govern ships of war and merchant." The act also provided that the masters of the Trinity House, in addition to their other duties, had the right to erect lighthouses, and to own and manage them. This provision was intended to prevent the destruction of existing lighthouses and to facilitate the construction of new ones.

In the 36th year of her reign Queen Elizabeth, but partly it would seem at the pruwc衩wise instance and by the aid of Lord Howard of Effingham, her high admiral, made a grant to the corporation of the castaways and ballastage of all ships in the river Thames and of the barque and buoyage upon the coasts of the realm which had previously afforded a considerable source of revenue to the lord high admiral. The grant recites that he had surrendered into the queen's hands the castaways and ballastage of all ships coming into or being in the Thames, and also the right to erect and place beacons, buoys, marks, and signs for the sea, on it or on the shores, coast, uplands, or forest of the kingdom, so long as it is not otherwise while respecting these matters to them. And it then proceeds to grant the same and all fees relating to them in the fullest manner to the corporation for ever.

The corporation assumed the grant of confirmation dated 1604. What else it has already been stated, and by him and his successors various patents for and leases of lighthouses to individuals were at different times granted to the Trinity House a charter of confirmation, but in the 17th year of his reign he granted the right of castaways and ballastage to one Colonel Carlos. This was the more extraordinary, because by the royal charter of the grant of 1604 the proper use of the beacons and signs was reserved to the crown, and it was was conferred upon Colonel Carlos on the assurance that it would not injure them, and the colonel was to pay 1000 marks a year for it to the Exchequer. The corporation resisted this grant successfully, and soon after Colonel Carlos surrendered it to the king, who regranted it to the corporation for 31 years (Elizabeth's grant having been 'for ever'), with the addition of all the lighthouses from Staines Bridge to the Medway. This portion of the grant was disputed by the City of London, and eventually the king regranted it as it had been granted by Elizabeth, except that the fees and profits were expressly appropriated to the use of the corporation, and any of the marks were reserved to Colonel Carlos. The grant confirms the exemption of the brethren and their servants, &c., from all service, civil and military, unless by order of the Privy Council. James II., who was much interested in naval matters, granted a fresh charter, the one in force, in the first year of his reign. It recites the former grant and charter, and declares the body to be incorporated, and that for the future it shall consist of one master, and one deputy master, four wardens, and four deputy wardens, eight assistants, and eight deputy assistants, eighteen elder brethren, and a clerk. The master nominated by the charter was Pepys, then secretary to the admiralty. It determines the mode of election of these officers, their continuance in office, and the mode of removing them from it, if necessary; and declares that all seamen and mariners belonging to the guild shall be younger brethren. It directs the brethren to examine such boys of Christ's Hospital as shall be willing to be brethren, and to apprentice them to commanders of ships. It also enables them to appoint and license all pilots into and out of the Thames, and prohibits under penalties all other persons from undertaking that office. It authorizes the corporation to settle rates of piloting, &c., to hold courts, &c., to punish seamen deserting, &c., and makes laws as to their subject-matters not inconsistent with the laws of the kind. It also contains a clause directed to the object of keeping the navigation of the channel open from foreigners, and renders the officers of the corporation

away the power and right which was and still is in the Crown by the common law over such houses. Far be it from us wholly in the affirmative, that they of the Trinity House shall and may erect such lights and marks at sea, but excludes not his majesty. And we are informed that since the statute, both in the time of the king of England, and also in the times of the late kings of England, no lighthouses erected by authority from the crown.

And therefore, however the ordinary authority and trust for the performance of this service is committed to the said corporation, they are not thereby at liberty to perform that purpose, yet if they be not vigilant to perform it in all places necessary, his majesty is not restrained to provide them according to his regal power and justice, in the safety of his subjects' lives, goods, and shipping in all places respectively. They are bound to assist the nation in the construction of castaways and ballastage upon the coasts and harbours of the kingdom, and to the several purposes of the sea, and to the good of this realm, as far as they may conveniently and reasonably be employed in the same. And therefore the said corporation are hereby required to render an account to this court of the proper and due performance of their trust, and to show that they have been diligent in the execution of the same, and have been diligent and effectual in the performance of their trust, and to show that they have been diligent and effectual in the performance of their trust.
In order to attend when required at the king's bidding. Since that time several acts of parliament have been passed for the purpose of authorising the Trinity House to regulate matters connected with the pilotage, &c. of vessels.

It may not be improper here to commemorate the very important services rendered to the country by the corporation on two occasions during the late war. At the time of the mutiny at the Nore, in 1797, a member of the corporation suggested to the first lord of the Admiralty the destruction of some pepper-horns belonging to the government. The suggestion was immediately adopted and a delegation of the brethren was dispatched the same night to carry it into effect. It was accomplished with complete success almost in the vice-regal presence, and partly by means of which they might have been enabled in safety to make their way out to sea. The memorable declaration of the merchants, bankers, &c., relative to the proceedings on board our fleet, was also in consequence of a suggestion made to the prime minister, at the same time by the same member of the corporation. In 1833, when the invasion from France was menacingly threatened and feared, the shipping in the river and London itself appeared in the greatest peril. The elder brethren, at the suggestion of the then deputy-master, volunteered to undertake the defence of the river. Their offer was accepted, and the corporation exerted all their talent and influence to carry it out. The short Time Tower Hospital, or the Navigation board, entitled the 'Royal Trinity-House Volunteer Artillery.' It consisted of members of the corporation and other seafaring people, the then master, Mr. Pett; being colonel. Some of the officers were styled honorary; the elder brethren captains, and some of the younger brethren lieutenants. Ten frigates lying in ordinary were placed at their disposal: they were moored in a curved line across the river in the Hope, where they formed, without any practicable intervals, a battery of nearly 200 guns. The expense to the corporation on this occasion was at least £12,000, besides individual subscriptions from the elder brethren and other members of the corps to a large amount.

In 1799, an act was passed for the incorporation, the management of the corporation was regulated by the 6 Geo. IV., c. 155, entitled 'An Act for the amendment of the law respecting pilots and pilotage, and also for the better preservation of floating lights, buoys, and beacons,' which recites the extent of the jurisdiction of the Trinity House in regard to pilots to be, upon the river Thames, through the North Channel, to or by Orfordness, and round the Long Sand Head, or through the Queen's Channel and the Downs, and from and from and or by Orfordness and up the North Channel, and up the rivers Thames and Medway, and the several creeks and channels belonging or running into the same; and for the better regulation and supervision of the pilotage, the examination, licensing, and employment of pilots, the rates of pilotage, provisions for decayed pilots, the protection of buoys, &c. At the present time however, besides those under examination and buoy services, the warden of the Cinque Ports, many independent pilotage establishments exist in various parts of the kingdom, but the expediency of subjecting all these to the sole uniform management of the Trinity House has been felt for some time past, and will probably soon become the subject of parliamentary enactment. The inconvenience and disadvantage resulting from the exercise of similar authorities vested in the hands of different parties had been observed; and it was thought that, if the privileges were vested in the hands of the crown, while some had been in times past leased out by the corporation itself, the lights in both instances being found to be conducted probably rather with a view to private interest than public utility. By an act therefore of the 6 & 7 Wm. IV., c. 79, passed 'in order to the attainment of uniformity of system in the management of lights, houses, and the reduction and equalization of the tolls payable in the same,' provision is made for the maintenance of the lighthouses and lights on the coasts of England in the corporation of Trinity House, and placing those of Scotland and Ireland under their supervision. Under this act the £1000 in the lighthouses which was possessed by his Majesty was vested in the corporation in consideration of £300,000, allowed to the Commissioners of Crown Land Revenue for the same, and the corporation were empowered to buy in the interests of the various lessees of the crown and of the corporation as well as to purchase the other lighthouses from the proprietors of them, subject in ease of dispute to the assessment of a jury. Under this act, purchases have been made of the corporation in the whole of the lighthouses before possessed by that body, the amount expended for the purpose being little short of a million of money.

The annual revenue of the corporation is very considerable, and is derived from tolls paid in respect of ships receiving their pilotage services from the corporation, buoys, and from the ballast supplied. The ballast is raised from such parts of the bed of the river as it is expedient to deepen, by machinery attached to vessels, and charged with power of by other means, and sold by manual labour. The remainder of the revenue proceeds from lands, stocks, &c. held by the Corporation, partly by purchase, partly from legacies, &c., and donations of individuals. The whole is employed upon the necessary expenses of the Corporation in constructing and maintaining their lighthouses and lights, beacons and buoys, and the buildings and vessels belonging to the Corporation; in paying the necessary officers of their several establishments, and in providing relief for decayed seamen and ballastmen, their widows, &c. Many almshouses have also at various times been erected, which are maintained from the same funds. The present house of the Corporation known as the Foster House, in Water Lane, was built of brick in 1695, while in Trinity Street, Water Lane, where it was twice destroyed by fire. Of the thirty-one Elder Brethren, eleven consist of noblemen and heads of the government departments, admirals, &c., who hold the position; twenty-three, selected from the several branches of the merchant service, who have retired from employment, and recently one has been chosen from the service of her Majesty's navy. The younger brethren (who are unlimited in number) are chosen by the remembrancers of merchant ships. Neither the honorary members nor the Younger Brethren derive any pecuniary advantage from their connection with the Corporation. The present master is the duke of Wellesley, the master of the corporation, Mr. Pitt, wrote that office for seventeen years, from 1795 to 1802, and King William IV. was master at the time of his accession to the throne. Formerly, according to Stowe, sea-causes were tried by the Brethren, and their opinions were certificated to the common-law courts and courts of admiralty, such cases being referred to them for that purpose. This is not however the practice at present; but two of the Elder Brethren now sit as assistants to the judge in the court of admiralty in administration, and are consulted where any question upon the navigation is likely to arise. The various branches of the corporation are parcellled among the warden's and different committees appointed for the purpose of discharging the same. One of the most important of these is the Committee of Governors, taking in all merchant ships engaged in trade with foreign lands, as well as pilots, undergo an examination. The deputy master and Elder Brethren are from time to time employed on voyages of inspection of their lighthouses and lights, and are consequently frequently absent from the metropolis during the summer months and seasons; and they are also often engaged in making surveys, &c. on the coast, and reports on such matters of maritime character are as referred to them by the government. The sums paid to the deputy master and Elder Brethren for their services are—who the former £300, per annum, and £100. further as the chairman of all committees, and to each of the Elder Brethren 300/., per annum.

TRINNODA NECESFITAS. This term, in Anglo-Saxon times, signified the services of the porters, and also the fees charged by them, which was the equivalent of tenures of lands in England for the repair of bridges, the building of fortresses, and expeditions against his enemies. All the lands within the realm were bound to contribute to these three emergencies, on the principle of their necessity for general convenience or safety; and for this reason every man's estate was subject to the trinodada necessitas, whatsoever other humanities he might enjoy. Even in royal grants to the lords of manors, many privileges and exemptions from these similar services, the right of deducere trinodum a terra, were allowed or transferred, and these privileges was almost always reserved to the king. (Selden's 'Annales Anglorum,' 1, 42; Cowell's 'Interpretor,' ad vocem.)

TRINOMIAL, the algebraical name for an expression which consists of three terms, as a + b + c, or ax + by + cz. [TERM.] TRUYDIA (from τρυξ, three, and οδης, a tooth), the
name of a genus of plants belonging to the natural order Graminaceae. It has a racemose panicle; a 2-valved, many-flowered, nearly equal calyx; a 2-valved corolla, the external valve being divided into three nearly equal teeth, the middle one of which is straight. The species of this genus of plants are principally natives of New Holland; only one is a native of Europe, and is also found in great abundance in Sweden.

_T. decumbens_, decumbent Heath-grass, has a panicle with a few racemose spikelets; calyx as long as the flowers; and the ligule a tuft of hairs. It is an abundant plant on wet mountain-passes, and on heaths and moors. It is a hardy plant, and one of the few grasses which will grow abundantly on poor wet soils. Animals do not however appear to be fond of it. According to Mr. Sinclair, the quantity of nutritive matter is small, which, combined with the thorny character of the grass, renders it a desirable plant for cultivation even on poor soils.

TRIPONYX. [Toerattonx.]

TRIPHANA. [Spodomea.]

TRIPHA/SIA, a small genus of plants of the natural family of Aurantiaceae, of which the species are found in the East Indies, Cochín-China, and China. The genus was named by Louront, from _spadix_, spike, _tripha_, three.

The calyx being 3-cleft, petals 3, stamens 6, nearly equal, filaments 6, flat, anthers curved, oblong. Fruit baccate, 1-3 celled; seeds 1 in each cell. The species form thorny shrubs, with simple or trifoliate leaves. The fruit of _T. triste_, is orange, sometimes yellow, which on being preserved and eaten as a fruit. It is sometimes cultivated in gardens on account of the white sweet-scented flowers and orange berries. It requires heat with turf, long exposure, and a nest.

TRIPLE ALLIANCE means, in diplomatic language, a contract entered into by a formal and solemn treaty between three different powers, by which each of the contracting parties, by contributing its share to the execution of it, is also entitled to a proportionate share of those advantages which may be derived from it. Such a treaty may be concluded either for defensive purposes, when each power pledges itself individually to assist the other, or the others in case of attack; or it may be entered into for an offensive object, when the contracting powers engage to commence and carry on a war against a fourth party. It has been discussed by several writers on international law, whether two of the three contracting parties have a right, after a triple alliance or treaty has been concluded between them, to enter into separate stipulations in which the third party does not participate and is not privy to. This question has been fairly argued, like many other intricate questions in that obscure branch of jurisprudence, and in case of difficulty the strongest hand would establish and maintain its own particular doctrine. Martens, however, and most of the leading writers on the subject, is of opinion that no separate stipulations can be made without the consent of all parties, if three or more, and that this doctrine is recognised by all civilised nations.

Powers allied by a treaty may in fact be considered as partners, who, as such, may enter into any agreements or treaties with other parties, without these other parties becoming participants in the first contract. For instance, this was the case in the late war, which resulted in the destruction of Napoleon's empire. Russia and Prussia concluded a treaty of alliance, defensive and offensive, at Kalisch, which Austria afterwards joined; and this triple alliance, or partnership, entered afterwards as such into treatious conditions with Russia, for the purpose of revenge; and almost all European powers, without these states however becoming parties to the original triple alliance.

A great number of triple alliances, some resulting in highly important events, are known in the history of the middle ages as well as in modern times. There is one however, which, if implicit faith could be placed in English historians, particularly in Hume, might most appropriately be called the negotiated triple alliance, and probably very few historical facts have been so much perverted and disfigured, it deserves a closer examination.

Charles II. of England, Frederick III. of Denmark, and the United Provinces of Holland and Westphalia, at that time presided, were the contracting powers. Charles's political character, as well as that of most of his ministers, is too well known to require any comment. Frederick's strict honour and veracity have never been impeached. It was on him that the two estates of the United Provinces, the nobility and the burghers of Amsterdam, under the presidency of the sturdy and indomitable Walckier, bestowed sovereign power. De Witt's profound sagacity and quickness of perception were proverbial at the time, and nevertheless Hume, upon no other evidence than the course of events, has endeavoured to prove that King Frederick was deluded by the advice of Charles and De Witt. The facts drawn from the most authentic sources, however, absolutely excludes this. From causes best known to himself, Charles declared war against the United Provinces in 1665, and was very anxious to secure the alliance of Denmark, then the second naval power of the north. Sir George Sandys, himself on the Danish coast, sent word to King Frederick willing to listen to his proposals, because the United Provinces had a short time before begun materially to disturb the Danish commerce on the coast of Guinea, and had also made very unfair demands for the expenses of the more than doubtful assistance which they had given Denmark during the last war with Sweden. Preliminaries for a treaty were soon agreed upon, and were signed on the 15th of May, 1665, by which Frederick promised to assist England with twenty ships of the line, upon receiving subsidies to the amount of 120,000 crowns per annum as long as the war continued. As soon as these stipulations were signed at Copenhagen, Sir Gilbert Burnet, who was on other business, came towards the end of June (the precise date is not known), Sir Gilbert had an audience with Frederick, in which, according to his own statement, he explained that he would take no answer till at least before an answer could be expected from London.

In the mean time the Dutch, alarmed at this formidable alliance, sent a special mission, under the direction of the celebrated statesman, Mr. various objects, to arrive in Copenhagen, to induce the King of Denmark to continue his friendship towards them, offering at the same time full satisfaction for injuries they had done to the Danish commerce. This embassy arrived about the same time that Sir Gilbert had the above-mentioned audience. Frederick, to gain time to see if the preliminary treaty concluded with Sir Gilbert would be ratified, or whether the rejection of it would leave him at liberty to adhere to his former allies, appointed commissioners to treat with the Dutch at Bremen, for the purpose of settling the indemnity due to Danish merchants for the spoliations committed on the coast of Guinea. On the 8th of August a Dutch fleet of fifty merchantmen, returning from the Mediterranean, captured a vessel from the Baltic, which was bound for Norway, and were on the following day joined by eleven East Indiamen, all richly laden, to seek protection against the English fleet, then cruising on the coast, under command of Lord Sandwich, who thought too good a opportunity to escape. He therefore dispatched Sir Thomas Tiddeman with seventeen sail, ships of the line and frigates, to attack and capture the Dutch fleet in a port which hitherto was neutral. He arrived in the outer port on the 6th of August, and sent an officer on shore to ask the commandant, Colonel Cieignon's, consent to his intended outrage, which was peremptorily refused. Sir Thomas then claimed the fulfilment of the unratified treaty of the 16th of May, which however contained nothing applicable to such a case. Upon this Colonel Cieignon became doubtful how to act, and dispatched a messenger to the viceroy, General Count Ashfield, for fresh instructions. Great Bertram was still stronger terms, and orders at the same time were transmitted to the commandant to defend the Dutch fleet to the last in case an attack should be attempted. Notwithstanding this, Sir Thomas Tiddeman made an attack on the British fleet, latter which the Dutch and Danes together, was beaten off with considerable loss. King Frederick was highly indignant at the treatment he had received from a power which had courted his alliance; and, not content with this, in still stronger terms, and orders at the same time were transmitted to the commandant to defend the Dutch fleet to the last in case an attack should be attempted. Notwithstanding this, Sir Thomas Tiddeman made an attack on the British fleet, which after a long engagement, of which it is impossible to describe here in detail, Sir John Clifford, with it to Copenhagen, was instructed to apologise for Lord Sandwich's conduct, and
to offer the king to remove him from his command, if that would be considered sufficient satisfaction by Frederick; he was also the bearer of fresh instructions to Sir Gilbert Talbot, to use his best endeavours to pacify the King. Frederick was now in the position of an offensive and defensive alliance was, about five months later (February 29, 1666), signed and ratified between Denmark and the United Provinces. Sir Gilbert left Copenhagen out of his ill success; and, on his return to England, asserts that the negotiations for which he himself had apologised and offered satisfaction to the king, in presence of three distinguished statesmen (Scheick, Scholting, and Klingberg), had been made in complete good faith; and that such argument Frederick himself had proposed during the audience which he gave to the envoy in June; adding at the same time, that the (King Frederick) would take good care that plenty of Dutch ships should seek shelter in his ports for the purpose of being robbed, and the spoils divided between him and king Charles. If this falsehood had not found credit in numerous pamphlets and histories of that period—if it had not been repeated by Bishop Burnet, then Sir Hume, and more recently on the floor of the House of Commons, upon the most important occasion—it would scarcely be worth while to show the absurdity of it; but as it is, a few words will suffice to prove that Hume has done gross injustice to Frederick.

1. Sir Gilbert's assertion was promptly refuted and unconditionally denied in a publication written by Frederick's secretary, W. Sherling printed at Paris in 1666, under the title of De Residuo Apolopseus Fregnacii. He asserts therein that he has the authority of his master, as well as that of the three above-mentioned witnesses, who were present at all the interviews which Sir Gilbert had with the king, and denies it feebly, and, therefore, Sir Gilbert to produce any proof for his assertion. This defence remained unanswered.

2. Charles opened the parliament at Oxford, October 30, 1666, and Sir Gilbert's return to England, and alludes in his speech to the Bergen affair as an unfortunate misunderstanding.

3. Can it be imagined that Frederick would enter into so important and treacherous an agreement with an envoy alone, without at least having his brother king to countenance him in his nefarious acts, and if this was the case, as Sir Gilbert and Burnet pretend, there was no time (from the end of June to the 1st of August) to obtain Claren's confirmation and afterwards to send the requisite orders to the viceroy in Norway and to Lord Sandwich. But on this subject Hume is silent.

4. If Frederick intended to enrich himself by the plunder of the Dutch fleet, why did he not afterwards accept the satisfaction offered by Sir Gilbert and Sir Talbot, and then take the Dutch fleet for himself? But on the contrary, the fleet remained safe under his protection at Bergen till the middle of October, and therefore could not be plundered.

Finally, Frederick's positive refusal to enter into any further negotiations with King Charles is not denied even by Burnet, and Hume nevertheless asserts that 'the king of Denmark, seemingly ashamed of his conduct, concluded with Sir Gilbert Talbot, the English envoy, an offensive alliance with the States, and at the very same time his resident at the Hague, by his orders, concluded an offensive and defensive alliance with the United Provinces.' This might truly be called a negative triple alliance. Now Sir Gilbert, clearly perceiving that his endeavours to recommence negotiations were in vain, left Copenhagen towards the end of October, 1665, and the treaty of alliance between the United Provinces and Denmark was signed at the Hague on the 11th of February, 1666, under much less favourable conditions to Frederick than those agreed to by king Charles in the treaty of May, 1665.

1. ‘Tripos,’ or the Examination at the Royal Archives at Copenhagen; Hume's History of England; Burnet's History of his Own Times, 6 vols., 8vo., Oxford, 1833; Theatrum Europaeum, 10 vols., fol., Frankfurt, 1703; L. Holberg, Daniaësque Antiquites, 4to., Copenhagen, 1773; Histoire de Dannemare, par M. P. H. Mallet, 8vo., Paris et Genève, 1788.

TRIPlicative. [Ratio, p. 309.] In the common arithmetic the rule of three is a case in which a given ratio is found by taking the cube of each of the terms of the ratio. Thus, P.C., No. 1833.

when we say that two similarly formed solids, whose linear dimensions are as 4 to 7, are in the triplicate ratio of 4 to 7, it means that the bulk of those solids are in the ratio of $4^3 : 7^3$, or 64 to 343.

TRIPLOUS (tris, rippos) is any article of furniture resting upon three legs, as chairs, tables, chairs, moveable altars, and other articles of the same kind. (Athen., ii., p. 49.) A chair or an altar of this kind must be understood when we read that the viceroy of Delphi, on the death of the archon, was to find also mention of tripods containing a certain measure of fluid (Hom., Il., xxiii. 294), and in this case we have to understand a bowl resting upon a pedestal with three feet. The crater, or the common tripod, which is frequently found at the banquets of the antients, was very frequently a tripod of this description.

The antients made much more frequent use of tripods than we, and, from their descriptions, as well as from the numerous representations of tripods on medals, and from the specimens still extant, we see that they were often more tastefully ornamented and of the most exquisite workmanship. They were usually of metal, but sometimes also of marble, and have been made as much for mere ornament as for use. The tripod was connected with the worship of several gods, and was one of their attributes; but there is no deity in whose worship tripods occur so frequently as in the worship of Apollo. Apollo gave his responses from a tripod, tripods were the most common presents (donaria) to his temples, tripods were given to the victors in the games which were celebrated in his honour, and tripods are presented to the gods which have any relation to the worship of that god. Some ancient tripods are preserved in the British Museum.

(Compare Dictionary of Greek and Roman Antiquities, under 'Tripods'.

TRIPOLI is a country in Northern Africa, which extends along the southern shores of the Mediterranean, from 11° to 23° E. long. In this direction alone the boundary-line of the country is tolerably well determined; on all other sides it is surrounded by deserts which form portions of the Sahara, or Great Desert, or are unfit for cultivation. Though Fezzan, which lies south of Tripoli, is governed by its own chief, he is really dependent on the Bash of Tripoli, as he pays regularly an annual tribute. This country is included, Tripoli extends on the road to Bornou southward to the vicinity of the northern tropic, or nearly 700 miles from the shores of the Mediterranean. Along this road alone we are acquainted with the distances to which the authority of the Basha of Tripoli extends inland; on all other points we have no information at all. We are therefore unable to form any idea of the extent of the country and its area.

About the middle of the present century the whole line of Tripoli is a wide and open gulf, which the antients called the greater Syrtis, and is now the Gulf of Sidra or of Sert. The Bedouin Arabs who inhabit the coast call it Ginn el Kebrit, or the Gulf of Sulphur. Cape Messuna is the name of it, and the town of Bengazi on the east; the distance between these places is, according to Beechey, 282 statute miles. The circumference of the gulf, according to the same authority, is 488 statute miles. It is the eastern point of the coast, its depth does not exceed 120 statute miles. This gulf was carefully avoided by the vessels of the antients, and it is still avoided by vessels sailing from Bengazi to Tripoli or the ports on their north. Sirt, (Strabo, i. 283, ed. Cassaub.) and Pomponius Meh (lib. i. 7), state that the dangers to navigation were occasioned by the frequent occurrence of banks and shallows formed by the flux and reflux of the sea, and still more by this flux and reflux themselves. In fact, a great part of the coast of this gulf is so shallow as to make the landing very difficult. But modern seamen are at a loss to find out what is meant by the flux and reflux of the sea, and the reflux of the sea, and the lengths which are so inconsiderable in the Mediterranean as not to affect navigation. Captain Beechey has given a very probable explanation; he states that the seas acts into the gulf, and that the vessels which are the effect of the east winds, passing over the Mediterranean, which is here widest, blow strongly against the coast, and that small vessels must have found it extremely difficult to avoid being drawn into its vortex. Thus the reflux is nothing else, according to Captain Beechey Vol. XXV.-2 K
than the produced, the great body of water, which by this draught is accumulated within the gulf during strong northern and eastern winds, and which is driven by them over the low land surrounding the gulf:

for an unbroken line of level ground is not raised, while the level of the sea extends on the west coast of the gulf for 100 miles in length, and occasionally as much as 15 in breadth. The reflux of the water, driven over a tract of such dimensions, may well be considered formidable. Bengazi is the north-east of that part treated. It is general to the east-north-east as far as Cape Ras Semm, but is low and sandy, with the exception of a few small hills. This coast has no harbour, except east of a rocky promontory called Ras Hafir; a small bay offers a convenient landing for boats, except with the wind on shore. A few miles east of Ptolemis, the mountains, which extend over the interior of Barbary, form a range close up to the coast, and is covered with vegetation.

Bengazi, which is situated at the entrance of the Gulf of Sidra, has a safe port, which however is fast filling up with sand. Bengazi, the north-east of that part treated. It is general to the east-north-east as far as Cape Ras Semm, but is low and sandy, with the exception of a few small hills. This coast has no harbour, except east of a rocky promontory called Ras Hafir; a small bay offers a convenient landing for boats, except with the wind on shore. A few miles east of Ptolemis, the mountains, which extend over the interior of Barbary, form a range close up to the coast, and is covered with vegetation.
in irregular hills, and is totally barren. But in approaching the mountainous spots oakwoods, and thorns and grass occur, which afford pasturage to the flocks of the Beduins, and near the base of the mountains the pasture-grounds are nearly contiguous to one another, and frequently intersected by dry-fields. In the eastern districts of the Desert, or those near the Tarhouna range, are also covered with high sand-hills, which reach to the base of the mountains, but they are traversed by two small perennial streams, called Wady Ramleh and Wady’in Seyd, which run in sandy valleys below the general level of the Desert. These valleys are covered with bushes, and between them corn-fields often occur. Barley and dhurra are cultivated.

The Ghurian Mountains, to the south of Tripoli, occupy a tract 12 or 15 miles in width. The northern declivity appears to be very irregular, several hills of bassalt being dispersed over their base. The mountains rise with a rather steep ascent, but on the top they spread out in plains of moderate extent, which are divided from one another by hills, many of which have a conical form. The plains are in a high state of cultivation. They are covered with corn and saffron fields, interspersed with olive-trees, but the elevated situation prevents the cultivation of the palms. The sides of the hills, which are too steep for the growth of corn, are planted with almonds, figs, apples, olives, and vines. A considerable portion of this tract however is used for pasture-grounds, and the hills and wadies, which lie mostly underground, in caves which have been dug for the purpose.

Farther to the east, and where the Tarhouna Mountains begin, the mountains decrease in height, and assume a different character. It is a table-land about 30 miles in width, which runs towards Cape Mesurata, and only on its edges assumes the aspect of high hills or mountains, especially towards the desert which lies north of it. The table-land is nearly level, whose soil is very stony, covered with gravel, and completely barren. But in the vicinity of the higher ground which encloses it on the north, it is laughed by irrigation; on the south and west on the borders of the hills, and to the east and south there are good crops of corn, and the level grounds separating them are covered with fine grass for sheep and camels.

The eastern portion of this table-land, in approaching the Gulf of Sidra, splits into several short ranges of hills, which fill up the space between Cape Sciarra and the town of Mesurata, and in many places come close up to the sea. Thus a hilly tract is formed, which extends about 60 miles from west to east, along the seashore, and from 5 to 6 miles inland, where it terminates on the plain of the table-land. This tract is the best-watered district in Tripoli, as several small streams which descend from the table-land run through its valleys, and reach the sea after a course of about 10 to 15 miles. There is always water in them. The western district consists of a succession of hill and dale. They possess a considerable degree of fertility, and produce wheat, barley, and dhurra. In the eastern districts the surface of the sea by a narrow tract of land 20 miles wide, which in two places is interrupted by ranges of low hills, so as to be divided into three plains of moderate extent, which are known as the plains of Lebda, Zelten, and Mesurata. The hills south of them are mostly pasture-grounds, between which some corn-fields are found; but the plains themselves, which slope gently towards the sea, are well cultivated. Thick groves of olives and date-trees rise above the numerous villages, and the interstices are either covered with the most luxuriant turf or rich with abundant crops of grain. The plains of Lebda and Mesurata especially are distinguished by their rich crops of corn, and large quantities of oil are sold to the wandering tribes living east of them or exported by sea. The cultivated grounds in the plain of Mesurata extend along the shores of the Gulf of Sidra as far as Bushaf. A ridge of low sand-hills separates the sea from the plains.

The country south of the table-land, extending to the Sudan Mountains, contains a much smaller portion of cultivated ground than that north of it. The greater part of this region is a complete mountainous country, in which we are able to collect from the works of the few travellers who have visited this tract, that its surface presents a succession of several wide depressions, running from west to east, and terminating on the coast in

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the low grounds which extend along the western shores of the Gulf of Sidra. From each of these wide valleys smaller valleys branch off, and penetrate a few miles into the higher grounds, which enclose them. These higher grounds are many miles wide, and rise rather steep above the valley to an elevation of 400 to 600 feet. A large portion of them is probably 1000 feet above the sea-level. Their surface is neither level nor yet hilly. It presents everywhere a useless waste, though it greatly varies in scenery. It is worth noting that it is called psudhr, or a level plain consisting of loose sand, without either trees, rocks, water, or vegetation. Other tracts, called seerar, are gravelly plains from which the sand has been swept by the wind. These are generally small in extent, in many instances rounded as pebbles on the sea-beach, in others sharp and pointed as if recently broken; and a third kind, which sometimes covers spaces of many miles in extent, is mostly composed of small stones which have a shining exterior. In the places where sand-hills are found. A third kind of desert is called warri: it presents a rough plain covered with large detached stones lying in confusion, and very difficult to pass over, as its surface is much broken and interspersed with numerous rocks and small hillocks. A few spots in these deserts are covered with bushes. The few wells which are found on these deserts are generally above 100 or even 200 feet deep, and yet the water and brackish springs are the habitations of region of this region is limited to the depressions above mentioned, where several villages are found close together, whilst all the other parts are uninhabited. But even in these districts, which are far from the villages a few fields and cultivated tracts are interspersed. The inhabitants of the villages cultivate them, but do not venture to form agricultural settlements on them for fear of the wandering tribes of the adjacent desert. These villagers have been observed to cross the desert on their camels, in some cases for weeks on end, but however water is found only for a few weeks in the year, as the rains south of the Ghurain Mountains and the table-land are far from being so abundant as north of them. The greatest depressions in the ground and supply only pasture for camels, sheep, and goats. The most fertile of them is that of Benioeleed, which is situated on the south of the table-land south of the Tarboosh Mountains. This village, which borders on the sea, of the Benioeleed is covered with light and columnar greenstone, and is of great extent.

**Country on the West and South of the Gulf of Sidra.**—The region just described does not reach the western shores of the Gulf of Sidra, being separated from it by a tract of very low country, or rather by a marsh. This marsh begins at Bushara, about 4 miles south-east of Messurata, and extends along the sea-shore as far as Givat, a distance exceeding 50 miles. The marsh, however, is made up of places, being separated from it by a narrow tract of more elevated ground, which consists of small but irregular heaps of sand, with occasionally a little vegetation on it. The course of the marsh is, in its part, both with Messeeta and Sooleib, which are 40 miles from one another. In these parts it is from nine and ten to fifteen miles wide. In approaching Sooleib it contracts to two or three miles, but widens again farther south to four and three. At the end of the rainy season in March, nearly the whole surface of this marsh is covered with water. At the end of the dry season by far the greater part of it is dry, but interspersed with numerous pools of water. Many of these pools are miles distant. The surface of the marsh consists of alternate layers of incrustations of salt and of alluvial deposit, and is entirely destitute of vegetation. In some parts small shells cover the surface, which renders it probable that the sea at times inundates the marsh. In the most level part of the marsh many places occur in which a solid crust, sometimes not more than two inches in width and a half in thickness, covers deep hollows, the lowest part of which is not subject to sinking water several feet deep. This circumstance renders the traversing of the marsh very dangerous. In this extensive tract of country the habitable ground is limited to the few cultivated tracts, which are found in the marshes on which date-groves are met with, and to three or four places where the narrow tract along the sea is somewhat wider, and consists of high ground covered with grass and bushes, which afford pasture to sheep and camels. This is the worst part of Tripolitania bordering on the sea. Delta Cellas speaking of it, says, 'The country contiguous to this part of the Gulf of Sidra is flat and very little raised above the level of the sea, and though the shores are lined with sand-hills, they are for the most part shifting and frequent dispersed by hurricanes. In the water about the African coast, and running southward, the sea, for a distance of about 50 miles, is much disturbed, with a trifling swell, while the surface of the water is comparatively calm.'

**Country east of the Gulf of Sidra.**—This part of Tripolitania is commonly called Barca [BARCA], and was known to the ancients under the name of Cyrenanaca. It comprehends the western part of the Mediterranean nearly in the form of a semicircle, and the countries lying south of it as far as about 29° N. latitude. It is supposed that the greater portion of it is mountainous, which is very probable, if the mountains which Zimmam had on his right in passing from Sawia to Algiers constitute the eastern side of the region. In this mountainous region would extend over three degrees and a half, or about 250 miles. Its extreme extent from west to east is nearly the same, and it reaches near 29°, and its eastern border approaches 28° E. long. About 15 miles, which is the eastern shore of the mountains, which extend the coast of Sawia. On the western side of the Gulf of Sidra, it is much narrowed to the sea, between 21° and 22° E. long.; on the west it is separated from the shores of the Gulf of Sidra in the form of a plain. This plain, which is called the Plain of Druggidal, from the town of that name, extends along the coast.
As to its productive powers the region may be divided into two sections, the dividing-line between which perhaps lies a short distance east of the plain of Ghirnena, or the antient Cyrene. The western districts are covered with hills, which are tolerably steep, and are separated one another by depressions, and occasionally a level tract. These depressions, as well as most of the hills, are overgrown with thickets of pine, cedar, laurel, laurestins, carob, eypress, myrtle, box, arbutus, and various other kinds of trees and shrubs. A portion of the valleys and plains is under cultivation, and produces plentiful crops of barley. The pastures of these tracts are superior to those of any other part of Tripoli, and the number of black cattle are more numerous. The larger number of those which are exported from Bengazi to Malta and other parts of the Mediterranean come from these districts. The vegetation is exceedingly luxuriant and beautiful.

The ruins of the town of Cyrene are on the edge of a range of hills about 800 feet in height, descending in terraces which are terminated by the level ground that forms the summit of the range beneath it. (Cyrene.)

East of the elevated plain of Ghirnena the nature of the mountain region changes. The country becomes stony and the soil arid. The vegetation is less vigorous, and diminishes gradually as we proceed eastward. The trees and shrubs are seen replaced by low thistles and other herbs. At first cover the slopes of the hills; but gradually these bushes and shrubs are interspersed with large tracts of stony ground almost entirely destitute of vegetation. At last large expanses of thistles and other herbs are seen with some juniper and myrtle. The ground in these parts is extremely broken, and the numerous hills rise with very steep declivities. This circumstance renders this part of Barca less fit for pasture, and as agriculture is limited to very few spots in this part of the country, the district is much less populous than those farther west; it is however traversed by the largest body of water found in Tripoli, the Wady Elthron, which flows from an immense fissure in the highest part of Tripoli. This stream brings a considerable volume of water nearly everywhere the mountains run up close to the sea, and the narrow beach along their base is almost blocked up by immense fragments of rocks, which have fallen down from the adjacent heights. There occurs however a plain, several miles in length, in which the town of Derna is built. This plain is narrow, being enclosed on the south by a range of very steep and barren mountains, which are from a mile to a mile and a half in height, and destitute of fertility, though only a small portion of it is cultivated and planted with trees. If we may draw a conclusion from its productions, the climate must be hotter than any other part of the district. At present, Derna is not yet cultivated with success. There are also extensive plantations of date-palms, vines, pomegranate and olive trees; oranges, lemons, figs, apricots, and other fruits are also abundant. A considerable portion of the country near the town is cultivated with wheat and barley, and irrigation is well understood. Beechey thinks that Derna has in most respects a decided advantage over every other town in Tripoli. A great quantity of honey is collected on the rocky mountains south of the plain.

The interior of the mountain range, as already observed, is not known. It is uncertain if it extends to the mountain-range which was seen by Hornemann in passing from Cairo to Fez, as it is supposed to extend farther. The extensive regions of Pacho, it is separated from it by a wide and sterile depression. The authority of the basha of Tripoli however extends much farther south, as the oasis of Augilia is within the country governed by him or his deputies. The mountain-range which lies to the north of this oasis runs in an unbroken line east and west. It rises from the level ground at its base abruptly, and consists of bare rocks and sand. For some miles to the east of Tripoli, according to Pacho, of three oases, Augilia, Iitlooo, and Leukhereth, of which the last mentioned are a short distance to the east and north-east of Augilia itself. All three, taken together, contain a population of from 8000 to 10,000 in-
dividends. They are only forests of palm-trees, surrounded by an immense plain of red sand. The wells are more than twenty feet deep, and the water brackish. Dhurra and barley and a little wheat are cultivated, but provisions, consisting of corn, butter, and cattle, are imported from Bengal. The dates and opium are the staple articles of trade in which feathers. Ostriches are numerous in the adjacent desert. Three smaller oases occur between Asgula and the southern extremity of the Gulf of Sidra, nearly equally distant from these places. The most remote and largest is that of Tafraout; they are wadis of palm-trees, surrounded by hills of shifting sand. As they are too small to afford sustenance to a population sufficiently numerous to resist the attacks of the nomadic tribes of the desert, these oases are uninhabited, but sometimes inhabited by diurnal living in the plain of Bengalari resort annually to them to gather the dates.

From the routes collected by Captain Lyon, it appears that a considerable oasis, called Fuggha, is situated south of the most southern part of the Gulf of Sidra. It seems to be situated in the desert mountains called Harush, which extend westward to the very boundary-line of Fezzan. [Fezzan, vol. x., p. 253.]

Productions.—Beside the different articles of agricultural produce, and a small stock of sheep, goats, and poultry, a few plants require mention. In the wadys of the desert grow some bushes bearing small black berries of a very sweet and agreeable taste. The leaves of a small bush in the desert are boiled and not eaten, but are used as a substitute for tea. In some places, a kind of sedge (Cyperus esculentus, L.) is found, whose roots are eaten; in others a kind of wild artichoke is met with. Prickly-pears and aloes are abundant in several places, and are only used to make charcoal. Where charcoal is not to be had, camel's dung is used as fuel.

Cattle are not numerous in Tripoli, except in Barca, where great numbers are found on the table-land, whence they are sent to Bengazi to be shipped for Malta and other places. The domestic animals are horses, camels, sheep, goats, dogs, and poultry. The horses are of a fine breed, but they do not acquire a handsome appearance for want of proper care. The camels are treated with more care. Camels are the only animals used as beasts of burden. The common dogs of the country are white, and resemble wolves in form; they are fierce, and defend the herds against the attacks of the hyenas and jackals. The most common wild animals of prey are wolves, foxes, hyenas, and jackals. There are antelopes, gazelles, the jirdus dipturus, hares, rabbits, hedgeshogs, and smaller animals, resembling the guinea-pig in form, called gundy.

Ostriches are only found in the deserts, especially south of the mountain region of Barca. The other wild birds are bustards, cranes, plovers, quails, ducks, storks, curlews, pigeons, and partridges. Ostriches are the only birds that the Gulf of Sidra flamingoes are frequent. Swarms of locusts frequently proceed from the deserts to the cultivated ground, and are not unwelcome to some of the inhabitants. The winter months are generally succeeded in frightening them away, and then they fall into the hands of the poor, who eat them roasted or salted them. Salted locusts appear to be a considerable article of inland trade. Bees abound in the hilly and mountainous tracts of the country, and honey is an important article of inland trade. Small quantities of honey are exported.

Metals do not appear to abound. Salt is found in many parts of the desert and on the shores of the Gulf of Sidra, but it is not collected as extensively as are the 50 miles west of the town of Tripoli, at a place called Zoara, rock-salt is found, and is worked. There is sulphur at a place called Kobrit, about two days' journey from Brega, to which place the produce is brought to be exported. An earth impregnated with sulphur is found at several places not far from the shores of the Gulf of Sidra, and is sent thence to Egypt and Tripoli, where it is used as a salting agent.

Population and Inhabitants.—Geographers have commonly estimated the population of Tripoli at one million of individuals; but this estimate is certainly below the truth, and was made when a great part of the country was unknown. It is more probable that the population is not less than two millions.

The population in the country consists of Arabs and Jews; in the towns, mostly of Moors and Jews; there is a small number of Turks, Mamelukes, Christians, and Arabs. Black slaves are numerous in the towns.

The Arabs of Tripoli, who compose the bulk of the people, are of the same stock as the Beduins of Arabia, as is proved by their language, which, though in some respects peculiar, is the same as that of the beduins, though in others it is intermixed with a great number of words derived from other languages. They are generally talking, straight, and well formed, and inclined, from their manners of living, to be hospitable and courteous. They are expressive and handsome, their form of face, and their noses aquiline: the noses of the females are usually straight and well formed; their eyes are black and large, and their lips full, and their teeth white. Occasionally white, their complexion becomes dark from exposure to the sun and from being not very particular in their ablations. They are active, capable of undergoing great fatigue and abstinence from food, lively in the manners, daring, and possessed of great cunning; though generous, they are great beggars, revengeful, and untouchable.

When young, the females are exceedingly pretty, but the old women are very ugly. The old women throw their hair over the forehead, or as to make it project to some distance; and they dye it of dull-red with the leaves of a plant called henna, which gives it the appearance of red wool. All the females have a practice of tattooing their children with the caps of their fingers.

There are two kinds of Arabs in Tripoli; one wanders the desert in the same way as the Beduins, and the other lives in cities and towns. Many of those who live in villages also travel about the country, but always return to what they consider their home. The wanderers have no permanent place of abode but remove their tents as pasture or circumstances may require. Their tents are made of woolen cloth coarsely woven in long pieces and sewn together. The tents spread to a great breadth, but are not high, the entrance being about six feet, and the top sloping gradually downwards. In the winter months, the roof is tightly closed. There are large tracts in the desert which are partially covered with grass and bushes, and afford pasture for sheep, goats, and camels, but it frequently happens that they are far from any well. Capt. Lyon observes that not only the Arabs and their camels, but all animals in the desert, have the power of remaining a great length of time without water. Sheep, provided they have a tolerable herbage, will pass even a month without drinking. Antelopes and wild cattle in some cases never taste water, none being found on the surface of the desert. The wandering Arabs cultivate some small tracts with barley or dhurra. These fields are usually at a great distance from the town, at which they are cultivated; they are respected by other wanderers, and are rarely stolen. When it is ripe, the proprietors come to gather it. They prepare the soil by turning up the earth with a large plough, and then work it. At the date season commences, many families come and plant their tents in the Meshees of Tripoli, in order to purchase dates for their future consumption. These they dry up on their stones, and, when knotted together, keep them in skins, so as to preserve them from insects or wet; these dates form their chief support, with the milk of their sheep and camels. The butter, called manette, which is obtained from the milk of the sheep (that of the camels does not yield butter), is a very good article of trade; and the salt until it becomes like oil, and is then poured into goatskins, is fit for use or the market. A large article of commerce is furnished by the fat of sheep. It is boiled until it bears some resemblance to the grease used by tallow-minders; it is then poured into skins, and is fit for use. It is used into almost every article of food by the Arabs, and extensively used in Tripoli and other towns. From its being boiled, it covers the women with a strong fragrance, carpets, shirts, and turbans. Their tents are made of wool and goats' hair, and also the sacks which are used the carrying of corn and merchandise on their camels. Mats and ornaments of palm-leaves or grass are produced in great variety. They are green and yellow and orange; in fact every colour except green, which they find much difficulty in producing, though at Tripoli dyers succeed very well with it. Many of the articles made
by the women are brought to Tripoli and other towns for sale.

The Arabs are divided into numerous tribes. Each tribe, or even set of tents, is governed by a sheikh, who, being an old man, or a young man appointed by government, is looked up to as superior, though his business is chiefly to collect the money which is paid to government. Nearly all the tribes have lately been brought to a complete submission, though thirty or forty years ago several of them were always in a state of rebellion. In relation to the Arabs, the government is not free. The Jews are numerous in the towns and in the villages of the Arabs. In the towns, though much oppressed, and paying large sums as tribute, they have succeeded in monopolising certain branches of the trade; and in the villages, where they are much better treated, they apply themselves to several mechanical arts and trades. In Tripoli and the larger towns they have several synagogues.

The Moors are most numerous in the towns and in the Meshes of Tripoli. They are either landed proprietors or merchants. As merchants they are mostly engaged in the carries which go to Fezann and Bornou. They resemble exactly the Moors of Morocco, but are less instructed than the Moghrebins, having no colleges, though there are several schools in which the children are taught reading and writing. They are less bigoted than the Arabs. The numbers of Turks and Mamelukes has increased since the occupation of Egypt. Many of the towns are inhabited by Moors and Turks, who are either officers of government or serve as soldiers. Christians are only found in the town of Tripoli, where they are better treated than in any other place in the Tripolitania. They are not permitted to build churches. The greater part of them are of the north of Italy, but there are natives of Italy. The black slaves, who are mostly kept by the Moors, are nearly all natives of Soudan.

(Hermann's Journal of Travels from Cairo to MOUNDRAH; Thulip's Narrative of a Ten Years' Residence at Tripoli in Africa; Della Cella's Narrative of an Expedition from Tripoli in Barbary to the Western Frontier of Egypt; Lyon's Narrative of Travels in Northern Africa, and in the Countries of the Barbary States; Narrative of Travels and Discoveries in Northern and Central Africa; Beechey's Proceedings of the Expedition to explore the Northern Coasts of Africa from Tripoli eastward; Pach's Relation d'un Voyage dans la Maghreb, Tunisie, &c.; Ewald's Reise von Tunis nach Tripolistan.)

Climate.—This part of Africa enjoys a fine climate no less propitious to the produce of the soil than to the health of its inhabitants. About the middle of October the rains begin, and are most regular in November and December. In January and February are cold months, yet the natives make use of no fire to warm themselves, but chase away the morning cold by the beams of the sun, which is never a day without shining. The climate of Tripoli consists of hot months, when it is very hot; and cool months, when it is very cold. Thus the air is either very cold or very hot. In April the fruit begins to form itself, and the air is serene and beautiful. In May the rain generally ceases. August is the hottest month, when the hardy Arab, although injured to the climate, is obliged to retire with his animals from labour for two or three hours in the middle of the day and seek the shade. Rain at this time is rare and dangerous, producing acute fever, and carrying off many of the lower orders. In the summer months0, the scirocco, or south-east wind, which in Sicily and Malta is extremely humid and energy, is here exceedingly dry, and although oppressive, forms a coolness in the shade, which is considered a healthy wind. The air on the other hand is humid when the easterly and northerly winds prevail. Dr. John Thelusson, an English physician, who has resided six and twenty years in Tripoli, from whom we have derived this account of its climate, has likewise favoured us with the following as the results of three years meteorological observations taken in the city.—Thermometer (Feuheit) max. 92°, min. 44°, mean temperature 65°; barometer 29 00 inches; average mean temperature of the year 236°, and of rain 67; the easterly winds were most prevalent from March to October, and the westerly from November to February; the rain is generally accompanied by a north-west wind. The country is free from plague, unless when brought from other places, as happened in 1755, when it was introduced from Tunis. It has never been known to pass from the side of Egypt by land. But when the pilgrims began to pass to and from Egypt by sea, several regulations were established under the direction of Dr. Dusineau and the plague was four different times confined to the lazaretto, and prevented from getting into the country. These precautions having been neglected on the change of government in 1835, the next year introduced by the pilgrims who arrived by sea from Mecca and Alexandria; and in 1836-37 it carried off thirty to forty thousand victims in the capital and the populous neighbourhood, and not less than one hundred thousand in the whole regency.

Government.—The Bashilic of Tripoli, like the other Barbary states, is a sordid despotism; and whether ruled by a Turkish or a Moslem, is held in the same low estimation of exacting a revenue, without any regard to the well-being of the people or the prosperity of the country. A considerable sum was formerly drawn from the plunder obtained by her corsairs, and a very lucrative branch of it was derived from the traffic in European slaves. But the humane interference and decisive measures of Great Britain in 1813-15 have contributed to abolish these sources of profit, and piracy is no longer heard of. To supply this deficiency, instead of endangering foreign commerce, the country was barrained with monopolies, the currency was tampered with, and the people were ground down with new taxes. The necessity which the inhabi-

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they engaged to keep and to hold in defence of Christen-
dom; but in 1535 it was wrested from them by Simon
Blasius, who attacked the city by the sea. Sultan Solymam, who appointed the famous corsair Dragut
(whose forces formed part of the expedition) its first
 governor; and about this time its present walls were built, and the tract of country not forming the regency,
first of a Turkish bashalic. Tripoli now became one of
those systematic piratical powers that for centuries at-
tacked the commerce of Christian nations, making slaves
of their prisoners. The first treaty between England and Tripoli, the agreement by which the English
people were admitted to trade with the bashalic of 1836
was concluded in 1824. The town was bombarded by a French fleet, when the
bashal sent an humble submission to Louis XIV.; and in
1716 England made another treaty of peace and commerce
with Tripoli. By this treaty, after the English had
shut the entrance of the bay, they were allowed a ship at sea to escape them if they thought
they could make a prize of her with impunity; and it was not
until 1810 that slavery and piracy were abolished. Previous to
the attack in that year on Algiers, a British naval force
appeared off Tripoli, and the basha bound himself to treat
all prisoners in future according to the usage of European
nations.

For the last 300 years Tripoli, like the other Barbary
states, has been considered a dependency of the Ottoman
Porte; but the allegiance of these states principally arose
from the Sultan being the chief of the Mohammedan
religion; and being at the same time an acknowledged sovereign, they held him in some degree within the pale of international law. Yet, as has been seen, they made separate and distinct treaties with other powers, and were so far independent. At first the treaties of Tripoli were sent from Constantinop-
ple, supported by a garrison of Turks, who kept the
Moors in complete subjection; and being liable to be
recalled, they generally purchased the continuance of their appointment by remitting a handsome tribute to the sult-
ann, which was not only large and exacting as much as possible for themselves. But in 1713, Hamet Caramanli, a Moorish
chief, and second in command, headed a well-organized
rebellion, and was proclaimed basha by the people. At
a gala day not far from the city he contrived to get all the Turks
officers to a superb entertainment, where about 300 of
them were strangled; and in twenty-four hours the Tur-
kish garrison was annihilated. Having in this manner freed himself and his family from the Turkish yoke, and
having succeeded in appeasing the Grand Sultan by large
presents, he contrived to render the government hereditary
in his family, which continued so until very lately, and his
reign is still called glorious. In a similar manner Me-
hemet Ali founded his extraordinary power in Egypt, by
the murder of the Mamluks in 1811. Notwithstanding
this total change in the government and dynasty, the su-
premacy of the Potemkin was still acknowledged by the payment of a nominal tribute, more or less, to the central
power, as the means of the Ottoman government to enforce it. But the power passed into the hands of the Caramanli family,
that is to say, of those of Hamet's descendants who had the
most influence, or the most cunning or courage, and the
best opportunities of putting to death those relatives who
stood in their way. At the accession to the bashalic of the third Moorsik prince, in 1755, seven of his uncles suf-
f ered, and one escaped to Tully's 'Letters,' written
during a ten years' residence at the court of Tripoli (1763
to 1773), contain a vivid account of this dynasty, as well as
of the manners and customs of the place, and of its topo-
graphy.

In 1832 Yussuf, the last basha of the Caramanli family,
who raised himself to power by the murder of his brother,
having lost the affection of the Tripolines, after a reign of
ty years, owing to the profligacy and expenditure of his
government, and its consequent tyranny and oppression,
was shut up within the walls of the town by his revolted
subjects, and was obliged to abdicate. Hence arose a civil
war between two of his descendants, which lasted three
years. The first conqueror of the bashal of 1836 was
Ali (his two elder brothers being dead), who was in
possession of the town of Tripoli; but being unable to
force him upon the Arab Sheiks in the country, who had
attacked him in his attempt, and consequently grandson of the old Bash Yussuf' in a direct line, a Turkish force appeared off the port, in 1835,
and carrying off Ali by stratagem, established again the
old policy of governing the country under a chief appointed
from Constantinople. A full and authentic detail of the
events is given by Smyth in his 'History of Barbary corsairs,'
April and December, 1835. Yussuf, who died in poverty,
was friendly to England, from the time that he became aware
that the French, in the time of the Revolution, wished to
aid him in driving the English out of their possessions in
Egypt; and he knew that his authority in that quarter depended upon the retention of Malta by
Great Britain. On this account our garrison there and our
fleet in the Mediterranean protected him in his wars with great readiness. The remains of this family (for Embambe, unable to survive the
ruin, shot himself), consisting of Mohammed Bey and his two sons, are now refugees in Malta (1841), living upon
the charity of the English and French; while in Arja, the
Turkish basha of Tripoli, Askar Ali, is powerless beyond
the walls of the capital. He has his bey, or lieutenant, at
Bengazi, whose power is equally censored to the
precincts of that town. Yet the possession of these two ports, the only ports in the regency, in a great measure
controls the whole country; but the interior is under no
settled rule, and the sultans of Fezzan and Bourna have
them off their allegiance, while the chiefs of Algiers and Ofodani are only friendly in so much as the situation
of their territories requires an outlet for their commerce:
Since the existence of the present anarchy the country
evertheless entirely without a master: the latest accounts repre-
sent the Tripolines as generally hostile to their Arab chiefs, who sometimes advance to the very gates of
the city. This state of things must last until by a favour-
able conjunction some of them be gained over, either to
the Egyptians or to the Tripolines, which requires more tact and address than the Turkish
bashas have yet acquired. As long as they remain unaided they can easily set them at defiance, while his necessary
obligations make it impossible for them either to
wage or to dispose of, which pays a duty, in passing through his capital, and which would otherwise
form a contraband traffic on some practicable part of the
coast.

Tripoli was the least powerful of the piratical states.
Father Pierre Dan, who was sent from Paris on a mission
to these countries for the redemption of slaves, says, that
formerly Tripoli had as many as twenty-five cruisers. In
1826, when he wrote his 'Histoire de Barbure et des
corsaires,' she had only seven or eight, the rest having
been lost or taken by the Knights of Malta; and we do
not find that she ever afterwards made any great figures.
In 1834 she had been the scene of a great war with France.
Tribal washing the plague in 1877, the Bash's naval force con-
sisted of a frigate and six smaller vessels, and about fourteen
gunboats. In 1830 he had five corvettes and brigs, of four
to twenty-two guns, five smaller vessels of fewer guns, and ten or twelve gunboats. In 1836 all these were
sold or otherwise disposed of by Yusuf Bashad before his
abdication, and the rest were sent to Constantinople and
the change in the government; so that Tripoli has at
present no marine of its own. She never had a station
beyond the three or four hundred Mamluk guards of the Bash; but the town is now garrisoned by about six
hundred Turkish troops.

Antiquities.—Most of the towns in the regency possess
interesting remains, which are as yet not imperfectly known, particularly in the Pentapolis, where immense
ruins of temples, theatres, and parts of Roman construction are particularly traceable at
Ghannou (Cyrene), Tauchen (Arsinoe), Molemyt (Phal-
mas), and Marsa Sosa (Apollonia). Lebida (Ly-
Magha) was examined by Smyth (1571), but the ruins are so deeply buried in the sand, that parts
of them could not be easily obtained. Indeed
it seems to this city had been so completely ravaged, that it was
impossible for them to be restored. The ruins of Tarentum and the remains of ancient tombs were
searched, everything ornamental being found punctuated
and defaced, and the mass of the columns, etc., only remaining entire, thirty-seven of which were
brought to England. From this place also Louis XIV. obtains
several teen immense columns of granite, which
his palace. A story of an ancient petrified city, this part of the world, with its people and animals,
standing in stone in their natural altitudes, as struck by a superhuman power, was circulated by a Tripolitan ambassador in London a century ago, which has ever since stimulated the research of every traveller. Rasen was the title and forts described by the hand of the Roman general who, in his memoirs, states that the ancient fortifications, which are now regarded as a fiction created by the fertile imagination of the Arabs, who may have thus described the remains of some ancient city with its buildings and streets, are partly from overhead, in the form in which they are laid, and partly from other causes. Their solidity of construction has preserved it from ruin. It was built in the second century; but although the inscription is perfect, the groups of figures which once ornamented it are too much worn away to be made out. A general view of the whole surface of the earth. To this circumstance, and owing to its arches being filled up and used as storehouses, it probably in no slight degree is indebted for its preservation. The Roman arches, which form the principal part of the Roman walls, are generally built on Tripoli. The first and second have been noticed in their proper alphabetical places. It remains for us therefore to give a short account of the last mentioned. Ghadamis is situated to the north of Tripoli, 148° in feet in diameter, with five degrees of seats; and in the same direction still exists the remains of one of the great Roman ways, on the borders of which are observable the ruins of ancient buildings in stone. Money, coins, and precious stones and gems, mostly intaglio, for which the people of Cyrene were once famed, have been found on the site of the ancient Berenice; and at the depth of a foot or two from the surface, as preserved, fragments of architecture are also commonly found. But a search for antiquities under a Turkish basha, in any part of the regency, would meet with insurmountable obstacles, from the suspicion that the Turks maintain six months the ancient dynasty of Moorish princes our counsel had succeeded in a great measure to conquer this prejudice, as was proved by the researches made at Libda.

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and clear. Water however for common purposes is easily found on the plain near the surface, but it is brackish.

There are a few schools, at which the reading of the Koran and Arabic, French, Italian, and Greek, are taught; and the neglected condition of the province, together with the European consuls, form the only educated class of the community. The inhabitants spend their time in the Turkish bazaar, smoking and drinking coffee, and gossiping over the events of the day. In Italian is generally spoken by the people of the town, in which language Europeans may make themselves understood in transacting their affairs. The basha, whether Moor or Turk, generally comes into the offices of state upon some of his own family, or upon foreigners or renegades upon whom he fancies he may depend more securely than upon the leading families of the country; for which reason he is seldom without powerful enemies. Jests are usually provided for by these, with great promptitude and little form, so that they are perhaps rarer here than in some European countries: but avarice, deceit, and low cunning are predominant vices of the common people. The women are tall, and of fine figure; and although they wear their religion, they do not possess the Mussulman virtue of sobriety, wine-shops, which yield a great revenue to the government, being public, and intoxication very common. As no registers are kept, it is difficult to say what may be the population, but it is estimated, since the plague of 1837, at about 20,000, of whom about 2000 are Jews. The Christians are incomparably more numerous in numbers: they are principally Maltese, who, on account of their island situation, have large possessions, and return less frequently according to the season or the demand for labour in Tripoli. The Maltese may amount to about 1000 or 1200; and when the country is not torn by civil war, they are doubled that number.

Outside of the town are the burying-places: and as great respect is paid to the dead, the tombs are decent and numerous. The basha has several country palaces, or kiosks, in the surrounding districts, where some of the European consuls and other persons of note also have country-houses and gardens. These plantations, though they have no neat walks, appear like so many groves of orange, citron, and lime trees, which, contrasted with the dark trunks of the pomegranate trees, with branches issuing from the top of it one hundred feet high, while the jessamine, gernium, and violet cover the ground, sending forth their rich odours, form altogether a scene of almost enchanting beauty. Surely no tracts of country can be met with near the capitals of Europe. Yet, notwithstanding the sandy appearance of the soil, it is very fertile when turned up and worked by the hand of man, the gardens and arable land being in fact an encroachment upon this little desert, which extends almost to the Guharian Mountains. In pleasant times the wandering Arabs make their appearance towards the autumn in the flat cultivable country near Tripoli, where they sow their corn, and return in the spring, pitch their tents, and remain until it is fit for reaping. The women in the meantime employ themselves in weaving, and sell their work to the townspeople. But the Arabs cannot enter the town without cave, and their chief is answerable to the basha for their good conduct. There are good weekly markets outside the town, and others at a distance of five and ten miles, well supplied with cattle of all sorts, poultry, game, vegetables, and fruit, the produce of the cultivated districts. The necessaries and even luxuries of life (with the exception of tea, sugar, coffee, and wine) are at hand, and cheap.

The harbour is formed by a long reef of rocks running out from the northern point of the town to the sea in a north-easterly direction, and by other reefs at some distance to the eastward of these, which together form a town. The whole is protected by the projection of land on which the town stands. In the deepest part however there is not more than five or six fathoms water. Ships of war are consequently obliged to anchor in the outer roads, where there is good holding ground. Tripoli is exposed to the north-east trade-wind, and the reigning weather is exposed to northerly winds. Two batteries, erected on commanding points of the rocks already mentioned, and some others situated on the beach, might annoy the vessels entering or departing, and are better mounted and in better condition than the defences of the town inland. The mainland, being very low and quite level, presents no conspicuous appearance from a distance. But the town is 3000 yards or more miles along the coast. On a nearer approach the town appears in a semicircle, and the white square buildings, intersected with cupolas and minarets, and with Indian fig and date trees growing among them, give the city at a distance a kind of pyramidal effect. A kind of town in the vicinity is protected with a line of earthworks, assisted by a few guns, and is protected by a fort with a good regular appearance.
as with Bengai and Derna. Of course the trade of Tripoli must greatly depend upon the communication with the interior; and it profits once or twice a year from 259,000 people coming the way to Meqera. Formerly these caravans, composed partly of penitents and partly of traders, started from Fez, and passing through Timesien, Algiers, and Tunis, increasing as they went, on arriving under the walls of the city to the number of 5000 persons, and half as many camels and horses, with their goods and merchandize, returning by the same route. But since the general pacification of Europe, and particularly since the suppression of the Stewards in the Levant, the crafty Mohammedans prefer the passage by sea to Alexandria, as less fatiguing and less dangerous. This has worked a change for the worse in the traffic of the place, the caravans which stop there in the present day seldom amount to more than few hundred people and animals; and this diminution may be ascribed as much to the false views of the late banya Yusuffat, in anticipating the duties and profits upon merchandize, and imposing upon commerce other shackles, which threw it into the hands of mercenary speculators, as to the more convenient route chosen by the true penitents. The caffites therefore, or small caravans from Fezzer and Ghadamis, are now the principal medium of inland trade. The people are partial to properly mercantile and pay the balance in gold-dust; and their credit is so good, that the merchants of Tripoli trust them, with few instances of their being deceived. Some very interesting information respecting the commerce of Tripoli has been given by Dr. De Hemis, Swedish consul in that regency, may be found in the Antologia, a periodical published at Florence in the years 1828-1830, Nos. 81, 88, and 111, which were but imperfectly noticed at the time in the London Magazine, the Revue Britannique, and the Bulletin des Sciences Geographiques.

Tripoli, from the regard generally entertained for the English nation by the ruling banya, Yusuffat Cammalini, in the beginning of the present century, had a good understanding kept up with him by our consul, no less than from the authority of the Moorish princes over the dependent states, and particularly their power in Fezzer, is the only place from which Northern Africa has been explored with any success by our travellers. Thus at the instigation and by the influence of Consul Warrington, Mr. Ritchie and Captain Lyon penetrated as far as Tegeryy, the southern extremity of Fezzer, 24° 4' N. lat., in 1818-19-20. The expedition of the brothers Beechevy, around the Gulf of Sidra, and in the Cyrenaica, in 1821-22; the survey of the coast eastward of the town of Tripoli, as far as Derna, in the same years, by Captain Smyth; the discoveries 1822-24, by Captain Denham, Captain Clapperton, and Dr. Oudney, extending across the Great Desert to the tenth degree of northern latitude, and from Kouka in Bournou to Saskato, the capital of the Soulaus emirates as well as the journey of Major Carington to Tripoli, in 1823-26, although he was cruelly murdered, and we are deprived of every account of it by the loss of his papers—were all made from this point. The influence of Great Britain in fact, and the power of the banya, was then so great, that our consul declared that the road from Tripoli to Bournou was as open to us, and as safe, as that between Edinburgh and London, and so it was found. But the political revolution of 1830, which we have noticed in other places, had put an end to the amicable connections and extension of commerce so justly hoped for by the late Lord Bathurst, under whose auspices, as secretary of state, the above enterprises were chiefly undertaken.

TRIPOLE, [Sicily.]—The Alumina, with a coarse, dull, earthy appearance, is a mineral, which is found in the hand and to the amiable productions and extension of commerce so justly hoped for by the late Lord Bathurst, under whose auspices, as secretary of state, the above enterprises were chiefly undertaken.

TRIPOLE, [Tripoli, Antiqua,] one of the chief towns in the Morea, is situated in a plain in Armenia, surrounded by mountains, in which it is built on the ruins of Messeni, and Pallantium formerly stood. The time at which Tripoli was built is uncertain. It is not mentioned in the Byzantine writers. The name points to its having been derived from a word signifying the sturdy old peasant tradition in Greece is, that these cities were Muhkbi, Tegae, and Mantinon. Muhkbi is said by the Greeks to have been a settlement from Amylae in Laconia, and it appears in the middle ages to have been one of the chief places in the Morea. It was taken by Mohammed II., in 1458, and it is not improbable that Tripoli was built soon after this event, when Muhkbi declined in importance. The bishop who resided at Tripoli is still called bishop of Muhkbi.

When Colonel Leake visited Tripoli in the beginning of the present century, the place contained 2500 houses, of which 1000 were Greek. The walls had only been built about sixteen years, and were of paltry construction. There are several remains of antique art in Tripoli, as the ruins of Tegae have been plundered for the purpose of building the mosques and other edifices.

The plain of Tripoli bears grass of a very fine quality, but it is nearly of a uniform level, in consequence of which many parts of it are frequently overflowed by the torrents from the surrounding mountains. Some parts indeed are half the year under water. The climate is cool in winter, and the snow often lies very thick upon the plain for many days.

Leake's Travels in the Morea, London, 1830.)

TRIPEL, ALEXANDER, a sculptor of considerable note, was born in Jena, in Thüringia, in 1717, and, at nine years of age, was sent to a relation in London, where he was put to the trade of a musical-instrument maker; but having a decided inclination for the fine arts, he afterwards accompanied one of his brothers to Calabria, and there studied sculpture under Professor Wiedewelt, director of the Academy of Arts in that city. Having so employed eight years in Denmark, lie went to Berlin; but being there disappointed in his expectations, returned to Jena, and gained several prize medals. He then visited Paris, where he remained about three years, and distinguished himself by a very fine allegorical group representing Switzerland. In 1777 he went to Rome, where he continued to reside till his death, in 1783, practising his art with great success, and with the reputation of being one of the ablest sculptors of his time, both on account of the noble simplicity displayed in his productions, and the power of the execution of his works. He was particularly successful in bas-reliefs and busts, among which last he executed one of Gishe for the prince of Waldeck, which is spoken of by the poet himself as being in an excellent style. The other of his productions is a monument of Zich. A considerable number of his productions are in Russia. Tripeh's portrait is prefixed to the 54th volume of the Neue Bibliothek der Schönen Wissenschaften.

(Weinreich, Kuenzer-Lexicon; Biographie Universelle; Neue Bibliothek; &c.)

TRIPUSRUS. [Woodpeckers.]

TRISECTION OF THE ANGLE. In the articles DECEPTION AND QUADRATURE, we have given a slight outline of the history of two of those remarkable problems the solutions of which at one time engaged the attention of the learned, and have not yet ceased to be the ambition of a certain class of mathematicians. The trisection of the angle is the third problem of this kind. Before however we proceed to a similar sketch of the attempts which have been made to cut an angle into three equal parts, we may add to the article QUADRATURE a notice of a recent extension of the principles to which the circumference of the circle has been carried. In that article it is seen that the Oxford manuscript carries it to 154 places; in the Philosophical Transactions, for 1811, Mr. Rutherford, of the Military Academy at Woolwich, has carried it to 1265 places. The figures after 59592 (up to which all the computers agree) are, according to Mr. Rutherford—

21372 35394 081238 46473 78129 208853 33830
21374 73906 00625 35192 91294 18582 80651

which confirms the Oxford manuscript up to its last figure.

2 L 2
exclusive. This problem is now, in its history, a useful test of the power of computation of one century as compared with that of a preceding one; if it ever be carried farther, it will probably be as a mode of showing the additional power derived from some new method.

The difficulty of cutting an angle into three equal parts is entirely of that geometrical nature which has been alluded to in the articles above cited. Euclid, who confines his theorem upon the sine of the third part of a given angle, and of 120° and 240° more than that same third part. The cause of the geometrical difficulty is seen in the cubic equation, which, as appears above, is essential to the problem; the cubic equation was exhibited by Euclid's geometry alone, unless cubic equation were algebraically reducible to one of a lower degree, which could be solved without the extraction of cube roots. 

Now a can be found from the angle by means of the series for the sine; and the solution of the cubic equation is then easy enough. [Ivossolution.] The three roots of the cubic equation are given by the sine of the third part of the given angle, and of 120° and 240° more than that same third part. The cause of the geometrical difficulty is seen in the cubic equation, which, as appears above, is essential to the problem; the cubic equation was exhibited by Euclid's geometry alone, unless cubic equation were algebraically reducible to one of a lower degree, which could be solved without the extraction of cube roots.

A, B, C, D be the sides of a rectangle, and E the diagonal passing through the angles made by B, C, and A, D: also let the angle E A be the one which is to be trisected. Through these points A, B, C, D, E draw a line F passing through D and A produced, in such a manner that the part between D and A produced is twice E in length. Then it is easily shown that the angle F A is the third part of E A. Through the line F produced, in a similar manner, of which the asymptotes are A and B. A chord of this hyperbola, set off from C towards A produced, and equal in length to twice E, will be a parallel to the line F required. Admit then the hyperbola among the curves of geometry, and the difficulty ceases. Again, if with two-thirds of any given line A as a major axis, an hyperbola be described whose asymptotes make an angle of 120°; and if with A as a base, and the branch of the hyperbola adjacent to the single third of A as a vertex, a triangle be described, the larger of the angles adjacent to A will always be double of the smaller. Consequently, one of the external angles will be triple of one of its internal and opposite angles. The peculiar virtue of the construction is, that the aumament of a circle containing the supplement of any given angle less than 180°, that circle will cut the branch of the hyperbola in a point which, being joined with the further extremity of A, will give an angle equal to the given angle.

Again, if from any point of a circle a straight line be drawn cutting the circle again, and then a diameter produced, in such manner that the portion externally intercepted between the diameter produced and the circle is equal to the radius, the angle formed by that line and the diameter produced is the third part of the angle made by the two radii, of which one passes through the first point of the circle mentioned, and the other is on the diameter which was produced. The construction can be effected by the Crescent of Nicomedes, which curve, if granted, gives the means of drawing a straight line of given length between any straight line and a curve, so that when produced it shall pass through a given point. 

Either of the curves known by the name of Quadratrix may be made to trisect an angle, as obviously may any curve having a straight line and a curve, so that a straight line may be easily trisected. The Spiral of Archimedes obviously gives another solution. But there is one particular curve known by the name of the trisectrix, which has not geometrical, but algebraic properties peculiarly possessed of this property. It is one of the tractrices, curves having the dextere and epitrapez equal, the motion in the latter being direct and equal to one-half of that in the epicycle. Or, add and subtract the radius of a circle from every one of the chords which passes through a point on the circumference of the circle, and the result is, which is the one in question. Let A be the point where the branches unite, and A B the axis of the loop describe a circle with A as a centre, and A B as a radius, take a point on the loop, and a line produced from the circle in Q and R. Then the arc B it is three times B Q.

Many other modes of trisection have been proposed, some of great geometrical beauty; but the preceding is the only one that a student will meet with in references in his reading. Many false trisections have also been proposed by persons who thought they could conquer the geometrical difficulty. There is not so much to expose in the case of trisections in modern geometry, for the circle which corresponds to it. There has never been so much of romance applied to this problem, no explanations of theological points have been made to arise out of it, no mode of converting the heathen asserted to be a necessary consequence, no number of the Beast taken into the calculation. We shall only notice one false trisection, because it will afford a useful remark. In May, 1830, an Austrian officer announced that he had obtained the geometrical solution in theme "Univ. Serv. Journal," and various commentaries appeared in that periodical, running through various months up to March, 1832. In January, 1832, an actual attempt at solution appeared, the work of a British officer. It was proposed to be a geometrical solution; and what is more, it was a geometrical solution, and it might have cost a practised mathematician a moment's doubt whether the problem was not that of the problem so much. The construction was made, which amounted to requiring that two sides of a certain triangle should be together equal to the third, the consequence of which was that the vertex of this triangle was brought down upon the base. Now to this construction, it was announced, the solution of the triangle, or equal to nothing; an angle which no geometrical solution would refuse to declare capable of Euclidean division into three equal parts, each of course equal to nothing. Algebra generally furnishes some proof of the abridgment of the conditions of a problem when they contradict one another; but this is not the case with geometry. A latent assumption which restricts the generality of a solution always produces its effect in the former science; whereas in the latter such an assumption might be made part of a demonstration, and produce its consequences, without pointing out that those consequences are not true of the general figure which was drawn. The accurate use of the ruler and compasses is sometimes more necessary; and it would have done so in the instance before us, but not always; solutions have been proposed before now which give so nearly the third part of an angle, that ordo- nary algebra is not quite sufficient to exhibit to every one who imagines he has discovered a geometrical trisection should take care to submit his construction to an algebraical verification; that is, if any person possessing algebra enough to do so should ever be in such a case.

TRISETUM, a genus of plants belonging to the natural order of grasses. It was separated from Avena by Persoon, who has been also followed by Pears, Lindley, and other botanists. The Inflorescence is terminal, the spikelets 2-flowered; glumes with a keel, membranous; lower pales with two bristles, and a tender flexuose bearded above the middle of its back; scale lanceolate.

'T faveolata, Golden Oat or Yellow Oat-grass, has the panicle much branched, spreading erect, spikelets 3-flowered, all the florets awned, it is common in Great Britain, especially in rich pastures. This grass does not thrive when cultivated alone but does in proportion to its nutritious matter more bitter extractive than other grasses; and on this account is sometimes a desirable grass. Sheep are very fond of it.

'T purpurea, Denny Oat-grass, has a panicule spreading equally on each side; spikelets 3-flowered, shorter than the florets; leaves flat and downy. This grass is a native of Britain. For cultivation it is only a second-rate grass its produce however is good, and it impoverishes the soil little; it is a very good subject for the propagation of the leaves, which is generally more evident the poorer the
soil on which it grows. It grows naturally on poor, dry, chalky soils. The other species of this genus are not cultivated.

TRISMEGISTUS, or the 'Thrice-Great,' was an epithet given to the Egyptian Hermes, who was said to have invented the art of writing, and to have first taught the sciences of astronomy, astrology, &c. There were several instances of the indirect mention of this person attributed to him, of which an account is given under HEBREWS.

TRISSINO, GIOVANNI GIORGIO, born at Vicenza, of a noble Venetian family, applied himself to classical literature, studied the Greek language, and became also an elegant Latin and Italian writer. At a mature age he proceeded to Rome, where Leo X. took him into his favour, and employed him in several diplomatic missions, as to his countryman Will, who sent him on a mission to Charles V., with whom also Trisson ingratiated himself. Trisson died at Rome in 1550. He wrote:—1. 'Sofonisba,' the first Italian regular tragedy, which however has little merit, and is now forgotten. It was much praised at the time as a novelty, and was performed at Rome with great splendour.

2. 'L'Italia liberata dal Goti,' an epic poem in blank verse relating the history of Italy by Belisarius in the reign of Justinian. The whole Island is to be considered such from its first appearance. 3. 'La Poetica,' a treatise on the poetical art. This is considered as Trisino's best and most elaborate work. 4. 'Ritratti delle belle lettere.'

Tristan Alfonso of Portugal, was a writer, and an orator, and became a statesman. In 1522, when he was 5, his father, having been stationed at Lisbon, where he was born, left him at the convent of St. Clement, to make his education. But he derived more from his mother, who had been a girl of noble birth in Portugal, than from the clergy. By the time he was 7, he had learned to write, and had devised several verses, which he sent to his mother. He was a good writer, and a good orator, and was much esteemed by his contemporaries. But he died of a disease of the heart, when he was only 20.

TRISTAN DA CUNHA, a group of islands in the Southern Atlantic, south-east of St. Helena, and south-east of the Cape of Good Hope. The largest and central island is intersected by the parallel 37° 0' N., and by the meridian 12° 2' W. The islands are three in number: the largest, to which the name of Tristan da Cunha properly belongs, is between 19 and 20 miles in circumference; the other two, which is named Nightingale, is a peak, and named inaccessible Island to the south-west. The islands, from the steep and rugged nature of their shores, can only be approached in a calm. The north side, with a very striking scene, stretches along the base of a mountain, the sides of which are clothed with thick brushwood, and which towers abruptly to the height of 8326 feet. In 1516 a company of artillery was stationed on this island, but it was withdrawn after the death of Napoleon, and a corporal of the name of Glass was left with one or two companions to take charge of the fort and the landing-places.

In 1529 the little colony amounted to twenty-seven persons—seven men, twenty-four children. They had 70 head of cattle, 100 sheep (of which the wool found a market at the Cape); a great number of swine and goats, which roamed about wild; and a considerable quantity of poultry. Water is good and abundant in the island, and vessels which touch there can easily procure supplies of fresh provisions. Off the coast is great abundance of seals, and whales, both black and white. These islands were discovered in 1506, by the fleet under Tristan da Cunha, whose name has been given to them.

TRITICUM, the genus of plants yielding the various kinds of wheat. It is derived from the Latin triticum, which is from tritum, ground or rubbed, because the fruit in its preparation as a food for man undergoes the process of grinding or trituration. The various kinds of wheat have been known from a very early period, and mention is made in the Bible of the wheat of Egypt, which is thought to be the great wheat of Egypt. Wheat is one of the most important articles of food in the history of man. Both the Egyptians and Jews made use of wheat as an article of diet, and this food is early mentioned in the Bible. It was also used by the Greeks and Romans, and Theophrastus and Pliny make frequent mention of it. On account of the early cultivation of many of the kinds of wheat as articles of diet, it is impossible to tell where the most common species are really indigenous. All the species of Triticum are however found most abundantly in temperate climates, and there take the place of the foods used in the hotter parts of the world. Wheat is in northern climates what rice and maize are in warmer ones. The part of the plant of Triticum which yields so large a proportion of the food of man is the fruit, or grain. This fruit, although small in itself, generally forms a large proportion of the plant. When the fruit is ground, the testa, or seed-coat, is separated from what is called the flour. This flour contains a large all-important and embryo of the seed. The proximate vegetable principles which this flour contains are starch and gluten. The starch is a highly carbonised vegetable principle, whilst the gluten is characterised by possessing those properties that contain carbohydrates are fattening, whilst those that contain nitrogen are strengthening. It is thus that wheat flour has become to be the staple article of diet of the finest races of men in the world. The great proportion of bread, but the gluten or azotised principle is not so large a quantity as in wheat,
as the following analysis of 100 parts of the organic matter of wheat, rice, and barley will show:

<table>
<thead>
<tr>
<th>Grain</th>
<th>Organic Matter (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>70-00</td>
</tr>
<tr>
<td>Rice</td>
<td>85-07</td>
</tr>
<tr>
<td>Barley</td>
<td>78-00</td>
</tr>
</tbody>
</table>

The starch is often separated from the gluten and used for various purposes in domestic economy. [Starch.] The gluten is also separated, and, in the form of macaroni and vermicelli, constitutes a favourite diet with some nations, especially where little animal food is consumed, for which it is substituted. It forms the principal food of its consumers. The following analysis of gluten by Bouin's, and, ox, or muscle, by Playfair, will make this evident:

<table>
<thead>
<tr>
<th>Component</th>
<th>Value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon</td>
<td>54-20</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>7-60</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>1-40</td>
</tr>
<tr>
<td>Oxygen</td>
<td>24-40</td>
</tr>
</tbody>
</table>

These analyses do not differ more than the analyses of the same substances frequently differ from each other.

The straw of wheat, and the chaff, or the culm, and the flowers, also contain 79 per cent. of organic matter. This consists principally of unassimilated vegetable matter, and may therefore be used as an article of diet for cattle. The culms of wheat are also used for the purpose of making plait from which straw hats and bonnets are made, a manufacture of considerable importance in some parts of this country.

The genus Triticum is known by possessing solitary spikelets, with the glumes 2-valved and many-flowered, the valves carinate, acute, or mucronate; the paleae 2-valved andacute, the lemma and palea, and the first and one acuminate, the internal one bifid at the extremity. The genus consists of about 40 species; of these 16 are European, and only 6 are natives of Britain. The species are divided into two groups, the cerealia, yielding edible fruits, and the agraria, which are merely grains. The latter group is by some writers, as Beauvois and Lindley, made into a distinct genus. It includes all the species that are natives of Great Britain.

The Calathea are known by their spikelets being more or less ventricose and turgid, and the valves are ovate or oblong. These are again divided into the Frunenla, or true wheats, in which the seeds fall out from the chaff, and the Spelta, or speltas, in which the seeds remain attached to the chaff. The most important species belonging to the former division are the following:

T. vulgare, Common Wheat, has a four-cornered imbricated spike with four flowered spikelets, the valves ventricose, ovate, truncate, mucronate, compressed under the apex, the nerve somewhat prominent. This species includes the T. aestivum and T. hybernum of many botanists. They appear however to be only varieties of this species and the period of their growth being the same, the native country of this species is not well ascertained: it has been found wild in some districts of Persia, also of Siberia, apparently removed from the influence of cultivation. The great extent to which the cultivation of this species has been carried in Europe has produced many varieties. Metzger, in his 'Getreide-Arten,' describes eighteen varieties which are cultivated in Germany; and many more might be added to this list. The variety called T. aestivum cyathicum is the type of all the wheats which are called summer and spring wheats. These wheats are not much cultivated in Great Britain; they are however in some parts of Germany. Metzger recommends the white-board summer wheat to be grown in large farms, as it yields the best straw for plaiting, which is used extensively in Italy for this purpose. The T. hybernum is the Lammus or winter wheat, and embraces by far the greater number of varieties which are cultivated as the food of man. The wheats known in Great Britain are the Continent as Fox, Kentshall, Talavera, Bohemian or velvet, red, white, and red-eared barley are varieties of T. hybernum.

T. durum, true beard Wheat, is known principally by its prominent carinae. About ten varieties of this species are known to agriculturists, half of which are summer and half winter wheats. Of these the clock, great or Revel wheat, and the Russian or blue English wheat, are the best. T. dicoccum, Spelt Wheat, has a parallel compressed spike loosely imbriicated; a fragilus rachi, spikelets 4-flowered, the valves obliquely truncate, dentato-mucronate, strongly prominent above, with a triangular section. The following are the species which are cultivated extensively in Germany, and there is no stronger prejudice in its favour in the markets of the south of Germany, than of Great Britain. The Stipa is cultivated in the south of Germany, that other kind of corn can with difficulty be rid of. Their great advantage appears to be, that they can accommodate themselves to almost any kind of soil yielding good crops in the extremes of heaviness and lightness, moisture and dryness. The wheat which is not easily laid, and is not attacked by birds, are less liable to smut. T. dicoccosum, Two-grown or Rice-Wheat, has the spike opposite compressed, rachis velvet, the spikelets 3-flowered, the valves obliquely truncate, dentato-mucronate, the carina compressed, strongly prominent above, with a truncate section of the apex infixed. This is the T. amyleum of some authors, and is cultivated with the other species in Germany.

T. monococcum, One-grown Wheat, has 3-flowered spikelets; the valves at the apex 2-toothed, with straight acute teeth at the apex of the carina. This species is of the most frequent cultivated in Switzerland, and is used extensively for making gruel. The spikelets are placed close together, and the spike has a remarkably neat appearance, as it is in ivory.

The Agropyron do not possess ventricose-turgid spike, and their leaves are lanceolate or linear-oblong. This division includes the wheat-grasses, some of which are known as troublesome weeds. The most remarkable instance of this is the T. repens, Creeping Wheat-Grass, Creeping-grass, or Spear-grass, which has a distichous spike with 5-flowered spikelets, the valves lanceolate, acuminate, with five nerves, the leaves flat, and underground creeping stem. It is a native of Great Britain and throughout Europe, but is too well known in cornfields. The difficulty of getting rid of its creeping underground stem, the small portion of which, if left in the ground, sends up a fresh plant is the cause of this plant being so great a pest to the farmer. These stems contain a good deal of nutritive matter, and are in times of scarcity some countries have been made into bread by the poor people. The T. maritinum of some writers, which is native of sea-coasts, seems to be only a variety of this plant.

T. juncosa, Sea Rushy Wheat-grass, has a spike turgid, spikelets 5-6-flowered, remote, the valves lanceolate, 9-11-nerved, leaves velvety above, the rachis glabrous, underground stem creeping. It is a frequent plant on our sandy sea-shores, and with the Carex arenaria, Elymus arenarius, and Festuca rubra, is one of the plants that binds the sand. Under the influence of the stems the roots of these plants whole districts are rendered cultivable, which otherwise would be a mass of barren moving sand. T. cauticum, bearded Wheat-grass, has a distichous spike; 5-flowered spikelets, lanceolate, acuminate, 3-nerved valves; awned foxtail, scariosus, leaves thin, fibrous. It is a common plant in England. According to Mr. Sinclair its produce of nutritive matter is good yields a very early crop when cultivated, and is recommended to be grown on soils of an inferior quality, used of rye-grass.

T. aristatum, Crested Wheat-grass, has elliptical spikelets, keeled, awned valves scarcely nerved, the spike much crowded, with about four awned flowers in each, is a native of Britain, and yields much nutritive matter. On light sandy soils it is recommended by Mr. Sinclair as good early grass for heat soils.

For the best and most practical information on the genus Triticum, consult Metzger, Die Getreidearten...
These rules however were not always strictly observed, and various deviations from them are recorded. Even the sanction of the senate ceased to be thought necessary as early as the fifth century before Christ, and the people of the Comitia Tributa assumed the right to grant triumphs (Liv., iii. 63; Dionys., xi. 50); and there are instances of generals triumphing in defiance of the senate and the people. In later times a general to whom a triumph was refused, was allowed to celebrate it in another city, like the Mount. (Liv., xiii. 21.) If however the senate granted it, a sum of money was voted as a contribution towards defraying the expenses of the triumph, and the general was then expected to pay the day of his triumph invested with the imperium in the city. During the triumphal procession, the general, standing in his chariot, wore a purple toga embroidered with gold; his brow was adorned with a wreath of bay (laurus), and in his hand he carried a spear and an eagle. On reaching the temple of Jupiter he deposited his wreath in the lap of the god. Banquets and other entertainments concluded the solemnity, which was generally brought to a close in one day, though in later times we meet with instances in which it lasted for three days. (Liv., xxxix. 62.)

During the time of the empire, the emperor himself, being the chief general of all the armies, was the only person that could offer himself for a triumph; indeed it was never granted to any one else but a member of the imperial family. Other generals received other compensations. All the triumphs that had been celebrated at Rome were in the past triumphal, and their total number, from the earliest times down to the last, that of Belisarius over the Vandals, has been calculated to amount to 550.

A lesser kind of triumph was called ovatio, from ovis, a sheep, which the general offered to Jupiter, instead of a bull. It was granted after victories which were not of sufficient importance to deserve the solemn triumph. The principal difference between the two was that in an ovatio the general rode the chariot, and in triumphs he rode horseback; he wore only the toga praetexta, and his brow was adorned with a wreath of myrtle. He carried no sceptre, and was frequently not accompanied by his army.


TRIUMPHAL COLUMN. [Trajan’s Column.]

TRIUMVIRI, or TRESVIRI, that is, ‘three men.’ A great number of offices at Rome, both ordinary and extraordinary (commissions) were held by three persons in conjunction, who thus formed a board which was intrusted with the management of the state.

The office itself was called triumvirate (triumviratus). Extraordinary triumviri were appointed on various occasions and emergencies; for example, when a new colony was to be founded, the whole management of the business, and the direction of the works was intrusted to a triumvir, whose full title was ‘triumvir coloniae dedecessit,’ or ‘agro dividendum.’

The triumvirates which have acquired the greatest celebrity in the history of Rome is that which was established towards the end of the republic by Octavianus, Antonius, and Lepidus. After the republic had been for years distracted by a series of civil wars, the three men mentioned above met near Misenum in n.c. 43, and ordained in the title of ‘triumviri rei publicae constitutae,’ the supreme power for five years, under the pretense of settling the affairs of the state. Their power and its duration was sanctioned by a senator consultation. They distributed the administration of the state among themselves, that Antonius received the greater part of Gaul; Lepidus, Spain and a small portion of Gaul; and Octavianus, Africa, together with the islands of Sicily and Sardinia. Lepidus was to govern Rome and had invested his power in the hands of his colleagues. His two colleagues endeavoured to get rid of the republican party by proscriptions, in which 2000 equites and 300 senators are said to have been put to death. Whole towns were robbed of their liberty, and the provinces, among the veterans soldiers of the triumvirs, and hosts of people flocked around the standards of Brutus and other republican leaders, to escape an ignominious death. Consuls were elected during this period as much as four times in one year, but they were either the creatures and friends of the triumvirs,
or one of the triumvirs himself held the consulsiphip. In the year 13 the time of their office expired, and it was renewed for five years more without any opposition. Abruptly, and as the term of the secret entity among the triumvirs burst out into open hostility; a new civil war began, which ended in the destruction of republican freedom. The triumvirate of Octavius, Antony, and Lepidus, or the Triumvir, was called the second triumvirate, if we may call it so, which was merely a private coalition, or, as it is written in Livy's Epitome (103); a consiparacy, entered into by Caesar, Pompeius, and Crassus, in the year 60: the title triumvir was perhaps never borne by three men, it was certainly not recognised by either the senate or the people.

The triumvir who were regular magistrates belonged to the minor magistrates. Among them we shall mention, 1. The triumvirs of the First Triumvirate, or the Triumvirs of the Year 1473, and were in many respects the successors of the quaestores pannicidi. They inquired into capital offences, apprehended criminals and committed them to prison, wherever they discovered them, and also carried into effect the sentence passed upon them. 2. The triumvirs Montesale, or the inspectors of the mint. 3. The triumvir Nocturni, whose duty it was to superintend the watchmen in the city at night, and to prevent or put out fires in them.

For further particulars about these and some other minor officers of this name, see Dictionary of Greek and Roman Ant., under 'Triumvir.'

TRIVET, NICOLAS, whose surname is otherwise found Tryvet, Trivet, Treveath, Treveath (a misprint or mistranscription), Triveth, Thriveth, and is latinized Trivetus, Trivelous, and, by Leand, Tripus (the Latinized form of the genitive, was born in Norfolk about the year 1265, and was son of Sir Thomas Trivet, who is recorded to have twice ridden as one of the Justices in Eyre in the latter part of the reign of Henry III. Trivet was at the bar of the common law in his Annals, under the year 1272, by the name of Thomas Treveath. He himself was sent, when a boy, to be brought up in the Dominican convent at London, and in due time he became a monk of that order. Having completed his education at the universities of Oxford and Paris (his residence for some time at which latter place of study he notices in the beginning of his Annals), he was, on his return to England with the highest reputation in all the branches of learning then cultivated, elected head or prior of the religious house in which he had spent his earliest years. This office he appears to have held till his death in 1328.

Leland, Bale, and Pits give long lists of the writings of Trivet, especially Pits, whose catalogue extends to between thirty and forty articles. Among them are annotations or commentaries on various parts of the Scriptures, on certain of the works of St. Augustine, on the 'Problems' of Aristotle, the 'Physics' and 'Metaphysics' of Ovid, the 'De Universo' of Boethius, Livy, and Juvenal; some astronomical and other scientific treatises, and a number of tracts on religious and moral subjects, all in Latin. Many of these manuscripts still exist in the libraries at Oxford and Cambridge, and elsewhere. A commentary on the treatise of St. Augustine entitled 'De Civitate Dei,' by Trivet and Thomas Valois, or Walleis, was printed by Schoffer, in the second volume of his edition of St. Augustin's works, fol. Mainz, 1473, and again at Toulouse in 1498, at Venice in 1499, and at Friburg in 1494. But Trivet is now only remembered for his Chronicle or History, principally of English affairs, though it embraces a sketch of those of the other kingdoms of Europe, from A.D. 1196 to 1297, or from the beginning of the reign of Stephen to the end of that of Edward I. This work was first printed by Lucas Acherius ('Fater Luc de Achery'), in the eighth volume of his 'Scribulatorum Veterum aliquot Scripturarum,' fol. Paris, 1617, and it is also contained in the second edition of that collection, in 3 vols. fol., Paris, 1723. But the edition commonly used is that published by Antony Hall, under the title 'Chronica Anglicana,' or 'Domini Thomae Sex. Rev. et Erm. Tri'vii de Angliae,' at Oxford in 1719, in 2 vols. 8vo., the second of which however (not published till 1721) is occupied with the Chronicles of Adam Murimuthus and his Continuator. This edition is from a manuscript in the library of the Dean of Oxford; but otherwise it has no great reputation, any more than Hall's other publications. Trivet however deserves to be well edited; he is a chivalrous, painstaking, and exact recorder of events, and he is the original authority for many particulars relating to his subjects. He is not, however, without acknowledgment by subsequent compilers.

Annals have different titles in the various manuscripts, and there is also in the library of Magdalene College, Oxford, a manuscript, for which no name is given, or for which the title is given as 'The French,' entitled 'Les Cronycles de FRere Nicholas Treporte a Dame Marie la fille mucn Seygourau le fil Roy Edwige la fil Henry.' Of this the first part is an abridgment of the work of the Old and New Testaments, and the second part, entitled 'Les Gestes des Apostoles (that is, the popes), Emperors, et Roys,' appears to be, in the latter portion of it, nearly a translation of his Latin Annals.

TRIVET, J. (Zoology.) ['Avery', vol. viii., p. 256.] TRIVULZIO, Attilio, Sforza, or Trivulzio, who bore the name of Attilio Sforza, one of the members of the house of Sforza distinguished in history, and the last of the family in the female line. The Sforzas of Milan continued to hold the dukedom of Milan till 1499, when the last of the Sforzas of the male line, Ludovico Sforza, died. It was the wish of the people of Milan that his son Galeazzo Maria should succeed him to the dukedom, but they were opposed to his cousins, who were also members of the house of Sforza, and who had been invested with the dukedom of Milan by the Emperor. Galeazzo Maria was therefore compelled to give up the dukedom to his cousins, and he was succeeded by one of the daughters of the last of the line of Sforzas of Milan. The reason for this was the wish of the people of Milan that the dukedom of Milan should be held by a member of the family of Sforza, and not by a member of the family of Sforza of the line of the Earls of Aragon. This was the reason why the dukedom of Milan was given to the daughter of the last of the line of Sforzas of Milan, and not to the daughter of the last of the line of Sforzas of Milan, who was married to the Duke of Aragon, and who was therefore held to be a member of the family of Sforza of the line of the Earls of Aragon. This was the reason why the dukedom of Milan was given to the daughter of the last of the line of Sforzas of Milan, and not to the daughter of the last of the line of Sforzas of Milan, who was married to the Duke of Aragon, and who was therefore held to be a member of the family of Sforza of the line of the Earls of Aragon. This was the reason why the dukedom of Milan was given to the daughter of the last of the line of Sforzas of Milan, and not to the daughter of the last of the line of Sforzas of Milan, who was married to the Duke of Aragon, and who was therefore held to be a member of the family of Sforza of the line of the Earls of Aragon.
1509, was having broken out again in Italy, Trivulzio was employed in the French armies, and commanded the advanced-guard at the battle of Agnadello, in which the Venetians were defeated.

In 1511 the French Marshal Chaumont having died, Trivulzio received the chief command of the French, and he drove Pope Julius II. from Bologna. Soon after Gaston de Foix, duke of Néons, came to take the command of the French in Italy, and Trivulzio served under him in the campaign of 1512, but the death of the Venetians, and the Spaniards. After the battle of Ravenna and the death of Gaston de Foix, Trivulzio was obliged to evacuate Milan, which was taken by Maximilian Sforza; and in the following year the loss of the battle of Trivulzio and the French and Trivulzio

out with them out of Italy. In 1515 Francis I., who had succeeded Louis XII., put Marshal Trivulzio at the head of a French army for the conquest of Italy. Trivulzio made a brilliant first move, crossed the Alps by a new pass, entered the marquisate of Saluzzo, defeated and took prisoners Prospero Colonna, won the battle of Marignano, called "the battle of the giants," against the Swiss, and in a short time conquered the whole dukedom of Milan.

The latest that has been written by the great historian, Tacitus, is, that in the year 988 the marquisate of Saluzzo, which had been taken by the French, was given back to Trivulzio, and that he succeeded in the following year, was succeeded by Marshal Lautrec, whilst the veteran Trivulzio was living in splendid repose in his own patrimonial house at Milan, content with what he had obtained, and as happy: he oppressed the people of Milan; and Trivulzio having shown some sympathy for his townsman, Lautrec accused him of secret practices against King Francis. Trivulzio, being informed of this, set out for France in the depth of winter. Although he was then nearly seventy-eight years old, and repaired to the court of Francis I., who refused him an audience. He then placed himself in the king's service, and as the king drew near he begged him to listen to a man who had fought eighteen battles in his service and in the service of his predecessors. Francis stared at him, and passed on without saying a word. This was too much for the old man; he fell ill, and died at Chartres, in December, 1516. Lautrec and those of his two wives were buried in the church of St. Nazario at Milan, with this epitaph:--'J. J. Trivulzio, Antonii filius, qui nuncquam queruit qui gesciscat. 'Face,' his name is not in favour among the Italians for having served foreigners against his own countrymen, of which however he is no singular instance in the history of Italy. (Litta, Famiglia celebre Italiana; Rosmini, Vita di Gian Giacomo Trivulzio detto il Magna.)

A branch of the Trivulzio family, enjoying considerable property and the title of marquis, has continued to exist at Milan to the present day. The late lady, Gian Jacopo Trivulzio, who died at Milan in 1827, was a great patron of learning. From the MSS. of his rich library at Milan he used several important works, such as the 'Johannides, seu De Bellis Libyca,' a poem of Cresconius Corippus; the 'Lettere ed altre Prese del Tasso,' the 'Lettere inediti di A. Caro,' the 'Convito' of Dante, and the "Life of Gian Giacomo Trivulzio," already mentioned, the "baton," or French marshal's staff, of old Trivulzio is still preserved among the heir-loom of the family. (Tipaldi, Biografia degli Italiani Illustri; Valery, Fresques en Italie.)

TROAD. [Trov.]

TROAChIC VERSE, a kind of verse used by the Greek and Latin poets, especially by the tragedians and comedians. The foot from which it takes its name and of which it principally consists is the trochee (C), which is combined, like the iambus and anapaest, into metres of two feet each. The most common form of the Trochic verse is that which is composed of a perfect dimeter followed by another dimeter wanting the last half-foot. This form of verse is the "Troche Tetrameter Catalectic of the Greeks, which was also called by the Romans quadratus, from its containing four metres, and septenarius, from its containing seven complete feet. The following is an example in English:

Alexander hated thinking,
Modestly he did the opposite, wrote,
He published the wits by drinking,
And wrote the wits in the wits' opinion.

In the Greek tragedians the following are admitted as variations on the pure Trochic verse:

1. The syllable at the end of the line may be short, P. C., No. 1385.
Further particulars respecting the tetramerart cataractic, and an account of other trochaeidæ, will be found in Tate's _Introduction to the principal Greek Tragic and Comic Metres_, and Hermann's _Elementa Doctrine Metrice_.

TROCHEATELA. Mr. Swainson's name for a subgenus of _Helicina_, which genus is placed by him next to _Cyclosta_ in the subgenus _Chitonelle_, which he makes the foundation of the family _Helicina._

Subgeneric Character.—Trochiform; spire elevated, acute; inner lip very thin, outer lip spreading. (Sw.)

Examples.—_Trocchata pulchella._ _Zool. Journ._, 1, pl. 6.

TROCHELLA. Mr. Swainson's name for a subgenus of _Calyptraea_. Lam., placed by him under the family _Helicoide._

Subgeneric Character.—Shell conical, patelliform; spire central, of two or more whorls; umbilicus closed.

Examples.—_Trocchella auriculata._ _Sow._ (Man., f. 236) and _Trocchella pleuris_ (Ibid., f. 237, 238). [Calyptraide._]

Professor Owen has contributed a most interesting addition to our knowledge of this group, in his paper read before the Zoological Society of London, on the 8th November, 1842, on the anatomy of _Lithedaphus longirostris_, the synonymy of which he gives as _Calyptraea Rotundata_ var. valve, _Calyptraea equispira_, auct. _Mitrudaria equispira_, Schumacher.

The mollusk on which the Professor has founded the genus _Lithedaphus_ was placed in his hands by Mr. Hugh Cuming on his return from the Philippine Islands in 1840, and the species was so closely connected with this species, which is inclosed, like the aceanous mollusks generally, in a bivalve shell, are related by that gentleman in the valuable _Conchologia Systematica_ of Mr. Reeve.*

Professor Owen remarks that the grounds on which these bivalve _Calyptraide_ are to be regarded as a distinct genus will be manifest in the description of the soft parts; for it may be doubted whether the mere dermal character, as he supposes, the secretion of the basal plate by the integument of the foot must be regarded, would have justified such a separation.

The normal valve, secured by the ordinary mantle, might, in Professor Owen's opinion, pass for the _Calyptraea_ of authors, and he adds that it is unquestionably very closely allied to that species, if it be not identical with it. The additional plate might be argued to be an accidental production, and it might be urged that its secretion was stimulated by the nature of the base of attachment selected by the individual _Calyptraeid_, or to which it had been drifted, as, for instance, the masses of dead coral under which Mr. Cuming discovered the specimen submitted to Professor Owen. He supposes that the species of _Calyptraea_ already discovered by M. Dufour at Madé, one of the Seychelle islands, which at the latter period of its existence has been provided with a separate calceiform valve. M. Dufour considers this species, named by him _Calyptraea Roisigi_, as distinct from _Calyptraea equispira_, in consequence of its having the margin of the upper shell dentated and exactly on the same plane, and the angle formed by the internal plate less open; but still he thinks that it is otherwise very closely allied.

Now, Professor Owen remarks that the specimens received by him from Mr. Cuming have also the contour of the shell-architecture on the same plane, and in the other specimen, with the depressed external surface, the shell gives, the Professor observes, a dentated structure to the margin; but he adds that in the specimen figured by Mr. Reeve the margin of the upper shell is sinuous, as in most specimens of _Calyptraea equispira_, and that the known form of which mollusks can adapt the calculated margin of their flexible and extensible mantle to the inequalities of the surfaces on which they rest materially invalidates the chief specific character of _Calyptraea Rotundata_ var. valve with _Calyptraea longirostris_, may, he thinks, possibly be varieties of one species; but the organization of this species, as represented by the specimens from Zebu and Bohol, establishes, in his opinion, their claim to subgeneric distinction among the _Calyptraea_.

Before Professor Owen proceeds to his description, he

refers to the materials for the requisite comparisons furnished by the labours of other anatomists, observing that Cuvier has taken the lead in giving the anatomy of _Crep._-, which term is employed by Helicæae in the subgenus _Chitonelle_, but that the first anatomy of a typical _Calyptraea_ is due to M. Deshayes.* M. Lesson has noticed modifications of _Calyptraea_ organization in the subgenus _Crepitissella_.*

Professor Owen has himself described others in the subgenus _Calyptraea._

External Characters.—_Lithedaphus_, according to Professor Owen, differs from all previously described _Calyptraea_ in the following points:—The head, instead of being short, broad, and flat, is long and subacute; the part anterior to the tentacles being produced in the form of a proboscis equaling in length the whole body behind it, and terminated by a clavate extremity. The tentacles or antennae are very large, proportional, to some specimens, to the beginning of the terminal expansion of the proboscis. The second external character is a moderately-long subcompressed process, projecting forward between the head and the anterior margin of the foot, like a second head, but consisting of the inner surface of the mantle, with muscular fibres for protraction and retraction. In some specimens the apex of this process was expanded and a little produced on each side. The more common form of this appendage is contracted.

The foot, in the specimens examined, was much smaller in proportion than in _Calyptraea_ or _Calyptraeus_; it presents a subcircular form, as in _Cal. sinensis_, but only equal half the diameter of the entire body; its whole margin is incised, and not the concrescent encircling this species. The dorsal surface of the mantle is impressed with a deep horse-shoe fissure, receiving the internal plate of the upper shell. The more common form of this appendage is contracted.

Internal Characters.—Respiratory and Circulating Systems; Digestive and Generative Systems.—Professor Owen states that the aperture of the branchial chamber extends transversely across the back of the head, but conducts to a cavity of univascular, twofourteen in each row. The two cerebral organs differ not merely in relative size, but likewise very remarkably in structure, from the previously dissected _Calyptraea_. In these the branchiae consist of a single series of simple, elongated, close-set and very numerous filaments, extending along the left side of the body in _Calyptraea sinensis_, and making the tour of the mantle in the _Calyptraeus_. In _Lithedaphus_ the branchiae consist of two short parallel rows of conical, subcompressed, plicated vascular processes, twelve to fourteen in each row. The coelomic and branchial organs do not differ very materially from the visceral mass. The ovisac, at first slender and constricted, expands on the right side of its cavity and is disposed in three long folds, which were laden with unusually large elliptical ova. At its termination, close to the branchial orifice, there is an oval muscous gland, and a short conical filament projects from the inner surface of the mantle. The proboscis is surrounded by a thick muscular tunic, inclosing a long, raspy-like, horny tongue, and at its base are two simple salivary follicles. The cephalopods expand into a small stomach, imbedded in a follicle. The cephalic branchial canal is more elevated, than in _Calyptraea_ or _Calyptraeus_; it bends towards the left side, and there forms a small mass of double spiral coils, five or six in number, from which the rectum is continued along the floor of the branchial chamber, in the interior of the gills, to the outlet of that chamber on the right side of the neck.

_Nervous System._—The nervous system of _Lithedaphus_, according to the Professor, is chiefly distinguished from the _Calyptraeae_ by the absence of any closer approximation of the supracoephalic ganglion—wherein equal the inferior masses. Besides the cords connecting the upper with the lower ganglions, the upper ganglions give off each three nerves; the largest runs for
They crenelated, probably which greater of whorls Enc., and this a philosophical and very subgenera, the different on ordinary the Calyptraeidan alimentary elongation of the foot from the gastrid plate may be possible.

The circumstances under which Mr. Cuming discovered his specimens would hardly be consistent with a greater extent of motion. The foot, therefore, whose normal functions are limited to the early stage of the Lithedaphus, may well offer diminished proportions when the animal has chosen a site for the deposition of its ventral plate and has taken up a position. It is then much more restricted, the necessity for extensive respiration is in the same degree abolished. The compensation for this abrogation of the power of moving about in quest of food is obviously the great development of the proboscisform head, which when outstretched in the living mollusk must appear like some worm moving to and fro from between the valves of the shell. The tactile organs of sense are co-extended with the prehensile organ; but the eyes, as of that of the Monodonta of Lamarck, from which these Trochi do not differ except in the angle of their aperture and the advancement of their lip. The aperture is, ordinarily, as high as it is wide. (Octoharidus, De Monti.)

Others again have the aperture much wider than it is high, and their concave base approximates them to the Calyptrae (Infundibulum, De Monti.).

Some whose aperture is much larger than it is high have the columella in the form of a spiral canal (Trochus foveolatus, &c., Chem.).

Those which have the shell turriculated approach the Cerithia (Telecopina, De Monti.).

Subdivision E. Umbilicate.

Some of the forms which are placed in this subdivision have no projections at all on the columella; the greater part are flattened, and have the exterior angle truncated. (Trochus agglutinans genus Phorus, De Monti., &c.)

Some have the edges of the lip rounded (Trochus cincras, Linn.).

Others have a prominence towards the lower part of the columella (Trochus virgatus, &c.).

Others again have the columella crenulated on its length (Trochus montanus, &c.).

Next to the Troch, properly so-called, come the Cadrans. (Solarium, Monti., Linn.)

These are distinguished from the other Trochi by having a spire in the form of a very widened cone, whose base is hollowed by an oblique notch so that the eye of each shell is situated as the eyelid, its edge is narrower and more conical, and so follow with the eye the internal edges of all the whors marked by a crenated cordon. (Trochus perspectivus, &c.)

Les Enopliées. (Enopliquus, Sor.)

These are fossil shells resembling the Solarii, but without any notches on the internal whors of the umbilicus.

Next in order follows the genus Turbo, Linn., with its subgenus (Turbinidea), and then come the genera Pblenius, Littorina, Mongaodon, or rather Mongaon, Phasianella, Ampullaria with its subgenus, Melania with its subgenus, Acteon (Fornatella, Linn.), Pyramidella, Janthina, and Nerita with its subgenera.

These Trochides are immediately followed by the Capulidae (Capulus, Hippopus, Cropitolus, &c.). (Regnum Anim.)

\[2M2\]
M. de Blainville makes the Goniatomata his first family of the order Asupliconbranchiata, and includes within it the great genus Trochus, Lam., only. He describes the
Animal as spirally coiled on the sides of the body often ornamented with digilated or lobated appendages, and provided with a short foot rounded at its two extremities; the head furnished with two tentacles, more or less elongated, carrying tubercles on a convexity of their external base, which is often sufficiently distinct to render the eye subpedunculate; mouth without any upper tooth, with a lingual spiral riband; anus on the right, in the branchial cavity, which holds one or two unequal, comb-like branchiæ; organs of generation terminating in a female individual on the right in the branchial cavity, and in a male individual in a sort of triangular tonguelet sustained by a small ossicle.
Shell subplanorbic or trochiform; the spire elevated, sometimes depressed (varisqueae), and more or less carinated on its last whorl, which forms a flat circular base; a moderate, depressed, and often nearly quadrangular aperture, with its external or right lip trenchant, angular, or folded in the middle.
Operculum horny, circular, with a submedian summit, rolled regularly into a spiral; the whors of the spire narrow and numerous.
M. de Blainville observes that all the species of this family which are of large size, marine, and live upon the rocks on the shore of the sea. He divides the group into Solarium and Trochus.

SOLARIUM.
Animal unknown. (But see, post, descriptions and figures of Solarium magnunm and variegatum.) Shell orbicular, rolled up (enroulée) nearly on the same plane, or planorbic; spire very much lowered (varisqueae); a large cone umbilicate, with its edges dentilute or not at the entrance; aperture not modified by the last whorl of the spire, which is perfectly flat and uniformly large.
Operculum unknown, Blainv. (But see the descriptions and figures of the opercula of the Solaria above-mentioned.)
M. de Blainville separates the genus into the following subgenera—

A. Species very much carinated on their circumference and the aperture of which is well squared.
Example, Solarium perspectivum.
B. Species subcarinated or with a double carination; the aperture sub-rounded.
Example, Solarium variegatum.
C. Species entirely flat on the side of the summit; the umbilicus not carinated at its circumference.
Example, Solarium magnunm. (Genus Mastrurtes, Le- sueur.)
D. Species with a slightly conical summit; the umbilicus not carinated. (Genus Esophalus, Sowerby.)
Example, Solarium antiquum.

TROCHUS.

Animal well known, and as characterized above.
Shell thick, ordinarily nacreous, trochoïd, with the spire sometimes lowered (varisqueae) and at others rather lofty (elèvée) and pointed at the summit, trenchant or carinated on its circumference, umbilicate or not; aperture depressed, angular or subangular, with disunited borders, the right lip trenchant; the columella baut, twisted, and often projecting in front.
Operculum horny, delicate, consisting of numerous narrow spiral whors, increasing slightly from the centre to the circumference. (Blainv.)
M. de Blainville thus divides this genus—

A. Species entirely eucliptrom in consequence of the great elevation of the spire or of the circumference, its excavation, and the smallness of the spiral cavity formed by a septicum lamina. (Genus Infraglandum, De Montf.)
Example, Trochus concomitant.
B. Umbilicated species, with the spire much depressed and agglutinating; the base very much widened and excavated as it were by the great projection of the right lip, which advances beyond the columellar rounded lip. (Genus Phorus, De Montf.)
Example, Trochus agglutinans.
C. Umbilicated species with a very depressed spire, trenchant, and radiated at their circumference by an angular canal of the middle of the right lip (Genus Calcar, De Montf.)

Example, Trochus imperialis.
D. Orbicular, depressed, shining, umbilicated species, the aperture subdepressed and semi-round, with a large callusity on the umbilicus. (Genus Rotella, Lam.)
Example, Trochus roseus.
E. Species not umbilicated, conical, with a flat and circular base; the aperture very angular.
Example, Trochus nitulodus.
F. Species not umbilicated, conical, elevated, with a circular and flat base; the termination of the colu-

memella strongly twisted, but depressed by the lip appearing to be notched by the advance of an in-

cremental and dentiform fold. (Genus Tectus, De Montf.)
Example, Trochus obtusus.
G. Species neither umbilicated nor nacreous, conica,

very much elevated; whors of the spire numerous, with decrepit edge; the extremity of the umbilic-

mella strongly twisted and reaching beyond the origin of the lip. (Genus Telecopium, De Montf.)
Example, Trochus telecopium.
H. Species not umbilicated, conical, with an oblique

base; the aperture large and circular. (Genus Solaria and submella twisted and forming a species of tooth at its termination. (Genus Cantharides, De Montf.)
Example, Trochus iris.

M. Rang expands the genus Trochus more comprehensively, for he comprises under it the following subgenera—

Mr. Swainson places the Trochides between the Turbidae (Turbi) and the Holetider, with the following char-

acter, and without noticing the animal—
Shell mostly trochiform (except Phasianella), the sub-

stance almost always perlaceous; outer lip nearly thickened; aperture entire, closed by a shelly or horny operculum.
The following are the subfamilies and genera included by Mr. Swainson under this family:—
Operculum round; calcareous; shell turbinate; the basal whorl varicose; pillar always smooth; aperture round, rarely oblique.
Genera: Scrutinaria, Humph.

This genus appears, from the species here given, to be the bolus of authors; Turbo marmonrotus, T. pellisetum (pelisetum f. T. argo-

rostomus, &c.); Marmorostoma, Sw.; Delphinula, Lam. Cyclanostoma, Sw.; and Cidaris, Sw.

2. Trochus. Trochus, or Top.
Shell trocheiform; the body more or less wide and flat-

tened beneath; the spire conical or pyramidal; aperture oval, wider than it is high; operculum horny. Mr. Swainson adds, except in the first genus and in T. milo-
lus—
Genera: Cantorbias, Sw. (with the subgenera Tubicen-

thus, Sw.; Cantorhias, Sw. (Sune); Pyronida, Sw.; Lamprostoma, Sw.; and Cariad, Sw.); Trochus, Lam. (with the subgenus Chlorostoma, Sw.; Trochus, Lam. Pugolæa, Sw.; Trocchide, Lam.; and Callostrum, Sw.)

Monodonta, Lam. (with the subgenera Blephrosch, Humph.; Echinula, Sw.; Monodonta, Lam.; Fragella, Sw.; and Montilla, Sw.); Solarium, Lam. and Onaxis, Humph.

Substance: perlaceous; shell depressed, thick, and highly polished; mouth thin; umbilicus closed. Mr. Swainson adds that these have probably no operculum. (But the shell may be an internal shell.)

Genera: Chryrostoma, Sw.; Rotella, Lam.; and Tax-

illum, Sw.

[N.B. The following is the description given by MM. Quit and Swainson of the animal Rotella lineolata, pub-

lished in 1834. Figures are also given which show that the shell is not internal.]

The animal is very spiral, with an elongated oval foot, folding itself longitudinally, in order that it may re-enter the shell, carrying at its posterior part a round membranee
operculum, absolutely; as in the true Trochi, with large and very distinct whorls. The lateral fringes of the feet are snipped as it were (concave), and furnished on each side with four long loose filaments. The muzzle is moderate. The tentacles are very long and slender; the terminal eyes are carried on very long pedicles, such as MM. Quoy and Gaimard had never seen in any mollusk, for they do not resemble those of the Strombus, which are also very much developed.

The pulmonary cavity is very open; a long gill goes from the left border of the mantle to the brim on the right side. The tentacle is a rather large auricle, hollowed into a gutter, which is never wanting in any individual. It seems, no doubt, to direct the exit of the eggs in this mollusk, which is very probably hermaphrodite, like all those of the family to which it belongs. The gill appeared to MM. Quoy and Gaimard, different from that of the Trochi. They further state that these animals being very small, and their specimens not fresh, their remarks are not so complete as they could have desired. The same observation applies to the colours. Nevertheless they state that one may see that the tentacles are well circled with brown; and that the muzzle is circled with black as well as the edge of the mantle. The colouring of the gill is, they add, a rare occurrence in the mollusks, where it is hidden under the double envelope which the mantle and the shell form. (Zeologe de L’Astrolabe; and see the Atlas, pl. 61.)

4. Pleurotomaria. (Pleurotomaria?) Trochiform. (The aperture with a slit or fissure. Fossil only.

Genus Pleurotomaria. Defrance.

5. Phasmatellina.

Oblique, spiral, polished; aperture oval; spine longer than, or equal to, the aperture; operculum shiny.

Genus Phasmatella. (Mauquoy, 1840.)

Mr. J. E. Gray makes the Trochide the second family of his Podopithidina, the first section of the order Phyllopoda in his arrangement. The Trochide are immediately preceded by the Turbinidae and followed by the Stomatidide.

Mr. Gray’s Trochidae consist of the genera Pyranis, Cardinaria, Trochus, Polyplanta, Clanculus, Phorcus, (Phorus?), Eutoplus, Canthidius (Canthurus?), Teuthia, Monodonta, Gibbus, Gibbula, Rotella, Lirina, Talopia, Camillia, and Delphinaula. (Synopsis Brit. Mus., 1840.)

In this article we shall confine ourselves to the genus Trochus, as it is described by De Blainville and other authors. Not that our space will admit of a description or illustration of even a very small part of the multitudinous and highly interesting species comprehended under that genus; but we shall endeavour to lay before our readers two or three of the forms, so as to convey some idea of the shells and inhabiting animals. This group is highly ornamental in collections, both on account of the shape of the shells and the colours with which many of them are ornamented; and, in some cases, to a considerable size; and few collectors are satisfied till they have obtained the specimens of the Carrier Shells (or Mineralogists and Conchologists, as they are termed, according to their selection of shells or minerals for agglutination to their own shells, the Sea Urchins, and the Perspectiva shells.

Trochus.

The number of recent species of Trochus recorded by M. Deshayes in his tables is one hundred and three, and there can be little doubt of the accuracy of this list. The geographical distribution and habits of these plant-eating marine gastropods are very widely diffused, there being few seas without some of the species: they have been captured at depths varying from the surface to forty-five fathoms, creeping on rocks or sea-weeds, sand, sandy mud, and gravel.

We proceed to the promised illustration of one or two of the forms.

Examples. Trochus obtusus. Shell conico-pyramidal, nodulous and granular, coloured with green and white; the whorls turreted and nodose, and gilt with many granose circles; the last whorl, as it were, removed or taken away (deprived); the lower surface planulated; the lip sinuated at the base.

Such is Lamarck’s description, but the species figured by MM. Quoy and Gaimard in the ‘Zoologie’ of the Astrolabe is concentrically smooth; the figure in Knorr referred to by Lamarck is neither very nodulous nor very granulous, and the species represented in the Atlas of the Astrolabe may be a smooth variety.

Animal with stout and short tentacles, which are white with a brown border; the ocular peduncles large, pointed, and doubly circled with black. The muzzle is very wide, with a black rhind near its border, as well as the head, which is moreover dotted with greenish. The foot is yellow below, and so dotted with brown on its sides, that it appears black. The edge of the mantle is variegated with brown and greenish. The fringes of the feet are white and without filaments. (Quoy and Gaim.)

Localities. — Lamarck gives the Indian Ocean as the habitat of his species. MM. Quoy and Gaimard, who captured the individual above described at Tonga, remark that in colour it is Trochus obtusus, but that it tends to Trochus octaculatus in its suddenly-pointed spine.

The same zoologists observe that the operculum of Trochus known in collections are nearly all of a chestnut colour. Thus, they remark, is ordinarily due to the action of the air, for on the living animal they are transparent and yellowish. In the very turreted species the animal draws itself back into the shell obliquely, dragging in with it in this manner its operculum, which otherwise could not lie flat in the aperture, which is always more or less flattened. These animals, they add, show themselves but little, and hide themselves far in, so that none of their parts can be perceived. It is even necessary to break the first whorl of the shell in order to draw them satisfactory. (Astrole.)
parts are whitish; the head and the mouth are striated across with black and violet: this last colour belongs only to the left side. The foot has some very bright marks on its sides: its lateral fringes are without filaments.

Operculum oval, smooth, whitish, and a little convex (renite) towards one of its extremities. (Astrolabe.)

MM. Quoy and Gaimard, who observe that the operculum of this species determined them to place it in the genus Turbo, state that it has only been hitherto found at New Zealand, where it is rare. They never obtained more than one living specimen: that from which the description and figure were taken was small, being only two inches in diameter, comprising the spines. It was covered with calcareous incrustations and marine plants, indicating the sloth of the animal: they found it in the Passé des François, Tasman Bay.

The number of recent species recorded by M. Deshayes in his tables is twelve.

**Geographical Distribution and Habits.**—The species of this genus hitherto found have occurred in the seas of the warmer climates. The Mediterranean, the Indian Ocean, the coasts of Tranquebar, the South Seas, and those of New Holland, are the localities recorded by Lamarck. The specimens have been found near the shore—it seems to be a littoral genus—on rocks and weeds.

**Examples.**—*Solarium perspectivum.* Shell orbiculate-conoid, longitudinally striated, whitish-yellow, with articulated belts of white and brown or chestnut near the sutures; the notches of the umbilicus small. (Lam.)

**Animal.**—With a large foot widened in front, and having a very strongly developed marginal furrow, yellowish on the sides, marked with a black stripe above. The head presents a large escutcheon. The tentacles short, stout, and marked with two longitudinal black bands on the sides. At their base are placed the eyes on very short pedicles. The branchial cavity appeared to be partially divided in two, lengthwise, by a sort of fold. The intestine describes two rather considerable circumvolutions before it passes the liver.

Operculum large, oval, membranous, and strongly but sparingly spiral at one of its extremities. The colour is yellowish, like that of the whole animal.

MM. Quoy and Gaimard, who have given this description of the animal in the "Zoologie" of the Astrolabe, state that they know nothing of the habits of this species, which was brought to them nearly dead by a Moluk of Ambon.
Fossil Trochi and Solaria.

Trochus.—M. de Blainville states that Lamarck enumerates nine fossil species, and D'Orbigny fifty-six, eleven of which the last-mentioned zoologist considers as analogous: they are from Italy, and thirty-eight from Grignon.

Mr. G. B. Sowerby observes that the fossil species, Chalcus, is more numerous than the living species, Con- 
imons, such as the cag, the calcareous groelier, and the green-
and; they are also, he adds, found in the London clay, and he remarks that he has reason to believe that some species occur so low down as the lias.

The number of fossil species of Trochus recorded by M. Deshayes in his tables is seventy (tertiary); and of these Trochus magnus, fugus, cingulatus, agglutinatus, Adunom, constrictus, cristatus, Mates; zygyphus, striatus, and obliquatus; are both living and fossil (tertiary). Trochus crenulatus is noted among those species which are found in more than one tertiary formation, but does not occur in the living and fossil species. The fossil shells collected by him in Ischia, and named by M. Deshayes, mentions Trochus crenulatus as one of four shells sent to him from Ischia, all of recent species. Mr. Lyell adds, also, among the fossil shells from the western borders of the Red Sea, collected by Mr. James Burton, and communicated by G. B. Greenough, Esq., Trochus maculatus, vittatus, and mauritianus, all described as recent by Lamarck. Among the fossil shells collected by him at Soma, he notes Trochus mediocris, and a new species, with its colour. (Principles of Geology).

That Trochus occurs below the chalk appears from Dr. Fitzton's valuable list, where Trochus Sedgwicki is recorded both from the upper green-sand of the Isle of Wight, and from the Oxford oolite in Dorsetshire, and another uncertain species from the last-named locality. See this list also for localities of Pleurotomaria. (Strata between the Chalk and Oxford Oolite).

Now it is wanting in the Silurian rocks, where Murchison records the presence of the genus in the old red sandstone (middle and lower beds only), in the upper Lud-
row, and (with a ?) in the Caradoc sandstone. In the same formation of the rock, Pleurotomaria is noted from the lower Ludlow rock and from the Caradoc sandstone. (Silurian System).

Solarium.—M. de Blainville observes that a few fossil species occur in the tertiary bed; and that there are some fossils belonging to the lower beds of oolite formation, and even lower as the mountain limestone, which resemble them very much, and he adds, forms the genus Currus of some authors, and do not appear to him to possess any characters by which they may be generally distinguished from the Orthochilus, Turnus, or Solaria.

Mr. G. B. Sowerby observes that a few fossil species occur in the tertiary bed; and that there are some fossils belonging to the lower beds of oolite formation, and even lower as the mountain limestone, which resemble them very much, and he adds, forms the genus Currus of some authors, and do not appear to him to possess any characters by which they may be generally distinguished from the Orthochilus, Turnus, or Solaria.

M. Deshayes, in his tables, makes sixteen the number of species of Solarium, and names Solaria variegata, concavilatula, and pseudo-perspectivum as species found both living and fossil (tertiary).

In the list of Red Sea shells above referred to Solarium projectus and Solarium dichotomum are noted.

That the genus occurs below the chalk is evident from Dr. Fitch's list, also above referred to, where three species are recorded from the upper green-sand, the gault, and Barston. Currus is also noted from the upper green-
sand of Dorset. Solarium does not appear among the fossils of the Silian rocks, but less than nine species of Euhomaphus are recorded in Mr. Murchison's tables, coming respectively from the Aymestry limestone, the lower Ludlow rock, the Wenlock limestone, the Wenlock shale, the Caradoc sandstone, and the Llandeilo flags.

These works are only quoted as examples out of many fossil lists which should be examined by the student. Here may be best noticed the Rotella name (from the Calborne beds, Alabama, tertiary) of Mr. Lea, who observes that he is not aware that the genus Rotella has been before by any one in America or in Europe, and refers to the tables of M. Deshayes, who gives four recent species, but none fossil. (Contributions to Geology.)

TROCHIDON. [Trochide].

TROCHILIDÆ, the scientific name for the family of Humming-Birds.

Linnaeus, in his last edition of the 'Systema Naturae,' placed the genus Trochilus at the end of his order Picæ, and next to the genus Certhia.

Cuvier includes this genus (Trochilus, Linn.) in his order Passereaux, placing the group between the Grimmeraux, or Cretacé (Certhia, Linn.), which in Cuvier's arrangement comprises the Sun-Birds and the Hoopoes (Upupa, Linn.).

The views of Mr. Vigors with regard to this family will be found in the article Sun-Birds, vol. xxiii., p. 284.

M. Lesson, in his 'Manuel,' places the Trochilidae next to the Phalangèides, and adds of the Téctenures, making the family consist of two genera only, viz. Coelis (Polygus, Briss.; Trochilus, Linn. et Auct.), and Ornitho-
myia, Less. (Mellisuga, Briss.; Trochilus, Linn., Temm., T. inornatus, Sib. ; and T. circus, Leçp.). The same zoologist, in his elegant little work 'Lettres, a Des Chirides, sur les Colibris et les Oiseaux Mouches,' gives the following classification of this brilliant group:—

Trochilus, auternus.

Synonyms.—Mellisuga et Polygus; Briss.; Trochilus, Linn., GM., Lath., Vieill., Temm.; Trochilus et Ortho-
ymyia, Leçp.; Trochilus, Cynanthus, Phthisopha-
tra, Cypseloglossa lamarca, Sw. (Zool. Jour.); Trochilus, Ramphodon, et Ornithomyia, Less.; Bellatrix, Cali-
phloz, Polygus, Glauces, Anthracothoraces, Helicia, 
Hylocharis, Basilinna, Chrysolampis, Sarcogordus, et 
Eulampis, Bosc (Natur., 1832).

Zoological Characters.—Bill longer than the head or nearly as long, with horizontal nostrils, and the upper mandible a little widened at the base, rounded above and beyond the nostrils, tapering into a point. Lower mandible straight or slightly bent above and below, entering within the upper mandible, dilating a little towards the point, and of the same length as the preceding.

Nasal basal, very small, covered by the advanced beak, plate in a lateral fissure, separa-
ted from each other by a slight ridge.

Wings with the quill-feathers graduated. The first the longest, and so on in succession.

Tail composed of ten feathers, very variable in length and form; calcar as long as the tail.

Crests delicate, slender, naked or feathered to the heels, subelliptical, having in front three equal toes, the two in-
ternal ones a little connected at their base, the hind toe rather stout, all furnished with compressed, curved, and hooked claws, which are rather robust for the toes.

Tongue extensible, long, divided at the summit into two widened filaments, which are slightly spatulate, and supported by two very long, narrow, tubular like a spring, inserted in the centre, or formed of two co-adapted (adoes's) cartilaginous canals.

Geographical Distribution.—America (including many of the adjoining islands), principally between the tropics; but, at the same time, there are species which range very far to the south, and others to the north.

Foal.—Soft insects, such as spiders, tipulae, ants, and also small coleopterous insects; necessarily the honed juice of flowers.

Plumage.—That of the male brilliant, sumptuous, and with metallic reflections. The livery of the females is nearly always sombre, tarnished, or with but little brilliancy. The young resemble the female, but only the males of the nestling. The feathers have their barbules constantly disposed in facets, even in those whose plumage is dull.

* See, Part I., 1838.

† These species are recorded in the island of Juan Fernandez.
1st Race. The Patagonians.
Tail elongated, deeply forked; the bill rounded, long, expanded (renié) at the extremity, very straight.
Ornament plumage is dull, brownish, with little brilliancy. The only known species inhabits South America.
Example, Ornismya tristis, Less. Locality. Chile. (Trochilus gigas, Vieill.)

2nd Race. The Campylopterians (Campylopterus, Sw.; Wings with the shafts of their quill-feathers flattened, dilated, and bent, which gives the feathers a sabre-like curved or dolabrid form. Head without any tuft; the bill strong and slightly arched.
M. Lesson divides this race into two sections:
1. The Swallow-like Campylopterians.
2. The True Campylopterians.
Tail moderate, equal.
Examples, Ornismya luttipennis (Trochilus campylopterus, Gm.); Campylopterus ornitennis, Sw., &c.

3rd Race. The Velriet Humming-Birds (Les Séricéphales—
Campep, Boie).
Tail moderate, equal or notched, bill a little recurved; form robust.
Example, Trochilus auratus, Less. (Trochilus grano-
tinus, Lath.,) &c.

Bill furnished with strong and serrated teeth. Two sections.
1. True Ramphodons.
Bill elongated, prismatic, straight, widened at the base, hooked at the point; tail rounded, the tail-feathers a little graduated.
Example, Ramphodon muculatum, Less. (Trochilus nevius, Dumont; Trochilus squamosus, Liehlt.)

2. The Sawbills.
Bill moderate, slightly recurved; tail a little notched in the middle, of a deltoidal form.
Example, Ornismya petasophora, Less. (Trochilus serrirostris, Vieill.; Trochilus santinotus, Natter; Trochilus petersophora, Wed.,) &c.

5th Race. The Avoetes.
Bill moderate, toothed on the edges of the mandibles, recurved upwards; tail moderate, rounded at the end.
Example, Ornismya recurvirostris, Less. (Trochilus recurvirostris, Sw.,) &c.

6th Race. The Caribs (Anthurachorax, Boie).
Bill elongated, robust, recurved; tail moderate, rounded; a plastron before the neck.
Example, Trochilus viridis, Less, &c.

7th Race. The Buffon Humming-Birds (Glauccis, Boie).
Bill elongated, recurved, a little notched in the middle; no jugular plastron.
Example, Trochilus Baffoni, Less, &c.

8th Race. The Brins-Blancs (Phaethornis, Sw.);
Bill very long, very much arched; form elongated, delicate; tail with its feathers graduated; the two internal feathers exceeding the lateral ones.
Example, Trochilus superciliosus, Linn., &c.

9th Race. The Topazes (Polytmus, Briss., Boie; Lampornis, Sw.,) &c.
Bill elongated, recurved, two long filaments in the tail of the male.
Example, Trochilus perplexus, Boie.

10th Race. The Thomist.
Bill short, straight; the external tail-feathers terminated by two long filaments.
Example, Ornismya cephalota (Trochilus polytmus, Linn.,) &c.

11th Race. The Sapphos (Lesbia, Less.)
Bill moderate, nearly straight; tail with its feathers very much graduated, wide, and deeply forked.
Example, Ornismya Sappho, Less. (Trochilus sapagurus, Shaw; Trochilus radiatus, Temm.; Trochilus chrysogaster, Orph.; Trochilus chrysochorius, Vieill.,) &c.

12th Race. The Clures (Clures, Less.)
Bill very long, very straight; form stout; tail moderate, hardly notched in the middle, or equal.
1st Tribe. The Mexicans.
No amethystine gorget.
Example, Ornismya elegans, Less. &c.

2nd Tribe. The Cramnias.
Bill very long, straight; an amethystine gorget.
Example, Ornismya meleagris, Less, &c.

13th Race. The Jacobins.
Bill short, straight; tail ample or graduated.
Example, Ornismya aurita, Less. (Trochilus auriculatus, Vieill. &c.

14th Race. The Glaucopeps (Melissuga, Briss., Boie.
Bill short, straight; tail forked.
Example, Ornismya glaucops, Less. (Trochilus gue-
copiae, Gm.,) &c.

15th Race. The Lucifers.
Bill elongated, recurved, delicate; tail forked; an amethystine or steel-blue gorget.
Example, Ornismya cyanopogon, Less. (Cyanthns luci-er, Sw.,) &c.

16th Race. The Racket-tails (Platures, Less.).
Tail composed of acuminate feathers, the two external ones with shafts without bars, and terminated by oval battlements (palettes).
Example, Ornismya platura, Less. (Trochilus longi-
caudis, Gm.; Trochilus platurus, Lath. Vieill.,) &c.

17th Race. The Emeralds (Basilinis, Boie.
Bill elongated, straight; tail rounded, moderate; plumage emerald-green above and beneath, or mixed with white only.
Example, Ornismya alboirorinis, Less. (Trochilus lew-
gaster, Gm.; Trochilus multilirius, Lath.,) &c.

18th Race. The Amazis.
Bill straight, moderate, reddish; plumage green above, white with ferruginous, or purple violet.
Example, Ornismya amazylis, Less. (Orthorhynchus amazylis, Less., Zool. de la Coqille,)

19th Race. The Septemberes (Stephanides,)
Bill straight, delicate; head tufted; tail rounded; lower part of the body with rounded scales; head violet or sapphire.
Example, Ornismya sephaniodes, Less. (Melissuga Kingii, Vig.,) &c.

20th Race. The Tui's (Su roljgates, Boie, part.
Bill very short, straight; a tuft terminated by a large, loose, gemmaceous blue or green plume.
Example, Ornismya Dendrurus, Less. (Trochilus Dend-
tris, and Trochilus versicolor, the latter the young, Vieill.,) &c.

21st Race. The Straight-tails (Heliactis, Boie; Cymacnas, Sw., part.
Bill very short; tail composed of long, delicate, pointed graduated feathers.
Example, Ornismya chrysophora, Less. (Trochilus ro-
natus, Wed.; Trochilus bilophus, Temm.; Trochilus Dres-
fortii, female; and Trochilus Pretii, young, Vieill.,) &c.

22nd Race. The Rubies (Calliphlox, Boie.);
Bill short, straight; an amethystine or ruby gorget; tail moderate.
1st Tribe. The Amethysts.
Throat amethystine-red.
Example, Ornismya amethystina, Less. &c.

2nd Tribe. The Rubies.
Throat ruby-red; body golden-green above.
Example, Ornismya colbris, Less. (Trochilus colbris, Linn.,) &c.

3rd Tribe. The Anns.
Throat ruby-amethystine; head the same.
Example, Ornismya Anna.

23rd Race. The Topazes (Chryseolampa, Boie.);
Bill straight; tail rounded; head ruby-red; throat topaz.
Example, Ornismya moschatia, Less. (Trochilus mosca-

tus, Linn.,) &c.

24th Race. The Sapphires (Hycocharis, Boie.);
Plumage very golden-green, with a blue tone, or the throat azure; tail equal; bill small, delicate, straight.
Example, Ornismya auduberti, Less. (Trochilus lucida, Shaw,) and another.
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23th Race. The Blues (Bleuca). Bill short, straight, delicate; tail rounded; head and neck marked with white.

Example, Ornispica Arvemi (Les.) (Tricholiu concinna, female). Tricholus hectorophagus, Vicell. (Tricholus lucidus, Shaw), and another.

In the tail of the Gold-tail:
Bill slightly recurved; tail with the feathers acuminate and of a brilliant red gold colour.

Example, Ornispica Arvemi, Less. (Tricholus ornatus, Gym.), Kc.

Mr. Swainson sees in the Humming-Birds the full development of the sectional perfection belonging to the Tenantros.

The bill, he remarks, appears, from its soft and delicate structure, adapted for both other purposes than to protect a long, bird, and flattened tongue, darted by the birds into the nectary of flowers, for the purpose of licking the honey. He observes that this tongue has been described as tubular, but that in all the Humming-Birds that he had examined the two filaments were perfectly flat; and so they might be consistently with the body of the tongue being a double tube; nor does Mr. Swainson say whether the filaments were ever recent, dry, or preserved in spirit. He adds that, like the rest of the tribe, the humming-birds are partly insectivorous, as he has personally ascertained, having repeatedly discovered minute insects in the bill he has dissected.

The same zoologist observes that there is obviously a strong affinity between the Humming-Birds and the Cinnyridae, although he is unacquainted with the precise link which connects the two; and that although the older authors note the Cinnyridae and the Tropine, the latter are too distinct to be mistaken even by a modern student. "The Cinnyridae," says Mr. Swainson in continuation, "have full-sized legs, and their wings moderate and rounded; the Humming-Birds, on the contrary, have the feet excessively long and remarkably small; while the wings, for the size of their body, are frequently longer than those of the swallow. As the sunbirds are restricted to the tropical altitudes of Africa and India, so are the humming-birds confined to America: both groups are rich in species; and of this in particular the variety of secondary forms is almost innumerable. We have endeavoured to determine the true generic type, but the subgenera can only be correctly ascertained by much more rigid criteria than we have yet been able to make. In the genus Tricholus, as now restricted, we have all those whose bills are perfectly straight, the tail being either even or slightly divergent in the shorter species or having the bill slightly bent, with a tail very long and deeply forked. If we look to the sunbirds on one hand, and to the hoopoes on the other, we immediately perceive that the straightness of the bill is a typical perfection of the humming-birds. In the genus Lamponis the bill is obviously much depressed at the base, and the tail is broad and even; while the type of the genus Campylorpetus seems to be the recurved-billed humming-birds. Last of all comes the genus Phoebornis: hitherto the form of the tail has either been square, forked, or rounded; but in this group the tail is considerably and regularly graduated, the side-feathers very short, and the middle pair exceeding all the others; there is not much bent, but they are much curved in the typical species as nearly as to assume the form of a sickle.

The gay and beautiful green which ornaments the upper plumage of all the groups here given places to a brown coloration, and even hooping-birds of the male birds are destitute of ornament. The genus Phoebornis, in fact, obviously represents the namoral type, and is a miniature likeness of the hoopoes, or that family with which we connect the name of the Tenantros. (Classification of Birds, 1857.)

In the Synopsis of the same work Mr. Swainson gives the following arrangement and definitions, observing that the typical examples alone are given of what he considers to be "the chief groups as the circumstantial connection of the subgenera in each is a subject which requires more investigation than he had been able to give it, he will not attempt to impose names upon the minor groups, which could not as yet be properly demonstrated.

Family Campylorpetidae. Humming-Birds.

Wings excessively long, falcated. Feet very small.

Genera.
Lamponis, Sw.—Bill straight, or very slightly bent, generally pale, considerably depressed for its whole length, but more especially for the base. Tenants reaching to the end of the tail, which is short and even.

Example, Lamponis mango.

Tricholus, Auct.—Bill very straight, long, cylindrical, or rather broader than high. Tail generally even, but sometimes slightly forked.

Example, Tricholus longirostris.

Cyanthus, Sw.—Bill cylindrical, more or less curved. Tail forked.

Example, Cyanthus forfatus.

Phoebornis, Sw.—Bill considerably compressed, generally curved from the base. Tail graduated, or cuneate. Colours less brilliant. The Rasmian type.

Example, Phoebornis superciliosus.

Campylorpetus, Sw.—Bill curved. Shafts of the quills dilated. Tail graduated.

Example, Campylorpetus recurvirostris.

Such is Mr. Swainson's arrangement. The Trochilidae are placed by him between the Cinnyridae and the Prome-ropider.

The Prince of Canino, in his 'Specchio Comparativo' (1827), places the family Anisigia, Hurji, with the genus Trochilus, between the families Tenantros and Agthiidae. In his 'Birds of Europe and North America' (1838) the Trochilidae are arranged between the Upajidae and the Chryzotronidae, and comprise the genera Trochilis, Lamponis, and Calyphoros.

Mr. G. R. Gray (List of the Genera of Birds (1840)) gives the Trochilidae a place between the Nectaridae and the Meliphagidae, making the first-named family consist of the following genera and subfamilies:

Subfam. 1. Lamponinidae.

Genera:—Campylorpetus, Sw.; Eulanopsis, Boie; Peta- sophera, G. R. Gray; Lamponis, Sw.; Glauces, Boie; and others.

Subfam. 2. Phoebornidin.

Genera:—Grypsis, Spix; Phoebornis, Sw.; and other genera;—Subfam. 3. Trochilidae.


In the last edition of his useful publication (1841) the same arrangement is followed.

The number of species recorded by M. Lesson in his general index to the Trochilidez is one hundred and ten; Mr. Bullock, so long ago as 1824, stated that in his former collection there were near a hundred species; and he adds, 'every day brings us acquainted with more.'

Mr. George Loddiges now (1842) possesses one hundred and ninety-six species, and some of his stores are not yet examined. This collection, the finest in Europe, affords all the materials for a complete history of the family; for not only is it rich in species and varieties, but in examples of their different states of maturity according to sex or age, including many cases with their contents. A great number are set up by the ingenious possessor in the most lifelike manner, and in a style peculiarly his own. He has studied the subject deeply, and no one is so competent as he is to present zoologists with a satisfactory arrangement. Here may be seen every form of bill—curved, even to an adnate downward curvature, recurved, very long and subcurved, straight, very short, sharp, and straight—and every variety of eye appendages, frills, ruffs, crests, tails, and feathered boots.
Organization.

An observer who gazes on an assemblage of humming-birds is struck, as soon as his dazzled eyes become so far accustomed to the gorgeous spectacle as to permit the exercise of his sober judgment, with the great development of the wings in all the species, from the Patagonian humming-bird to the smallest Epidendrum, feathered creation among them, and the extreme smallness of the feet.

If he examines the skeleton of one of these minute birds, this observation becomes, if possible, strengthened. The very deep keel of the sternum, the power of the bone of the wing, the lengthened scapula, and the comparatively impoverished structure of the lower extremities, all exhibit an organization of the locomotive system especially adapted to the development of the highest powers of flight.

The combination of the corresponding development of the muscular system is applied. The enormous — for enormous, by comparison, they are — pectoral muscles, and the other muscles employed for working the wings, form nearly the whole fleshy substance of the bird: those allotted to the feet are reduced to the least possible quantity consistently with the requisite stability. All proclaims that the being before us is destined to pass the most active part of a highly active life in the air, and when we proceed to inquire into the habits of this ethereal race, we shall at once perceive how admirably adapted to those habits this organization is.

Skeleton of Humming-Bird (from a specimen in the museum of the Royal College of Surgeons in London, by permission).

In the Physiological Series of the museum of the Royal College of Surgeons, No. 292 c, is the preparation of a humming-bird with the wings extended and the pectoral muscle of one side exposed, which, in this genus, is remarkably powerful, and the keel of the sternum proportionally deep. Professor Owen remarks that the first primary or digital quill-feather, as in all birds of great powers of flight, is the longest. (Cut, vol. 1.)

Another part of the mechanism of these minute creatures, intimately connected as it is with their existence, demands some notice. The tongue is the principal organ for obtaining the food, which consists of the hoised juices of flowers and insects. This tongue is so formed that, like the same organ in the Woodpeckers, it can be darted out of the bill by a sudden action of the os hyoides, comparable to that of a spring suddenly released from the detent. It is very long, and can be protruded a good way from the bill. M. Lesson describes it as composed of two muscular fibrous cylinders soldered to each other, something after the fashion of a double-barrelled gun, throughout a great portion of their continuity, and separated towards the point of the tongue; so that the two tubes, slightly enlarged towards this part, separate from each other, and each presents a little blade, which is concave within and convex externally.

In order that the tubular tongue may be thus projected upon, articles which its terminations are appointed to seize and retain, the os hyoides which supports it is formed of two bony plates which separate, pass below the cranium, re-ascend over the bones of the occiput, and proceed to form a point of resistance, or fulcrum, by their union on the forehead. The result of this disposition, when brought into play by the muscles of the tongue, is a great power over the muscular tubes, furnished with circular fibres, which compose the organ of taste. The two small blades, or elongated spoon-like terminations, seize the insects, or lock up the hoised excretions, which are on the instant carried to the aperture of the esophagus by the elasticity and compactness of the two tubes, and forthwith swallowed. The long and slender bill comes admirably in aid to insert the tongue into the nectaria of flowers.

Bill and tongue of Humming-bird.
opinion that the Golden-crowned Wren is the regulus (Tyrannus) of Aristotle (Hist. Anim., viii. 5); Ray on the other hand considers the Golden-crowned Wren as crisatus, Aldrov., to be the Trochilus of Pliny and Aristotle, and the Frebys and Basileus of the latter. But Pliny apparently confounds the two Trochilus of Aristotle, as he states (H. N. 30) that the first enters the crocodile’s mouth is a little bird, called in Italy the King of Birds. Again, he enumerates among the birds which are inimical to each other (Ibid., xi. 64), the Eagle and the Trochilus (Erd edemus) because the latter is called ‘rex avium.’

The other Trochilus of Aristotle, that which enters the crocodile’s mouth and is suffered to depart without injury (Hist. Anim., ix. 6), appears to be the Trochilus mentioned by the Greeks. It is a little bird of the commonest kind which associates with the Halycon, both species of which have a cerulean or sea-coloured back (eucerae). This Trochilus seems to be identical with that bird on the banks of the Nile mentioned by Herodotus, which enters the mouth of the crocodile to search for leeches that have there attached themselves, and which Geoffrey St. Hilaire seems to have made out to be the Geny-ara of the Arabs, the Charadrius lugubris, or Egyptian Dotterell, of Hel- sedigust, which closely appertains to the European Little King-Dotterell (Charadrius minor, Meyer).

Under such circumstances it would have been much better for Linnaeus to have adopted the generic name for the species of the Cree, Basileus, Telourus, whose name, Trochilus; but this Linnaean term is now so generally acknowledged among zoologists as the designation of the Humming-Birds, that it is too late to propose an alteration which would only involve confusion. We, therefore, state that this is by no means a solitary instance of the misapplication of antient Greek names to animals exclusively belonging to America and its islands.

We have seen the numerous races into which M. Lesson has subdivided the Humming-Birds in his General and Synoptical Index of the Birds of the genus Trochilus (1832); but in the volume which treats of the Natural History of the Colubri, he expresses his opinion that only two races can be generally recognized, the one Old-world (Oiseaux mexicains, or Oiseaux Mouches (Fly-Birds), the Rhamphodon, and the true Colubri.

The term Colubri, according to Buffon, is a Carabie word, and is written in old accounts Colibiri, or Colibri; but M. Lesson would rather derive the word from the old French col brillant, expressive of the beautiful changeable reflections of the throat-feathers, which may have been transformed into Colibiri or Colibri by the negroes of the Antilles, unless it be supposed to be derived from the Greek word Coluber, expressive of those same ever-changing reflections with which their plumage shone.

Colibri, according to Sonnini, appears to be the name by which they are known to the Guianese.

The native names of the Humming-Birds were, as might be expected, first made known by the Spaniards and others who first invaded the New World. With the antient Mexicans these bright creatures appear to have been greatest favourites. The radiant mantles worn by the natives in Montezuma’s time gladder with the spoils of these diminutive birds, which were also employed in the art of design, and in the composition of those embroidered pictures which Cortes has so highly praised. Humboldt notices the religious belief of the Mexicans that Toamujin, the spouse of the God of War, conducted the souls of those warriors who had died in defence of the gods into the mansion of the sun, and transformed them into the beautiful designs of these birds; and it must be owned that they form an emblem of the soul hardly less spiritual than the butterfly of the Greeks. Hernandez treats of the Mexican species under the names of Hustiztoltotli, or Ave varias; and also of Xoehum, Amurrun, Animalium, et Mineralium Mexicanorum Historia a Francisco Hernandez-Medico in India praestantissimo primum complete. dein à Nardo Antonio Reccho in Volumen digesta, &c. (Rome, 1631, folio), we find seven species described under the name of Hustiztoltotli. A very curious work is the description of Xoa, Xoa holtzitzin, Xoa holtzitzin, Yurec holtzitzin, Xoa holtzitzin, Xococo holtzitzin, and Xoa holtzitzin. Xococo is the word Hustiztoltotli; and Xoehum, a name employed by John de Laut to speak Qenui as the Peruvians and Tuminois as the Spanish appellation. Ouenia is the name recorded.
by Nieremberg; and Guianumbi, according to Maergrave and others, is the Brazilian designation. These and other Indian terms are said to signify rays of the sun, trees of the standing sun, or standing birds. The Spanish name Tomineor or Tomineor seems to refer to their diminutive size and small weight;* and Picaflores, another term employed by the Spanish or Portuguese creoles, to their mode of singing. The latter term has been adopted by one of his names in his Journal of a Residence and Tour in the Republic of Mexico (1828), states that in the neighbourhood of Xalapa the Humming-Bird is distinguished by the names of Chaparros and Cayacos. The latter term means "bird-sucker," and, I believe, refers to the way in which they are transformed from flies, some going so far as to declare that they had been seen in the half-fly half-bird state. Then again they were supposed to live no longer than the flowers which afforded them food, and when those flowers faded they were believed to fix themselves by the bill to some pine or other tree, and there remain during the dreary months till the ascending rains brought back the flowering, with the birds singing again. This alternation of life and death, Government states that they expired in the month of October, having previously suspended themselves by their feet from a branch in some warm place, and were resuscitated in April. Instances were elicited of this, and it had been believed to some extent within doors, and after lying lifeless for six months, had become ruminated, and being given their liberty, had flown forth into the fields. This is related as worthy of all credit in the edition of Herodotus above quoted (Rome, 1851, p. 322, folio). John de Laet quotes Ximenes for the story of their remaining affixed by their bills, and there remaining immovable, like dead birds, for six months rising again when returning. Flicks again declined the fields. (Nouv. Orbis, &c., folio, Lugd. Batav. (Ezerev), 1683, p. 256.)

Huming-Birds were in the museum of the Tradescants under that name, the origin of which we shall presently see: in the Museum Tradescantianum, by John Tradescant (12mo., London, 1656), we find in the catalogue of Whole Birds, divers Humming-Birds, three sorts whereof are from Virginia. It may be interesting, with reference to the fabre mentioned, to give an instance of the power of these birds to brave the wintry weather. Captain Phillip King, R.N., saw one at Tierra del Fuego under such circumstances. It has been mentioned, says he, that he had found many humming-birds at Port Antonio, which are said to have been driven to sea and travelled so far a distance that they were found alive in the mountains of the place, and the luxuriant growth of fuchsias and other plants upon the sweets of whose flowers they feed. Here however one of the same species was seen sporting about in the open air and during the height of a snow storm, a proof of the hardy character of this little bird, which, if it does migrate upon the approach of winter to a warmer climate, lingers, at least, as long as it possibly can. This was the middle of April; the winter had, in fact, already commenced, and all the mountains round us were clothed with snow, while the ground was also coated with the same dazzling covering. (Voyages of the Adventure and Bengal, vol. i.) The bird here seen was the Linstead Kingi, which, Mr. Darwin observes, is found over a space of 2500 miles on the west coast, from the hot dry country of Lima to the forests of Tierra del Fuego.

We will now turn to the record of a very acute zoological observer who had especially turned his attention to this lovely race. Mr. Bullock (after observing that though it abounds more in the warm regions, it is dispersed over every part of America and its islands, in almost every climate, for it is found in the summer months in Hudson Bay and Canada) remarks that Captain Cook brought many fine specimens from Nootka Sound. He himself added several new species from the temperate table-land of Mexico. The humming-birds in the mountains of Otaheite, Popocatepetl, &c. In Jamaica he procured the smallest known, which, he remarks, is considerably less than some of the bees. The first I ever saw alive was a new species, Bullock, was in the yard of the house of Mr. Miller in Kingston, Jamaica. He had taken his station on the twig of a large tamarind-tree, which was close to the house and overspread part of the yard: there, perfectly indifferent to the number of people in the house, or to the noise, the bird kept up its own liminary music, except most of the day. There were few blossoms on the tree, and it was not the breeding season, yet he most pertinaciously kept absolute possession of his dominion: for the next year I saw the very same bird, which, when he approached near his tree, he attacked it most furiously, and drove it off, always returning to the same place he had before occupied, which he had worn quite bare of blossoms. In the same year, when the arborescent tree was in full flower, he gave up singing for it. I often approached within a few feet, with pleasure observing his tiny operation of dressing and pluming, and listening to his weak, simple, and often-repeated note. I could easily have caught him, but was unwilling to destroy the little chirrap of a crust in the bird for the sake of so much pleasure. In my excursions round Kingston I procured many of the same species, as well as the long-tailed brown and a few others; and especially the one I have mentioned as the smallest yet described, which has the finest voice of any. I spent some agreeable hours in the place that had been the Botanical Garden of Jamaica, and on the various trees now growing to a luxurious size met with the Humming-Bird. The Nest, being perched on the highest branch of the broad-fruit or chilab-tree. He poured forth his slight querulous note among a most curious assemblage of the valuable indigenous and exotic plants and trees of the island, on a spot which is now known as "The Humming-Bird's Glen." (Six Months' Residence and Travels in Mexico, 1823.)

The expressions in this interesting description relative to the voice of the Humming-Birds bring us to the question with which we began. Mr. Leeson remarks that the Spanish authors make mention of any song: but that the French alone, Levius et Theretus (Thvet and Jean de Léry are probably meant), declare that they do sing, nay, that they sing so close to another that he has not been heard and would believe that such sweet and sublime a song could proceed from such a diminutive body. Buffon likens their small cry frequently repeated to the syllables "weep, weep," and Vieillot, with much more truth, according to M. Leeson, to that of the lay. L'ip, articulated with more or less force, and most ordinarily in a sharp tone. M. Leeson says that the Oiseaux-mouches do not appear to have any song. It is, he remarks, principally in going from one place to another that he his above alluded to is excited and most frequently they are completely dumb. He declares that he has passed whole hours in observing them in the forests of Brazil, without ever having heard the slightest sound proceed from them. Mr. Darwin says that the Cora humming-bird sings. The truth may be that there are both dumb and vocal species among so great a multitude of Oiseaux-mouches and Colibris exhibiting such varieties of habits. Mr. Darwin, like many others, was struck with the similarity of their flight and habits to that of the sphinx. He relates that he started early and walked to the Cava, or topsail mountain in the neighbourhood of Bahia, the air was delightfully cool and fragrant; and the drops of dew still glittered on the leaves of the large hissaceous plants, which shaded the streamlets of clear water. Sitting down on a block of granite, it was delightful to watch the various insects and birds as they flew past. The humming-birds seem particularly fond of such shady retired spots. Whenever I saw these little creatures buzzing round a flower, with their wings vibrating so rapidly as to be scarcely visible, I was reminded of the sphenic moths, their movements and habits are indeed in many respects very similar. (Journal.) Mr. Bullock speaks of them when caged, as remaining as it were suspended in the air, in a space barely sufficient for them to move their wings, and observes that the humming noise proceeds entirely from the surprising velocity with which they perform that motion, by which they will keep their bodies is the most apparently motionless for hours together. When it proceeds from the moth it is so weak as to be quite without action. It is seen to stop thus for some
instants before a flower and dart off like a glean to another; it dives all, plunging its little body into their bosom, caressing them with its wings without ever settling, but at the same time never quitting them. To the noise thus occasioned they not only owe the name by which we designate them, but also the epithets of murmur, bewitcher, by which they are distinguished by the Creoles of the Antilles and Cayenne.

Mr. Darwin (loc. cit.) states that two species are common in Chile, and that he has seen a third within the Cordillera at an elevation of about 10,000 feet. Elymus pungens, to which these are referred, is a kind of broom grass: hovering near the edge of the thick beds, every now and then dashed in close to the ground; but Mr. Darwin could not see whether it ever actually alighted. At the time of your referring to him there were very few flowers, and none whatever near the beds of broom, however, he was quite sure they did not live on honey, and on opening the stomach and upper intestine, by the aid of a lens he could plainly distinguish, in a yellow fluid, morsels of the wings of Diptera, probably Tiniutidae. It is evident, he observes, these birds search for minute insects in their winter-quarters under the thick foliage. He opened the stomachs of several specimens, which were shot for different parts of the continent; and in all remainders of insects were so numerous as often to present a black comminuted mass, as in the stomach of a creeper. Mr. Darwin goes on to state that in Central Chile these birds are migratory, moving northward in March, when the climate is rather warm; the latter end of the month corresponding to our October they were very common. They began to disappear in the spring, and on the 12th of what would correspond to our March he saw, in the course of a walk, only one individual. As this species migrates to the southward, it is replaced by the arrival of the larger kind presently to be noticed. Mr. Darwin does not believe that the small kind breeds in Chile, for during the summer their nests were uncommon to the south of that coast. He refers to Humboldt’s Personal Narrative, Cook’s Third Voyage, and Beechey’s Voyage, and remarks that the migration of the humming-birds on both the east and west coast of North America exactly corresponds to what takes place in the southern continent. In both cases, he observes, they move towards the tropic during the colder parts of the year, and retreat northward before the returning heat. Some, however, he adds, remain during the whole year in Tierra del Fuego, and in Northern California, which he remarks, in the northern hemisphere, has the same relative position which Tierra del Fuego has in the southern, and he quotes Beechey for the fact that some remain.

Numbers of the large species (Trochilus aura) arrived in the neighbourhood of Valparaiso, during the year in question, a little before the vernal equinox. Mr. Darwin describes it as coming from the parched deserts of the north, probably for the purpose of breeding in Chile, and says that when on the wing its appearance is singular. We observe that, like others of the genus, it moves from place to place with a rapidity which may be compared to that of Syrphus among Diptera and Sphingia among moths; but, whilst hovering over a flower, it flaps its wings with a very slow and powerful movement, totally different from that vibratory one common to most of the species which produces the humming noise. He declares that he never saw any other bird where the force of its wings appeared (as in a butterfly) so powerful in proportion to the weight of its body. He tells us that when hovering by a flower, its tail is constantly expanded and shut like a fan, the body being kept in a nearly vertical position. This action, he says, appears to steady and support the bird, between the slow movements of its wings. He further states that although the bird always flies from flower to flower searching for nectar, its stomach contains an abundant remains of insects, which he suspects are much more the objects of its search than honey; and that its note, like that of nearly the whole family, is extremely shrill.

Mr. Bullock saw one in the set of praying upon insects. The house I resided in at Xalapa for several weeks, on my return to Vera Cruz, was, says that enterprise

naturalist; only one story high, inclosing, like most of the Spanish houses, a small garden in the centre, the roof projecting six or seven feet from the walls, covering a walk all round, and leaving a small space only between the tiles and the trees which grew in the centre. From the edge of these tiles to the branches of the trees in the garden the spiders had spread their innumerable webs so closely and compactly that they resembled a net. I have frequently watched with much amusement the cautious peregrination of the humming-bird, who, advancing beneath the web, entered the various labyrinths and cells in search of entangled flies, but as the larger spiders did not tamely surrender their booty, the invaders was often compelled to retreat: being within a few feet, I could observe all their evolutions with great precision. The active little bird generally passed once or twice round the court, as if to reconnoitre his ground, and commenced his attack by going carefully under the nets of the wily insect, and seizing by surprise the smallest entangled flies, or those that were most feeble. In ascending the angular tramps of the spider great care and skill was required; sometimes he had scarcely room for his little wings to perform his office, and the least deviation would have entangled him in the complex machinery of the web, and involved him in ruin. It was only the works of the smaller spiders that he durst attack, as the largest rose to the defence of their criadules, when the besieger would shoot off like a sunbeam, and could only be traced by the luminous glow of his resplendent colours. The bird generally spent about ten minutes in this predatory excursion, and then alighted on a branch of an avocado to rest and refresh himself, placing his crimson star-like breast to the sun, which then presented the glowing fire of the ruby, and surpassed in lustre the diadem of monarchs. The species whose evolutions are here described appears to have been called by Bullock the Mexican Star, Cynanthus lucifer, Sw. (Ornithoptera cyanoptera, Linn.).

The nests of these birds are as wonderful as any that are made. They vary greatly in form and structure; but
in all the soft and delicate materials are so put together as to furnish as much warmth as possible, an object of scanty importance where the body of the parent, generally speaking, is so small, and the quantity of animal heat given out must be in proportion.

Prince Maximilian de Wied, on examining the flower of a palm-tree in Brazil, found affixed to it the nest of the blue-headed humming-bird (Trochilus pileatus, Ornithomyia cristata, Lem.), which, he says, much resembles that of the Trochilus bicolor of authors. He found it as well covered with moss as those of the Gold-inch and many other small European birds. The Prince adds, that in all humming-birds' nests two white eggs of a elongated form are found, which in some species are extraordinarily small. This rule as to the duality of the eggs is not without exception, if the information given to Sir William Jardine be correct, that the Doctor Humming-Bird, as it is provincially termed (Trochilus hirutus), builds its nest suspended like that of the Yellow-tail (Cascasia cristata) with the entrance somewhat downwards, and lays only one egg. This nest is described as being of a lengthened form, composed of dried grass and slender roots, moss, &c., as not of the general compact structure, and as suspended from the leaf of some reed-like plant, to which it is cemented chiefly by the threads of spiders or caterpillars.

Cotton, tussle-down, delicate fibers, a fungus-like substance, and other soft materials woven into a compact and fleecy substance, enter into the composition of the nests of Humming-birds. The outside is in most instances covered with lichens, generally supposed to be stuck on with a sort of glue secreted by the bird; but we have reason to believe that this is not so. The nest, generally, appears to be made by warping spider's webs over fragments of plants, their down, lichens, &c.; and the lichens, which are never turned the wrong way, are secured by the webs only.

Sir W. Jardine, in the Naturalist's Library: Humming-Birds, vol. ii., gives the following interesting account of the manner of building of one of the species, related to him by Mr. Kirk, a resident in the island of Tobago:—

'The Ruby Humming-Bird,' says Mr. Kirk, writing from that island, 'makes its appearance here on the 1st of February. Some say it is found in the leeward part of the island all the year; others, that it arrives earlier by a month to the windward: the latter, I think, more probable. Certain I am that there is no individual in the island who takes so much exercise in the woods as I do; and I can positively say, that since the 1st of August last, and perhaps some time previous, until the 1st of February, I have not seen one of these birds; and now (1st March) they are abundant. They begin to make their nests about the 10th of February. I have now noticed one containing two eggs each, and watched one yesterday for nearly an hour. Her manner of construction was very ingenious: bringing a pile of small grass or lichen, she commenced upon a small twig, about a quarter of an inch in diameter, immediately below a large leaf, which entirely covers and conceals the nest from above, the height from the ground being about three feet. After the nest had received two or three of these grasses, she set herself in the centre, and pulling her long slender beak over the outer edge, seemed to use it and her throat much in the same way as a mason does his trowel, for the purpose of smoothing, rubbing to and fro, and swarming quite round. Each visit to the nest seemed to occupy only a couple of seconds, and her absence from it not more than as many minutes. In a few hours after I saw the nest, which had all the appearance of a finished one. I expect to find an egg there to-day.'

Such are only a few of the forms of these cradles: many of them are proofs of a sagacity beyond instinct. There have been seen hanging evenly balanced on a single tendril, of a somewhat uncoy shape, bulging out on the side opposite to that where the bird sat, and loaded so as to form a counterpoise to the bodies of the parent and young. In another such nest small stones were placed at the counterbalancing end. Another nest, on which there were feathers externally, hung from a rock secured by two suspensory bands. But the late lamented Captain Lyon. R. N., whose accuracy as an observer is well known, gives a very extraordinary account of the adaptation of the labours of the bird to the exigency of the case, in a letter to a friend in England, dated Gongo Socó, Brazil, 17th March, 1826: 'I am too closely confined here, says Capt. Lyon, 'and too constantly occupied to attend much to Natural History or to anything except the mines; but it may interest you to have an account of some young Humming-birds whose lighting and education I studiously attended, as the nest was made in a little orange-bush by the side of a frequented walk in my garden. It was composed of the silky down of a plant, and covered with small flat pieces of yellow lichen. The first egg was laid January 29th, the second on the 28th, and two little creatures like bees made their appearance on the morning of February 14th. As the young increased in size, the mother built her nest higher, so that from having at first the form of figure 1, it became ultimately like figure 2.

'The old bird sat very close during a continuance of the heavy rain for several days and nights. The young remained blind until February 25th, and flew on the morning of March 4th without previous practice, as strong and swiftly as the mother, taking their first dart from the nest to a tree about 20 yards distant. (Zool. Journ., vol. v. p. 1.) This is the only instance known to us of such post-nascent nest-building; and it is not impossible that the parent might have laid her eggs in an old nest which she perceived to be too shallow to contain her young quantity. Still the context would lead to the conclusion that the nest was begun under Captain Lyon's eye; and he was so anxious in his observation, that we think he would not have passed over the occupation of a nest so lately attended. Other writers give a shorter period of incubation: thus the black humming-bird is said to sit twelve days, the young leaving the nest and following their parents in eighteen days; the North American species only ten; the young being ready to fly at the expiration of a week.

The parents are most valiant in defence of their nests. Ovidio relates how they will fly even at the face of a man who climbs a tree where their nests are, and strike him in the eyes, coming, going, and returning so swiftly, that no man would well believe it who had not seen it. Mr. Bullock says that the female of the Mexican Star, above mentioned, lays two eggs, perfectly white and large for the size of the bird; and the Indians informed him that they
were hatched in three weeks by the male and female sitting alternately. He states that when attending their young, the male can pick any bird indiscriminately that approaches the nest. "The birds are in the influence of rage; or fear, or are very violent, and their flight rapid as an arrow; the eye cannot follow them, but the shrill piercing shriek which they utter on the wing may be heard when the bird is invisible, and often led to their destruction by persons for their approach. They attack the eyes of the larger birds, and their sharp needle-like bill is a truly formidable weapon in this kind of warfare. Nothing can exceed their ferocity when one of their own species invades their territory during the breeding season. Under the influence of jealousy they become perfect furies; their throats swell, their crests, tail, and wings expand: they fight on the air (uttering a shrill noise) till one falls exhausted on the ground. I witnessed a combat of this kind near Olimba, during a heavy fall of rain, every separate drop of which I supposed sufficient to have beaten the plump warriors to the earth." (Six Months in Mexico.)

Wilson says, "I have shot and haras the King Bird (Musciuca pyrrhopterus."

This pugnacious audacity probably fostered the Mexican belief that these diminutive bodies contained the souls of Jain warriors.

Mr. Bullock states that the humming-birds in sleeping frequently suspend themselves by the feet with their heads downwards, in the manner of some parrots.

It may be expected that we should notice a very captivating story. M. Lesson tells us that the humming race has, doubtless, like all existing creatures, numerous enemies; but he declares that the most cruel, the most deadly of all, is that great and monstrous hairy spider, very common throughout the warm parts of America, called by naturalists the Bird-catchhing Spider (Aranea ariadne, Linn.). Spreading its nets round about the nests of the humming-birds, it craftily watches the epoch when the young ones come to light, drives away the parents from the nest, seizes and devours their progeny, and sometimes, when it supposes the parents themselves, consigns them to the same fate. Such, adds M. Lesson, is the picture which Bachholz represents in the 5th plate of his first volume.

M. Lesson thus commences the very next sentence: "Les faibles les plus souplices ont été propugés sur les oiseaux mouches," and we think that he might, without much fear of contradiction, have added this terrible spider to the catalogue. The monster in question is a ground insect, and we never heard of its making a web, in the ordinary acceptance of the term. It is certainly big enough to cope with some of the humming-birds, and it is possible that it may creep up trees and surprise the young in the nests; but even this seems to be mere conjecture. The story has been rendered current by the pencil of Madame Merian, which, on this occasion, appears to have been guided by her imagination.

And here we may notice the supposed medical virtues of the spots on the back of the birds. Powdered humming-bird was considered a specific in cases of epilepsy; and the alleged efficacy of the birds in curing rheumatism secured a place among the old European Pharmacopoeia.

We proceed to give a very few examples of the multitude of forms presented by this gorgeous race.

The Common Humming-Bird, Ornithoza pyrrhopterus. Less.—Upper part of the head, back, rump, and coverts of the wings, uniform and metallic green. A wide iridescent gorget unites the throat down to the half of the neck and to the cheeks; the lower part of the neck in front, the breast, and all the lower parts of the body, are tawny white, with a little brown on the flanks. Tail, consisting of eight feathers, is gracefully bordered with white within; two middle feathers much longer than the others, white on their internal side, brownish on their external border, and entirely brown at the extremity. Bill slender, black. Feet reddish. Tail length six inches for lines (from the middle of the tail measures three inches two lines, and the bill six lines.

Locality.—Peru, and especially the Plain of Lima.

Such is M. Lesson's description in the 'Oiseaux Mouches;' but in the 'Troc/ii/us' he gives a figure (pl. xxxv.) of this bird in its completely adult state, with its tail in its entire development. The bill, he says, is short, slender, and straight, and completely black, as well as the tail. The wings are delicated, recurved, and purple-brown. The plumage is fresh golden-green above. The throat and the front of the neck sparkle with the violet tint of the amethyst, a white gorget marks the limits of the scaly feathers; and golden-green is spread over the flanks and the belly. The tail-feathers are the longer the more internally nacreous, and all are stiff, narrow, and of a sword-blade shape. The two external ones are the shortest; the six others are graduated between them, but the two internal ones considerably exceed the preceding, and form two narrow delicate

The Cura Humming-Bird. (Lesson.)

ribands, coloured white for a great part of their length, and only terminated by black at their extremity. The lateral tail-feathers are brown, and finely variegated with white on their borders. At pl. 40 of the same part of his work M. Lesson figures a young bird. The description is given at p. 111, of the text.

The Double-crested Humming-Bird, Trochilus cornutus. Weld; Trochilus bilophus. Temm.; Ornithoza cornigera, Less. Male.—Bill and feet very weak and obscure in colour. Two flattened fan-shaped crests, each composed of six small feathers, part from the forehead on a level with the eyes. The brilliancy of these crests surpasses description, glistening as they do with the tins of polished gold and red copper, changing into the gummy tints of the ruby and emerald, now fine-coloured, anon the purest green, and presently the brightest yellow. The scaly feathers of the forehead between the two crests sparkle with metallic uniform green, changing to steel or sapphire blue. A coronal of dark changeable violet extends from the throat behind the eyes, and descends along the side of the neck to terminate in a point of long feathers before the breast. This uncertain violet graduating into a non-metallic blue, with its velvety very dark tints, is sharply defined on the milk-white of the breast, which extends to the lower part of the neck, so as to form a rather large metallic collar. The lower part of the belly is white; but the middle of the abdomen and the flanks are, like the back, golden-green, with which is mingled a little of the greyish colour of the base of the feathers. Back and sides of the head behind, back, and feathers of the rump, metallic golden-green.
Quills brown. Tail graduated, composed of four feathers longer than the six others: the two middle ones are brown, the two external pure white. The other shorter external tail-feathers are white, but their outer border is variegated with brown. The tail below is white, slightly smoked as it were. The wings reach only to the half of the tail, the general form of which is long, acuminate, and narrow. Length four inches five or six lines. Bill six lines and a half. M. Lesson refers to his pl. 8 for the female, which has, he says, no crest: its livery is less brilliant; and the middle tail-feathers, instead of being dark, are pure white, as well as all the others, none being in the slightest degree bordered with brown. M. Lesson's pl. 8 however represents a young male.

Sickle-winged Humming-Bird, *Trochilus falcatus*, Sw. Green; throat and breast shining-blue; body and vent blue-green; tail even, rufous cinnamon; exterior quills falcated, the shafts dilated and compressed.

Mr. Swainson, whose specific character this is, after speaking of the dazzling brilliancy of the colours of the bird, says that it is however more remarkable from the extraordinary construction of its wings, the outer quills of which are greatly curved, and the shafts dilated to a most disproportionate size; a similar structure occurs also, he observes, in the Broad-shafted Humming-Bird of Shaw (*Trochilus latipennis*); and he adds that it may not be improbable that such additional strength in the wings has been given as a defence against the small birds of prey (*Lanius*, Linn.) which abound in tropical countries. The cinnamon-coloured tail-feathers are tipped with a purplish-black bar; the middle feathers are the darkest, and glossed with green. (Zool. Ill.)

Locality.—Spanish Main: at least a specimen was sent from thence.


Golden-green; throat shining emerald-green; middle of the breast and body black; lateral tail-feathers beneath to apex; bill recurved. (Sw.)

Mr. Swainson remarks that the extraordinary formation in the bill is without parallel in any land-bird yet discovered, and presents in miniature a striking resemblance to that of the Avoset. It is almost impossible, he adds, to conjecture rightly the use of this singular formation; but it appears to him not very improbable that the principal sustenance of the bird may be drawn from the pendent *Bignonia* and other similar plants, so common in South America, whose corollae are long, and generally bent in their tube; the nectar, being at the bottom, could not be reached either by a straight or incurved bill, though very easily by one corresponding to the shape of the flower. (Zool. Ill.)

Locality.—Peru: at least Mr. Bullock received it from thence.

M. Lesson seems to doubt that the recurvature of the bill is natural; and says that it is very probable that the organ has been compressed and recurved in its fresh state by some art. This doubt is groundless. Indeed M. Lesson himself afterwards records a second species—*Ornithomyia arcuella*.

Gould's Humming-Bird, *Ornithomyia Gouldii*, Lem.—M. Lesson states that he owes his knowledge of this charming little bird, which is not known in France to Mr. Charles Stokes, who sent to him a drawing made from an individual in the collection of Mr. George Lodges. Of the same size and absolutely of the same form as the little *Happe Col* (*Ornithomyia ornata*, Less.), this species says M. Lesson, of which three or four individuals are known in the London cabinets, is distinguished from that only by its fan-shaped ornaments, which are snow-white and oscillated at their extremity. The pointed and erect tuft on the top of the head is deep chestnut or ferruginous. The back is golden green. A white stripe traverses the rump. The tail is moderate and rounded; the two middle tail-feathers are golden green, the lateral feathers blackish. The wings, which are delicate and narrow, are purplish-brown. The front of the neck from the chin to the lower part of the thorax is scaly, and of a very varying lustrous emerald green. The belly, the sides, and the lower belly brownish-green. The feathers which compose the jugular ornaments are disposed in a fan-shape, and so that the
longest are outside, and the shortest the most internal. These feathers are all pure white, but the summit of each of them is terminated by an occlusion sparkling with gold and emerald hues eneeked by deep green. Bill and feet brownish.

This bird, Oritismya ornata, and the Hauze Col Blanc, Oritismya stramaria, Less., form a small natural tribe. The Hauze Col, Oritismya ornata, which is figured by M. Lesson (pl. xii., male and female, Oiseaux Mouche, very young, pl. xxiv. Trochilides), is found in Guiana, Brazil, and Trinidad; the Hauze Col, figured by M. Lesson (pl. xii., male; pl. xiii., female and young, Oiseaux Mouche), is found in Brazil.

Gould's Humming-Bird. (Lesson; from the drawing above noticed.)

The Bar-tailed Humming-Bird, Sappho Humming-Bird of Lesson. This is the Trochilus sparganus, or Bartailed Humming-Bird of Shaw; Oritismya Sappho, Less.; Trochilus radiatus, Temm. (Galleries of the Museum); Trochilus chlorurus, Cuv.; Trochilus chrysochiron, Vieill.

Description.—Male.—Robust, and one of the largest of the family; the tail enormously developed, not less than four inches long, and very deeply forked. Bill nearly straight, pointed, not very long, being not more than seven lines, and black, as are the tarsi. Wings rounded, recurved, and not exceeding the origin of the tail more than an inch. Body about two inches and a half. Throat, breast, and front of the neck covered by a garbot of scaly feathers, from which glance forth the purest emerald green tints, presenting under the lower mandible an aspect of deep velvety green. A small band of more yellow green extends from the eye and descends on the sides of the neck. The anal region is furnished with greyish feathers. The whole of the plumage above, as well as the lesser coverts of the wings, is metallic golden green. But the feathers of the rump and the upper coverts of the tail are of a lively shining cinnabar. The quills are purplishbrown, and their shafts bent and widened. The ten tail-feathers are very much graduated. The two middle ones are very short and oval; the two external ones are very long, riband-like, flattened, and exceed the two next by eighteen lines. All of them, squared or slightly rounded at their extremity, glitter variously under the rays of light which fall on them. Their most ordinary hue is that of red copper changing into gold; but occasionally these rich metallic tints change into a sombre purple or violet. Their extremities are terminated by a quadrilateral velvet spot, largest on the longer feathers, but which diminishes upon the shorter ones till on the two middle ones it forms a simple border. M. Lesson gives two figures of this bird; in the second the plumage is more complete. No colours can give an idea of the richness of this species when in full feather; even in the richest collection it strikes the eye at once. M. Lesson also gives a figure of the female, in which the tail is much shorter, and the whole colouring in comparison with that of the adult male. He admits however that no information accompanied the skin which could prove the sex, and that it may be a young male.

Locality.—The east of Peru.

May we venture, in conclusion, to hint at the possibility of importing these lovely birds, and keeping them in an easy captivity? Father Montdidier, according to Labat, kept humming-birds alive for five or six months, and they brought up their young in his apartment. Don Pedro de P. C., No. 1897.

Melo, governor of Paraguay, had a humming-bird, taken in the adult state, for many months, as Araza relates; and it became so tame as to carve its master and fly round him for food. Its life was preserved by giving it fresh flowers from time to time, but ordinarily by syrup in a glass, which was held out of the perpendicular to assist the bird in taking the syrup; and it died at last through the negligence of a servant. They have also been sustained for four months by honey and syrup made of bruised sugar and water, placed at the bottom of the corolla of bell-shaped artificial flowers.

Mr. Bullock, when in Mexico, had nearly seventy in cages, which, with attention and care, he kept alive for some weeks; and he declares that he could have devoted his whole attention to them, he had no doubt of the possibility of bringing them alive to Europe. The accounts of their being so fierce and untameable as to beat themselves to death when confined, are, he says, not true; no bird is more easily reconciled to its new situation. They are, it is true, he observes, seldom off the wing, but never beat themselves against a cage, nor the glass of a window. In each cage was placed a small earthen cup, about half filled with sugar and water of the consistence of a thin syrup; in this various flowers had been inserted, principally the yellow bell-shaped corolla of the great aloes, (Aloe Americana), the end of which, next the stem, being cut off, permitted the liquid to flow into the flower, into which the little prisoners were constantly inserting their long lidid tongues, and drawing up its lucious contents. This operation, he adds, was generally, like most of the actions of the bird, performed on the wing, but they sometimes slighted on the flower, perching against its sides in an upright position.

Captain Lyon, when in Mexico, kept a humming-bird for nearly a month on sugar and water slightly impregnated with saffron. It eagerly sucked this mixture from a small quill, and the Captain adds, that he is sure that with constant attention these little creatures might be kept for a long time. (Journal above quoted.)

But the humming-bird has actually been brought alive to England. It is related that a young gentleman, a few days before he sailed from Jamaica, found a female
Mango Humming-Bird sitting on her nest and eggs: he cut off the twig and brought the whole on board. The bird became so tame as to suffer herself to be fed on honey and water during the passage, and hatched two young ones. The ship was long in arriving, but the young were brought to England, and continued some time in the possession of Lady Hammond, from whose lips they took honey; and though one did not live long, the other survived for at least two months from the time of their arrival.

Now this happened before the introduction of steam-navigation by sea; and as we read of fresh bouquets of American flowers crossing the Atlantic, a little care and management in May and June might bring living humming-birds in a fortnight or three weeks to our shores, where our stoves and greenhouses with a little precaution might offer them an asylum. They are disposed to become familiar. Wilson mentions one which would enter the window, examine the flowers in the room, and pass out at the opposite door; and this same bird was known to take refuge in a hothouse when the cool nights of autumn came, going forth regularly in the morning, and returning as regularly in the evening for several days.

We have heard an instance of still greater boldness, where the bird suffered the window, the only outlet, to be shut after it had entered for the purpose of examining the flowers in the room. The honeyed liquor being placed in a bell-shaped flower and held in a person's hand, the humming-bird, nothing daunted, came and fed from the flower when so held.

These facts lead us not to despair of seeing living humming-birds in England.

TROCHILUS. [Trochilidae.]

TROCHOIDAL CURVES. Under this term is included a large number of lines which are produced by the composition of two circular motions, including the straight line, the circle, the ellipse, a class of curves called epitrochoids, of which one particular case is the epicycloid, and a class called hypotrochoids, of which one particular case is the hypocycloid. Among these must also be included the extreme case in which one of the motions is rectilinear, which gives the common trochoid, the cyclloid, and a class of spirals which includes the involute of the circle, the spiral of Archimedes, and others.

There are two ways of considering these curves. The first, which is universally adopted, may properly be called the trochoidal mode (epi/hypocycloid, etc.), because in it one circle is made to roll like a hoop, either upon a straight line, or upon the circumference of another circle.

The second, which we believe might be advantageously substituted for the first, we shall propose to call the planar mode, because it resembles the consideration of the motions, straight line, and its satellite move round the sun. Here a circle, without any rolling, has its centre carried round the circumference of another. As there is no elementary work which treats of these combined motions, that some understanding of them is necessary even for the purposes of the most elementary astronomy, we shall first enter into this subject at more length than usual, endeavouring to make ourselves understood by those who have the first notions of geometry and of the composition of motion: we shall then, more briefly, consider the application of the differential calculus.

Let the point $M$ (fig. 1) be carried uniformly round the circumference of the circle $AM$, and let $M$ be the centre of some circle $AM$, and let $P$ be the point of contact. Let a point $P$ be carried about the moving circle, so that its angular velocity from a line of fixed direction in the moving circle (say $MC$ parallel to $AB$) always bear a given proportion to the angular velocity of $M$, say, that of $s: 1$. That is, when the line $OM$ has described the angle $MOA$, the line $MP$ has described the angle $PMC$, which is $n$ times $MOA$. It has been supposed that when $M$ was at $A$, $P$ was at $B$. The point $P$ will then describe a curve called a trochoid; or, on this explanation, planar. And the circle $CP$ being always contained between two fixed circles, $B$ and $D$, the planetary curve is always contained between those two circles. We shall now propose a nomenclature for the principal parts of the curve.

As in the Ptolemaic mode of considering the planets, let the fixed circle $AM$ be called the deferent, the moving circle $CP$ the epicycle. Let $M$ be the mean point, $P$ the planet, $O$ the centre, and let the planet be said to be in its apocentre or pericentre, when it is farthest from, or nearest to, the centre. And as every apocentre must lie on $E$ and every pericentre on $O$, let these two points be respectively apocentral and pericentral. Let $OP$, as usual, be called the radius of the curve, or its radius vector; and the angle $POA$ its vectorial angle. When the revolution is in the direction from $A$ to $M$, it be called direct: when in the contrary direction, retrograde. Let angle $MOA$ be called the mean or deferential angle, and denoted by a; and let the $PMC$ be called the epicyclic angle, being denoted of course by $b$. Let the angle contained between the centre and apocentral radii be called the angle of descensus. The following theorems will be readily seen, so soon as these terms are understood:

1. The planetary curve beginning from its apocentre at $B$, and the epicyclic motion being direct, and greater than the mean motion, there will be a pericentre as soon as $PMC$ has gained two right angles upon $EMC$ or $OMA$, that is when $b - a = 180°$, or $\phi = 180°$ divided by $n - 1$.

2. But if the epicyclic angular motion, being still direct, be less than the mean motion, so that $EMC$ is greater than $PMC$, there will be a pericentre when $EMC$ has gained two right angles upon $PMC$, or when $b - a = 180°$, or $\phi = 180°$ divided by $n - 1$.

3. And if the epicyclic motion be retrograde, so that $P$ begins to move the other way from $C$, there will be a pericentre when $EMC$ and $PMC$ together make two right angles, or when $b + a = 180°$, or $\phi = 180°$ divided by $n - 1$.

4. When the planet has come to its pericentre, it will begin immediately to ascend towards the next apocentre, in a curve of the same form as that by which it descended, but inverted in position, the parts preceding and following the pericentre being alike, and the part preceding the next apocentre resembling that following the last apocentre. As soon as the second apocentre is gained, the curve will start again, in the same manner as the first. If $n$ be a commensurable number, say $p + q$, where $p$ and $q$ are integers and the fraction is in its lowest terms, the curve will return into itself when $M$ has completed $q$ revolutions: there will be, if the epicycle be direct, $p + q$ or $q + p$ apocentres, and as many pericentres; but if the epicycle be retrograde, there will be $p + q$ apocentres, and as many pericentres.

But if $n$ be incommensurable, the convolutions will go on for ever, and the curve will never be completed. We have therefore, in order to obtain the form of the curve only to consider one descent from apocentre to pericentre, or one ascent from pericentre to apocentre; though the general appearance of the curve depends much on the effect of many convolutions.

5. Every epicycle may be described by two distinct epicyclic motions. For if we describe the parallelogram $OMPQ$, we see that the point $Q$ describes a fixed circle equal to the epicycle, while $QP$ is the radius of a moving circle equal to the deferent. If then the radius...
the deferent be $a$, that of the epicycle $b$, and the epicyclic angular velocity be $n$ times the deferential or mean velocity, it gives the same planetary curve as if the radius of the deferent were $b$, that of the epicycle $a$, and the epicyclic velocity $1/n$ of the deferential. If then we take the epicycle to be the least of the two, we do not limit our investigation, provided we consider every possible case of epicyclic velocity.

The actual motion of the planet, compounded of both motions, deferential and epicyclic, may be either direct or retrograde: and the curves may be best classified by observing whether the motions at the pericentres and apocentres are direct, retrograde, or neither. At 1 is represented a case of each motion, pericentric and apocentric, direct; at 2, a case of each motion, when it is neither direct nor retrograde, that is, directly towards the centre; at 3, a case of each motion, retrograde. We shall now consider how to make the separation of these cases.

First, as the apocentres. When the motion in the epicycle is direct (for abbreviation, say when the epicycle is direct), the two motions conspire; the line $MC$, then at $A$, is being carried forward with the velocity of $A$, while $P$ is being carried from $MC$. Let angles be measured in theoretical units [Aran.], and let the deferential or mean velocity be 1, then the linear velocity of $A$ is $a$, and that of $P$, when at $B$, is the linear velocity to an angular velocity $n$ and radius $b$, or $nb$. Consequently $a + nb$ is the apocentric velocity, which is direct; or the apocentric velocity is always direct when the epicycle is direct. But if the epicycle be retrograde, the line $MC$ is advancing with the velocity $a$, while $P$ is receding from it with the velocity $nb$. Consequently, when the epicycle is retrograde, the apocentric velocity is direct, neither, or retrograde, according as $a$ is greater than, equal to, or less than, $nb$.

Next, as to the pericentres. We can make a pericentre by supposing the planet to be at $b$, when $MC$ is on $A B$. Now if the epicycle be direct [Motion, Direction of], the line $Bb$ being carried forward with the velocity $a$, the planet is carried backwards with the velocity $nb$. Consequently, when the epicycle is direct, the pericentric motion is direct, neither, or retrograde, according as $a$ is greater than, equal to, or less than, $nb$. But when the epicycle is retrograde, the motion of the planet at $b$, as well as that of $Bb$, is in advance, and $a + nb$ represents the whole velocity: consequently, when the epicycle is retrograde, the pericentric motion is always direct. Observe that we name the deferential motion with respect to the centre, and the epicyclic motion with respect to the centre of the epicycle: as explained in the article cited, a motion may be direct with respect to one, and retrograde with respect to the other.

We shall now consider the trochoidal mode of viewing the subject, previously to combining the two. Let the circumference of one circle roll upon that of another, any point on, in, or outside of the rolling circle (if outside, of course supposed to be fixed to it by a carrying arm) describes a curve by the motion compounded of the motion of the rolling circle round its own centre, and the motion of that centre round the centre of the fixed circle. Three cases may be supposed, as in the following diagrams (Fig. 2). The two convexities may be opposed, or the rolling circle may roll outside the other; or the concavity of one may fit the convexity of the other. This last divides into two cases: first, when the rolling circle is the smaller, in which case it rolls entirely inside the other; next, when the rolling circle is the larger, in which case the fixed circle is always inside the other. Now each of these cases may easily be reduced to a much more intelligible planetary system, by which much of their difficulty will be removed. It should be observed that when the convexities are opposed, the trochoidal system is called ep trochoidal, and when concavity fits convexity, hypotrochoidal. We call the radius of the fixed circle $F$, and of the rolling circle $R$.

1. Every epicycloidal system is a planetary system in which the epicycle is direct. Taking the circle which rolls entirely outside the other, $P$ is the point describing the curve, and $T W$ has rolled over $T V$ since $P$ was at $B$. Now $M$ is constant, being $F + R$, so that, since $P$ rolls uniformly round $M$, here is a planetary system in which $M$ is the radius of the deferent, $M P$ that of the epicycle (which is direct) and the epicyclic velocity is to the deferental as the angle $P M C$ to $M O A$. Now the arcs $T V$, $T W$ are equal, and $T O A$, $T W$ being $\phi$, and $T M W$ being $\phi$, we have $\phi = \phi$, or

$$PMC = \frac{F}{R} + 1 \phi$$.

2. Every hypotrochoidal system in which the rolling circle is the larger of the two is a planetary system in which the epicycle is direct. Here, in the proper diagram, $W T$ has rolled over $V T$, as before, and $O M$ and $M P$ are the radii of the deferent and epicycle, and the epicyclic velocity is to the deferential as the angles $P M C$ and $M O A$; and $M O = R - F$. If $M O$ and $T M W$ be $\phi$ and $\phi$, we have, from the equal arcs $T W$ and $T V$, $R \psi = F \phi$, and

$$\angle P M C = \phi - \phi = \left(\frac{F}{R} - 1\right) \phi$$.

3. Every hypotrochoidal system in which the rolling circle is the smaller is a planetary system in which the epicycle is retrograde. In the proper figure it is now evident enough that $O M$, the radius of the deferent, is $F - R$; and that, $M O A$ and $W M T$ being $\phi$ and $\psi$, we have $R \psi = F \phi$, from the equal arcs $T W$ and $T V$. It is plain also that $M P$, the radius of the epicycle, moves with a retrograde velocity. Moreover, the epicyclic and deferential velocities are as the angles $P M C$ and $M O A$, and $R \psi$ being $F \phi$.

$$\angle P M C = \phi - \phi = \left(\frac{F}{R} - 1\right) \phi$$, and $\frac{F}{R} = \frac{F}{R}$ for the ratio of the velocities. Either then
To distinguish the two hypotrochoidal systems, which have very different properties, let that one in which the rolling circle is smaller than the fixed, so that the curves lies entirely inside the fixed circle, be called the internal hypotrochoidal system; and that in which the rolling circle always contains the fixed circle, and in which the curve is entirely without the fixed circle, the external hypotrochoidal system. It appears then that a planetary system with a direct epicycle belongs to both the epitrochoid and the external hypotrochoid: while one with a retrograde epicycle belongs to the internal hypotrochoid.

We now take the converse problem,—namely, given a planetary system, to find the corresponding trochoidal systems. This might be easily done algebraically from the preceding results, but a simple geometrical construction will much assist the beginner, who rarely can get the true phase of a figure out of formulae. It is required first to construct the real velocity and direction of a planet at any point of its curve. The epicycle is, at any given instant, moving forward perpendicularly to the radius of the deferent with the velocity $a$, while the planet is moving perpendicularly to the radius of the epicycle with a velocity $nb$. The composition of these two velocities gives the real motion and direction of motion of the planet for the time being, and shows us how to draw the tangent of its curve.

Let $OM$ and $MP$ (Fig. 3) be radii of the deferent and epicycle (not drawn); and from $P$, the planet, draw $PX$ and $PY$ perpendicular to $OM$ and $MP$. Make $PX$ to $PY$ as $a$ to $nb$, and complete the parallelogram $PXYZ$. Then $PX$ represents the motion, for the instant, of the whole epicycle, and $PY$ the motion of the planet in the epicycle whence $PZ$ represents the planet's actual velocity, and $PZ$ is tangent to its curve. In the first of the figures the epicyclic motion is direct, and in the second retrograde, the arrows showing the direct motion of revolution. Also, for variety, the planet is placed much nearer to its pericentre in the second figure than in the first.

Draw $PSL$ perpendicular to $PZ$, meeting $OM$ and epicycle $S$ in $L$ and $R$. Then, the sides of the triangles $QPS$, $PMR$, being severally perpendicular to those of $PZX$, these three triangles are similar to one another. Hence

$$PQ = \alpha : QS :: PX : XZ :: a : nb, \text{ or } QS = \alpha n$$

$$PM = \beta : MR :: ZK : XP :: nb : a, \text{ or } MR = \alpha n$$

In the second figure, or when the epicycle is retrograde, it will always be found that $R$ and $S$ are in $OM$ and $Q$ produced: but the first figure, as drawn, is good only for the case in which $n$ is greater than 1, as was supposed in the construction, and is seen in the result, since $QS$ or $Rn$ is shorter than $QO$ (or $b$), and $RM$ (or $a$), is less than $OM$ (or $a$). If $n$ had been less than 1, $PS$ would have passed through $Q$; but in all cases of direct epicycle, one of the sides $OM$ and $MQ$ is cut externally and the other internally; while in every case of retrograde epicycle, both are cut externally, and have of the revolving circle, the arm of connection being $QP$. For instance, if we take the retrograde epicycle, and make

$$F = b(1 + n), \text{ or } b = \frac{R}{1 + n}$$

which are the equations, already found, of connection between the internal hypotrochoidal system and its corresponding planetary one: and similarly for the other cases.

And the result is, as appears from the figure, that every direct-epicycle planetary system is both epitrochoidal and externally hypotrochoidal, while every retrograde-epicycle planetary system is in two different ways internally hypotrochoidal. We are thus enabled to refer the description of all the trochoidal curves to their corresponding planetary systems, which are much more easily followed, especially when, as is always in our power, we make the radius of the epicycle not exceeding that of the deferent. It has appeared that when $a = bn$, the planet has no motion of revolution, at the apocentre in a retrograde epicycle, and at the pericentre in a direct epicycle; the motion must then at those epochs be all from or to the centre, giving curves with such cusps as are shown in a former diagram. Now, looking at the corresponding trochoidal systems, we see that when $a = nb$, $QS = QP$, and $MR = MP$, or the point which describes the trochoid is on the circumference of the rolling circle. In this case the epicycle is called an epicycloid, and the hypotrochoid an hypocycloid. And since in all cases the line which joins $P$ with the point of contact of the circles ($R$ or $S$) is normal to the curve, or perpendicular to the tangent, it follows that in the epicycloid and hypocycloid, the two chords which join the point that traces out the curve with the two extremities of the central diameter of the rolling circle are, one tangent, and the other normal, to the curve.

We shall now pass on to the consideration of the varieties
which planetary curves afford; and first we have to separate some extreme or critical cases from the rest. These are when \( n = 1, 0, \) or \(-1,\) for we shall now begin to distinguish three cases of the radii of the rolling circles. When \( n = 1,\) \( \mathcal{P} (\text{Fig.} 1) \) will always be equal to the deferent of the epicycle. If \( n = -1,\) the angle \( \angle \mathcal{C} \mathcal{M} \mathcal{P} \) \( (\text{Fig.} 4) \) is always equal to \( \mathcal{M} \mathcal{O} \mathcal{N}, \) and the triangles \( \mathcal{E} \mathcal{O} \mathcal{N}, \mathcal{C} \mathcal{M} \mathcal{P} \) are similar: whence \( \mathcal{E} \mathcal{F}, \) or twice \( \mathcal{C} \mathcal{P}, \) is always a given proportion of \( \mathcal{E} \mathcal{N}, \) the ordinate of \( \mathcal{E} \) : it follows then that the planetary curve is an ellipse when \( n = -1. \) But when \( a = b, \) the point \( \mathcal{P} \) is always at \( \mathcal{H}, \) in the line \( \mathcal{O} \mathcal{N}, \) and the planetary curve is as much of the straight line \( \mathcal{O} \mathcal{H} \) as extends from twice \( \mathcal{O} \mathcal{M} \) on one side to twice \( \mathcal{O} \mathcal{M} \) on the other. Looking at the trochoidal character of these varieties, we have, when \( n = 1, \) either \( \mathcal{F} = 0, \) \( \mathcal{R} = b, \) or \( \mathcal{F} = 1, \) \( \mathcal{R} = 0; \) that is, the curve then described is made by a circle revolving round a point in its circumference; in both cases we have a circle. But when \( n = 0 \) we have \( \mathcal{F} = b, \) \( \mathcal{R} = 0, \) or the trochoidal curve belongs to a point connected with a circle of no radius, which revolves on a circle of the radius \( b, \) or \( \mathcal{O} \mathcal{K}. \) This is one of those extreme cases which are rather interpreted than perceived [Interpreta-

\[ \phi = \frac{360^\circ}{n - 1} \]

This gives us on until \( n \) is so far reduced; in value that \( a = nb, \) when the pericentral velocity vanishes, both the trochoidal systems have the planet upon the rolling circle, the loops degenerate into cusps, and we have epicycloids, as follows:—

\[ \phi = \frac{360^\circ}{n - 1} \]

\[ \phi = \frac{360^\circ}{n - 1} \]

\[ \phi = \frac{360^\circ}{n - 1} \]
Towards the end of this division the character of the curve may be much affected by the relative value of $b$ and $a$. At the epicyloid, when $n = a - b$, the angle from apocentre to pericentre, as subtended at the centre, is $180^\circ \times (n - 1)$ or $180^\circ (a - b)$ in degrees. The nearer $a - b$ is to unity the greater does this angle become, and if $a$ be near enough to $b$, it may be increased to any amount: so that a planet might descend from apocentre to pericentre through thousands of thousands of revolutions before it formed its loop or cusp, and began to ascend, as in the following figures:

If $a$ be actually equal to $b$, all these curves have the lower points of their loops in the centre itself, but as $n$ diminishes down to unity, the descent becomes slower and slower; and when $n = a - b$, or 1, ceases altogether, the apocentral circle itself being the hypocycloid of this extreme case.

II. When $n$ diminishes from $a - b$ down to 1. When $n$ has become a little less than $a - b$, the angle from apocentre to pericentre has increased, the velocities at both places are direct, or the planet is never retrograde. In the trochoidal systems, it is now without the rolling circle of the external hypo-system, but within that of the epicyclic system. The cusps have given way to points of contrary flexure, as in the following figure:

The way to find these points of contrary flexure is as follows:—Find $a_{n}$ from the equation:

$$\cos (n - 1) = \frac{a^2 + b^2 n^2}{a b n (n + 1)}$$

then there is one point of contrary flexure when $\phi = \phi_{n}$; and another when $\phi = \frac{300^\circ}{n - 1} - \phi_{n}$.

As $n$ diminishes, these points of flexure, after approaching somewhat towards the apocentre, cease that approach, and begin to return towards the pericentre, in which they are lost when $n$ has come down to the square root of $a - b$. But this time they do not unite in the cusp from which they came, but the convex part of the curve disappears, in such a manner as to give a remarkable straightness to the parts adjoining the pericentres.

When $n$ is less than $\sqrt{(a - b)}$ the curve is always convex, and the angle from apocentre to pericentre perpetually increasing, the descent may be made as slow as we please, as in the following:

At the limit of this case, when $n$ becomes 1, all descent ceases, and the apocentral or pericentral circle is all that is left, as before described.

At the beginning of this section of curves, the planet was upon the rolling circle in both trochoidal systems: it became a kind of epicycloid, as rolling outside the rolling circle in the external hypo-system, and inside the rolling circle in the epicyclic system. Moreover, in the former the fixed circle gets smaller, and the rolling circle approaches the epicycle, so that when $n = 1$, the external hypo-system is merely the epicycle revolving round a point in its circumference. But in the latter, as $n$ approaches to 1, the rolling circle approaches the deferent in size, while the fixed circle becomes smaller and smaller: its extreme case coincides with the extreme case of the former system.

III. When $n$ diminishes from 1 to 0. The angle from apocentre to pericentre, or the angle of descent, as we may call it, which left off infinite at the end of the last section, immediately becomes very great and negative when $n$ is a little less than 1; indicating that the descent is performed by the radius of the deferent gaining upon that of the epicycle, instead of the contrary. The curve is always concave to the centre, and its long folds, much resembles that of the last diagram. But as $n$ diminishes towards 0, the angle of descent becomes less and less, and is only $-180^\circ$ when $n = 0$; and during this time, the descent becomes more and more circular, until, when $n = 0$, we have nothing but the circle with centre $K$ and radius $KB$, as before explained (fig. 1). As to the trochoidal systems, the external hypo-system and the epicyclic system have changed formulae: in the latter, the fixed radius changes from 0 to $b$, and the rolling radius from $b$ to 0, the planet being always outside the rolling circle: the extreme case has already been explained. But in the former system both radii increase without limit, and become infinite when $n = 0$, the planet being always within the rolling circle. The extreme (last) case is then explained ([last] page 265): to construct a planetary curve in which the epicyclic motion is very slow compared with the deferential, by means of its external hypo-trochoidal system, we must take both radii fixed and rolling, very large, and the larger the slower the relative epicyclic motion, without limit.

IV. When $n$ increases negatively from 0 to $-1$. The angle of descent, which left off at $-180^\circ$, now diminishes in amount, being still negative; and by the time $n = -1$, it brings us, as we must be thus explained, which is $-90^\circ$. The apocentral and pericentral velocities are still positive throughout this section, and the curve is a series of shorter concave descents. The final ellipse has $a + b$ and $a - b$ for the semi-axes.

Both the trochoidal systems are internal hypo-systems, the planet being inside the larger of the rolling circles, and outside the smaller. At the extreme case, the ellipse, the two systems are the same, and in both cases the fixed circle becomes double of the rolling circle in diameter. Before the extreme case, the greater rolling circle belongs to the greater fixed circle, and the less to the less.

V. When $n$ increases negatively from $-1$ to $-a + b$. The curve is always convex, and the angle from apocentre to pericentre perpetually increasing, the descent may be made as slow as we please, as in the following:—
Something resembling the last continues (the angle of descent still diminishing) until that angle is too small to allow of a descent wholly concave. By the time $n$ becomes $\pm (a + b)$ the descent is almost a straight line, except very near the apocentre, and when $n$ is greater than $\sqrt{(a + b)}$, taken negatively, there are points of contrary flexure dividing the convex from the concave part as before.

These points of contrary flexure do not, as before, return to the apocentre at which they begin; but as $n$ varies from $-\sqrt{(a + b)}$ to $-a - b$, they run up the arc of the curve, and unite at the apocentre, when $n = b + a$, in a cusp. This cuspedated curve is the hypocycloid, and up to this point both apocentral and pericentral motions are direct.

The only change that has taken place during this time in the trochoidal systems is a continual increase of both circles in one of them, and a continual diminution of both in the other. At the hypocycloid both the rolling circles are thus brought to pass through the planet, and the fixed circles become equal. The common radius of the fixed circles is $a + b$, those of the rolling circle $a$ and $b$.

VI. $\sqrt{n}$ increases negatively from $-a - b$. We left off with the hypocycloid at which the apocentral motion (in revolution) is nothing. This apocentral motion afterwards becomes retrograde, the pericentral continuing direct, so that apocentral loops begin to be formed; and the central angle of retrogradation, in which the planet passes through the higher part of a loop, may be found from a preceding formula.

As $n$ increases, these loops become nearer and nearer, and at last begin to interlace, the angle of descent continually diminishing. In the trochoidal systems, both circles of one of the hypo-systems increase without limit with $n$, while in the other the fixed circle perpetually becomes more nearly equal to the deferent, while the rolling circle diminishes without limit. As $n$ increases, each of the loops more and more nearly coincides with the epicycloid, and the extreme limit is a circle of no radius, carrying the planet on an arm equal to the radius of the epicycloid, and revolving on a circle equal to the deferent: or a revolution in an epicycle whose centre is fixed. This limit of course is never attained; or perhaps the analyst would say, that when $n$ is infinite, the planet goes over the whole space between the apocentral and pericentral circles.

When the deferent and epicycle are equal, or $a = b$, the epicycloid becomes the apocentral circle, and the hypocycloid the straight line. The other curves take various extreme forms, as in the following diagrams:

There is never any sensible arc of retrogradation; all the retardation, as it were, taking place suddenly at the pericentre, that is, at the centre. We shall leave the further investigation of these cases to the student.

When $n = 2$, the angle of descent is always 180°, and the epicycloid has the rolling and fixed trochoidal circles equal, and is a curve shaped somewhat like a heart, whence it is called the cardioid.

On these curves generally we may remark, that their minor modifications of form are very various. The descent through a point of contrary flexure, for example, gives two curves of very different figures, according as the angle of descent is more or less than a right angle; and the loops may be made very small or very large, compared with the rest of the curve. It must be particularly noticed also, that by the angle of descent we mean simply the angle between the apocentral and pericentral distances, not the vectorial angle described in going from one to the other: the latter may become greater than this angle of descent before the pericentre is arrived at, and then diminish down to the angle of descent.

Let us now suppose the deferent to become a straight line, or $a = \infty$, and let the centre of the epicycle be carried along this line with a velocity $a$, while the planet moves in the epicycle with an angular velocity $\nu$ in theoretical units. Curves will now be described which are called "trochoids," among which the cycloid has the same place as the epicycloid among the epicycloids, or the hypocycloid among the hypotrochoids. The forms can be readily imagined by conceiving the deferent to be a circle of great radius. It is now of no consequence whether the epicycloid motion be direct or retrograde. If $\nu$ be very great, we have a series of interlacing loops; when $\nu$ becomes less, these loops separate; when $a = \nu b$, the loops degenerate into cusps, and we have the cycloid; and when $a$ is greater than $\nu b$ we have only a series of undulations with points of contrary flexure. All this may be represented by a trochoidal system in which a circle rolls upon a straight line, carrying with it an arm to which the planet is attached; and the trochoid is looped, cycloidal, or wavy, according as the planet is without, on, or within, the rolling circle. It will be a good exercise for the student to deduce the centre and radius of the rolling circle from a construction similar to that hereinafter employed for deducing the elements of the trochoidal from those of the planetary system.
To suppose the epicycle infinite leads to nothing: but if we now take a trochoidal system, and suppose the rolling circle infinite, we have what is equivalent to a straight line rolling round a circle to which it is always tangent, and remaining fixed at that point. If here the planet be on the straight line, we have obviously the involutes of a circle; for the unrolling thread described in the article cited may be considered as the part of the rolling tangent which has heaped up, so to speak, into the circle since the beginning of the motion. If the planet can pass through the centre of the fixed circle, the curve becomes the spiral of Archimedes. These spirals must be made complete by using both positive and negative values of the radius vector. [See page...]

They are not of much use except to the mathematician.

The various classes of trochoidal curves must be studied to aid in forming a proper conception of the effect of combined circular motions: one remarkable instance of their application is that of the apparent motions of the planets. These apparent motions must be exactly what would take place if the earth were at rest, the sun revolving in an orbit about the earth, which orbit is the deferent; while the sun itself is the centre of an epicycle (to that of the planet's orbit, in which epicycle the planet moves. And since the epicycle and deferent are convertible, we may in the case of one of the superior planets use the planet's largest, and the sun's smaller orbit as an epicycle. Again, since the planet of the smaller orbit always has the greater angular velocity, the ratio of the epicycle to the deferential velocity, or $n$, is always, the smaller orbit being the epicycle, greater than unity. Hence, when the planet is retrograde, the loop of its apparent orbit is always turned towards the earth, so that the apparent magnitude of the planet is always greatest in the middle of its retrogradation. To test these things, we ought to have angles of longitude measured in the plane of the planet's deferent, as well as in the plane of the epicycle; but since the inclinations of those planes to the ecliptic are not very great (with the exception of the new planets), angles measured on the ecliptic, or longitudes commonly so called, will do as well for illustration.

When the planet begins and ends its retrogradation, the tangent of the apparent orbit passes through the earth, and the planet, moving in that tangent, does not sensibly change its apparent position in the heavens for several days; it is then called stationary. The angle between these two stationary points is the angle of retrogradation, for which a formula has been given. But we shall simply notice the general figure of the apparent orbits, giving the ratio of the radius of the deferent to that of the epicycle, when the smaller of the two orbits (sun's round the earth, and planet's round the sun) is the epicycle, and the larger the deferent, and also the ratio of the angular motions.

$$\alpha = \frac{r}{a} \tan \theta,$$

$$\tan \theta = \alpha \sin \phi \pm \beta \sin n \phi.$$
\[
\begin{align*}
\{ a^2 + b^2 r^2 \}^2 &= 1 + \left( \frac{b n t - a}{a^2 b^2 (n^2 + n)^2} \right) \\
\phi' &= \frac{n (n + 1) \phi}{(n + 2) \phi} \\
\end{align*}
\]

The various double points are thus determined. Let \( \phi \) and \( \phi' \) be the two deferial angles belonging to a double point, the first when the curve passes through it the first time, and the second for the second. Hence the same value of \( r \) is the same at both points, we must have

\[
(\phi - \phi') = 2n \gamma + (n - 1) \phi.
\]

(12)

\( k \) being a whole number, positive or negative. If \( n = (n - 1) \), the angle of descent, be called \( \mu \), we have

\[
\phi' = k \phi + \phi \phi' + \mu.
\]

and we will substitute this in the equations (1) remembering that \( n \mu = \mu + \phi \), we find, by ordinary trigonometrical development, that the following equations exist between the coordinates of every double point:

\[
x = \cos 2k \mu, y = \sin 2k \mu, x = \cos 2k \mu, y = \sin 2k \mu.
\]

These two equations should be really the same, and they are so if we take the lower signs, in which case they amount to the following:

\[
y = \tan k \mu, x, \quad \theta = k \mu, \text{ or } k \mu + \pi.
\]

If the higher signs be substituted, it will be found that the two equations are not identical except when \( 2k \mu = 2 \phi \), \( \theta \) being a whole number, which can be true only when \( n \) is a commensurable fraction. But this case being further examined, shows that no double points are indicated, only that the curve itself is repeated in all its points after a proper number of revolutions of the deferent, as is otherwise sufficiently obvious. Consequently all the double points of a trochoidal curve lie in apocentric or pericentric radii, or in the radii opposite to them. The values of \( y \) and \( x \) in \( y = \tan k \mu, x \), and this equation is easily reduced to

\[
am 
\sin (\phi - k \mu) = \sin (n \phi - k \mu) = 0;
\]

from which the values of \( \phi \) which belong to double points answering to different integer values of \( k \) are to be obtained by approximation.

The radius of curvature of any trochoidal curve is obtained from the formula (10), and is as follows:

\[
\frac{a^2 + b^2 n^2 + 2ab n \cos (n - 1) \phi}{a^2 + b^2 n^2 + 2ab n \cos (n - 1) \phi}
\]

It never becomes nothing except at the cusps of the epicycloid or hypocycloid; nor infinite except at the points of contrary flexure, or at the pericentre in the case of a great approach. The equation of the Evolute [Evolute and Evolute], \( \xi \) and \( \eta \) being coordinates of a point \( n \), is involved in the following equations:

\[
\eta = a (n - x) \sin \phi + b (1 - n \phi), \\
\xi = a (1 - \cos \phi) - (n - 1) \cos n \phi \\
x \text{ being } x = a^2 + b^2 n^2 + 2ab n \cos (n - 1) \phi
\]

The evolute, then, of a trochoidal curve may be described as an extended sort of planetary character, having an epicycle of variable size, and radius \( b (1 - n) \), which moves upon a deferent, also of variable size, whose radius is \( a (1 - n) \). In one remarkable pair of cases this variation of the elements of the evolute causes, namely, for the epicycloid and hypocycloid. If \( b n^2 = a^2 \), it will be found that \( \xi \) becomes the constant 2\( (1 + n) \), and the equations of the evolute become those of a new epicycloid or hypocycloid, having its vertices at the cusps of the originalolute.

The arc of the trochoidal curve cannot be obtained without the previous rectification of an ellipse, except in the case of an epicycloid or hypocycloid. In the former case the arc measured from the apocentre or cusp, formed while the deferial angle \( \phi \) is produced, is

\[
4ab \div (a + b)
\]

and the whole arc of descent is \( 4ab \div (a + b) \). The same for the epicycloid, the apocentre being now a vertex, is

\[
4ab \div (a - b)
\]

the whole arc of descent being \( 4ab \div (a - b) \). All the preceding formulae may be reduced to those of the trochoidal form by the general equations before given.

resulting from them. Most of those given in this article were executed in his lifetime by means of Ibbetson's geometric pencil. A number of these which are known to turners, but which have never been exhibited, as far as we know, in any article professing to give a mathematical classification of them.

The preceding is the curve called the troctrix in the ancient mathematics. It is a wood-cut made in the usual way from a drawing made in the lathe; all the rest are cut in the lathe.

TROCHIDEEA. [Trocchideae.] The genera referred to Trogloidea will be more particularly treated of in the article TURBINIDE.

TROCHUS. [Trocchidae.] TROGEN. [Troceni or Trochini], one of the most ancient Greek cities in Argolis. It was said to have been built by Leucippus, a Greek who Pausanias (ii, 6, 6) considers to have been an Egyptian, but it derived its name from Troezen, one of the sons of Pelops, for before its time its name is said to have been Posidonia. It was situated on the eastern coast of Argolis, fifteen stades from the sea. The harbour, at the entrance of which lay the island of Calauria, was called Pogon (a beard), whence the Roman proverb 'Trocoenem navigare,' to wear a false beard. The town itself lay on a considerable eminence between the sea and the mountains. Posidonion and Troezen are still extant in and about the modern village of Tamala.

Troezen was a sovereign city which had a considerable territory and several small towns. Its wealth and power derived from the trade which in the Persian invasion of Greece the Trogzenians joined their countrymen with an army of 1000 men and five ships of war. Their generous conduct towards the Athenian women, children, and slaves who quitted Attica when Xerxes invaded its refuges shows the character of the Trogzenians. Their town continued to be of some importance even as late as the time of Strabo, and Pausanias has left us a description of its numerous temples and other public buildings, most of which were filled with costly works of art. (Paus. ii, 31, &c.)

TROGLODYTAE (Τρογλοδύται). [APES, vol. ii., p. 147.] Under the term Trogloidytes the ancients appear to have comprised men of the same race of men. The principal race, that referred to by Pliney (Nat. Hist., v. 8, as excavating caves for habitations, feeding on serpents, and expressing their ideas by articulate sounds, 'strider, non vox,' is placed among the Aethiopians. Again, in the twenty-ninth chapter of the sixth book, treating of the nations near the Red Sea, we find the Troglohytesi and the Aethiopians. The annotator, in the Variorum Pliny (Lud. Batz., Rotterdam, 1609, &c.) states in a note to the chapter last quoted, that the Troglodytes of Pausanias near the Red Sea then went by the name of Trogloidytes, and that the kingdom was called Barmagas by the natives.

These African Trogloidytes, according to Aristotle and other ancient writers who have treated on the subject, lived in holes in the ground, in regular magazines. They built the corpse neck and heels together, hung it up, pelted it with stones amid shouts of laughter, and, finally, after having covered it with a heap of stones and placed a stone upon the heap, lit fire to it. The tribe usually warred for food, and strangled weak and worn out individuals of their own nation with an ox's tail. This mode of disposing of such members of the community was considered a benefit, and the dead were treated in the same manner; for they held it to be the duty of such persons to go down into the earth, to do anything worthy of life should continue to love it. They missed rather than spoke, and lived on the flesh of serpents, some of which were found in their country twenty cubits in length. In a state of indulgence they were able to run down the wild beasts which they hunted. In their territory some placed the Fountain of the Sun, which was tepid in the morning, cold at noon, become warm in the evening, and at midnight poured forth streams of the hottest water.

A general description of the mode of living and of the habitations of the Trogloidytes on the Arabian Gulf (the Red Sea) is given in Strabo (xvi, p. 775, &c.). Their principal occupation was the breeding of cattle, and the highest power was in the hands of a number of chiefs. The men had wives and children in common, with the exception of the chiefs, who had wives belonging to them exclusively. They lived principally upon animal food and no part of an animal, not even its bones and skin were despised as food. They were either naked or were clothed with skins, and the women tattooed their bodies, and wore necklaces of shells. These general features, and still more the detailed account of their life in Strabo, show that the Trogloidytes were people in the lowest stage of civilization.

In the island of Crete the Trogloidytes live in the Trogloidytes, and places them in the marshes whence the Nile flowed, in which locality they with their little horses made war against the cranes.

Cluverius states that the Arabian Trogloidytes possessed the whole left side of the Arabian Gulf, where the region itself was called Trogloidyta. In the fourth section of the fifth chapter of the sixth book, in which he treats of the Deserts of Libya, the Trogloidytes and Garamantes, he places the Trogloidytes beyond the Libyan Deserts, in the locality called, when he wrote, the Desert Brevia; and he says that the Black Mountain (Mons Aer, so called from its sun-burnt appearance) protected the Trogloidyta from the south wind; and that beyond them lay the Garamantes, called, when he wrote, the kingdom of Borno. (Bouquet.)

The accounts of the almost mere animal life of the Boshischem, in South Africa, by Thunberg and others, correspond in some particulars with those related of the Trogloidyta.

But there was also in Mosis a nation called Trogloidyta. Cluverius describes the Pocceceurs and the Trogloidyta as inhabiting the lower part of Mosis. (Introit.Hist. VIII., cap. 12, p. 518; Diod. Sic., xxvii, 15; and Strabo, xxvii, p. 578; that the tribe was more accurately known as Trogloidyta, he places the Garamantes between the coast of Syria and that of the Caucasus. This tribe was well acquainted with the cultivation of corn. (Strab., xi, p. 506.)

The earliest extant account of Trogloidyta is by Agatharchides of Cnidus (Photius, Bibliotheca, c. 290.)

TROGLODYTES. [Wrens.]

TROGLODYTINAE. [Wrens.]

TROGON. [Trogonidae.]

Trogons form a family of INSSECTEARS, or Perching birds, remarkable for the beauty of their plumage.

Biross's thirteenth order of birds consists of those which have four toes, two before and two behind. The order is divided into four sections: 1, those with a straight bill, comprising the Wyneek, the Woodpecker, and the Iacamas; 2, those with the bill slightly curved, embracing the Barbets and the Cuckoos; 3, those with a short and hooked bill, including the Trogons (Cournout), the Buit de preu (Courcous), and the Parrots; 4, the Toucans.

Linneus, in his last edition of the Systema Naturae, placed the genus Trogon in his order Picu, between Paradise and Hucco, in the body of the work; but, in his Characteres Avium, at the commencement of the birds, where the living is divided into sections (1, those with walking feet; 2, those with scansional feet; 3, those with sessorial feet), he places Trogon in the second section, between Ramphastos and Psitacus. Latham also places this order in the same name section, between Courcous and the Barbets.

Leopéde makes the second order of his great division Grimpours, or Climbing-birds, consist of those with a dentilated bill. At the head of this order he places the Toucans, and, between them and the Trogons, the Trogons.

In Dumeril's arrangement the Trogons appear in the second family (Levitintes or Ceranomphantes) of his Climbing-birds, between the Phinfin-naiers and the Toucarons.

The Trogons are a family of birds of the order of Grimpours, and in that family Trogons stand between Corythae and Musophaga.

Cuvier, in his last edition of the Regne Animal, places the Trogons (Trogon, Linn.) between the Barbets (Hucco, Linn.) and the Touraco (Anisofion).

The subgenus Tamatia, among the Barbets, immediately precedes the Trogons. These with other secular genera form Cuvier's third order, Grimpours.

The Trogons are placed as the first family of the Barbets (Barb.), the fifth family of M. Vieillot's first tribe, Zygolodytii, of his second order, Syvicolere.

In M. Terninck's fifth order, Zygolodytii, the Trogons are placed in the suborder Grimpours and the family Trogontia.

In the method proposed by Mr. Lichtenstein in 1815 and 1821, and developed by Mr. Lherminier in 1827, Trogons stand in the first subclass (Normal Birds), between Cukus and Galapusi.
The Pogoniopygues, or Beady-bills, are the second family of M. Latreille's third order, Grimpures, and in this family our own stands between Barbicou (Pogonoma) and Muscosa.

The families comprised in the order Sacerodotes of Mr. Vigors are Ramphastidae, Psittacididae, Picidae, Cerithiidae, and Caclididae; and he observes that the immediate connection of Ramphastos with the succeeding group, Psittacididae, is so exact that he has placed next to each other by all systematic writers; and he says that he decidedly concurs in the general views which bring them into neighbouring groups. 'But,' he adds, 'I am inclined with others to think that they are intimately connected, and soften down the important difference observable in the bills and tongues of these birds. This is one of the greatest chasms which interfere with the continuity of our chain of affinities. I might indeed hazard some suggestions as to the mode in which this difficulty may be solved; but I wish to illustrate the general principles of this inquiry by such facts as are acknowledged, and such inferences as are indisputable, without treading on the unstable ground of conjecture.' At the word 'suggestions' in the paragraph above quoted is a reference to the following note:—'It is particularly mentioned the Trogon, Linn., as a bird, whose bill, serrated, but, at the same time, short and hooked, give it a character peculiar to each of these groups. We know but little of this genus, although it abounds in the Old and New World, and that little is altogether insufficient to afford us any information as to its natural affinities.' (On the Natural Affinities that connect Genera and Families of Birds, in Linnean Transactions.)

M. Lecog, in his Table Méthodique, makes the Trogonés the fifth family of his fifth tribe (Symbatylæ) of his second order (Passerremæ). The Trogonés are placed between the Huacones and the Psittacidae. (Manuel d'Ornithologie.)

Mr. Swainson acknowledges that the Trogonide, or Trogons, are, in one sense, such an isolated group, that zoologists have been divided in what natural family to arrange them; and he remarks that Cuvier, in placing them nearly to the Puff-Birds (Tamarina), seems to have had some perception of what Mr. Swainson believes to be their true station in nature, although both these groups find a place among his Climbing-birds (Grimpures). Mr. Vigors, he observes, in his 'Natural Arrangement,' first placed the genus Trogon between Crotophaga and Corytharia with a mark of doubt, but subsequently arranged them next to the Parrots. 'The Trogons,' says Mr. Swainson in continuation, 'are abundant in South America; and are, perhaps, one of the most extraordinary genera found in that continent. They are not climbing-birds, nor are they small birds; they are useful fowls, perhaps, for the deepest and most gloomy shades during the day, when they sit almost motionless on a dead branch: during the morning and evening they are more active; at these times they go to and fro in the trees and bushes, taking a short stallon, dart upon winged insects, particularly hard-coated beetles; at other times they feed upon fruits, especially on the rich purple berries of the different Melastomas (Melastomatae), at which they invariably dart precisely as same as if they were insects capable of getting away. The singular account of these birds given by our hunters first awakened our attention to them in their native regions, and these results have since been fully confirmed by the observations made upon them by Mr. Waterton, a well known and observing field-naturalist. Finally, the Trogons, like the Goatsuckers, have remarkably thin skins; like them, they feed upon the wings; the feet of both are so soft and feeble, as scarcely to be by any further use than to rest the body; the bill in both is remarkably short; the plumage in both is so soft and loose, both have the mouth defended by strong bristles; and both are most active during twilight. Here then is the peculiar resemblance between these two families, an affinity yet discovered between the Cramphigulides and the Trogonide; and it is thus, as we conceive, that the cible of the Fissirostrae is formed, we began with the Goatsuckers; and, after tracing their connection with the Swal- low-tailed, we come to the Spiderlings, taking the Kingfishers, we finally return to the point when we started.' (Classification of Birds.)

In the Synopsis of the same work the Trogonide are placed between the Hulseonide and the Cramphigulide, with the following characters:—

Trogonide. The Trogons.

Bill short, tricuspid, strong for the题材, and generally the margins, toothed. Wings very short. Rascular.

Genus Trogon, Linn. Both mandibles with their cutting margins serrated, The two anterior toes united as far as the first joint. Nostrils concealed by bristles. Tarsus almost feathered. Tropical America. The centristral type.

Examples. Trogon melanurus, &c.; twelve species in all.

Subgenera. Harpactæ, Sw. Bill stronger; both mandibles deeply notched at their tips, but the margins smooth. Nostrils perfectly naked. Tarsus only half feathered. The anterior toes less united. Tropical Asia. The centristral type.

Examples, Harpactes malobaticus, &c.; six species in all.

Apodotoma, Sw. Bill as in Trogon, but the dentations almost obsolete. Feet stronger than the toes; the latter to their base to their. Africa. The tenuirostral type.

Examples, Apodotoma Narina and Apodotoma Reinwardtii.

Apodotoma, Sw. Bill as in Trogon. Tail-feathers forked at their tips; the points diverging. South America. Feet—? The fissirostral type.

Examples, Temnurus abellicollis; but note, Mr. Swainson remarks that neither Mr. Temminck nor Mr. Gould, to whom monographs of birds are attributed, has described the form of the feet, and he says that he is therefore doubtful if this is its true situation.

Calurus, Sw. Bill destitute of serrations. Head (typically) with a compressed and elevated crest. Upper tail-covers enormously developed, and lying the tail. South America. The rascal type.

Examples, Calurus resplendens and Calurus paranionus. Under a line, and between the Trogonide and the Cramphigulide, are placed the genera Crypticus, Sw., and Trogonidea, III.; and Mr. Swainson, speaking of Crypticus, remarks that it is by this form, as he suspects, uniting to the Lamosanidae, that the circles of the Hulseonide and the Trogonide are connected (1837).

Mr. Gould's splendid 'Monograph of the Trogonidea' was finished in 1833; and in the 'Introduction' to that work he observes, that such birds, as their general structure and their habits sufficiently indicate, belong to the fissirostral tribe, the Cramphigulide. 'We are,' he says, 'seize the fitting insect on the wing, which their wide gape enables them to do with facility; while their feeble tarsi and feet are such as to qualify them for the branches of a tree, as a post of observation wherever to mark their prey as it passes, and to which, having given chase, to return. As in all other groups, however, we shall find modifications of the type constituting the ground of generic or subgeneric divisions.

If not strictly elegant in form, the Trogons in the brilliancy of their plumage are surpass'd only by the Troonglides: their splendid ample compensates for every other defect. Denizens of the intertropical regions of the Old and New World, they show their gorgeous colors in the deep and gloomy recesses of the forest, avoiding the light of day and the observation of man; dazzled by the brightness of the meridional sun, morning and evening twilight is the season of their more active display.

Mr. Gould refers to Mr. Griffith's edition of Cuvier's 'Animal Kingdom' for an account of the habits of the Trogons; and the author of that account notices their long attenuated feathers with disarranged and luxuriant bars, other being among them appear more bulky than they really are. The feathers, too, are stated to be so feebly implanted that they fall at the slightest agitation, and the skin is described as being so delicate that it will tear upon the slightest touch.

The Trogons themselves are described as solitary birds, extremely jealous of their freedom, never frequenting inhabited or open tracts, and delighting in the silence of deserts. The interior of the thickest forest is their home, 'they are seen sometimes on the summit of trees; but in general, they prefer the centre, where they remain a portion of the day without descending to the ground, or even to the lower
branches. Here they lie in ambush for the insects which pass within reach, and seize them with address and dexterity, though they are among the most lively, active, and lightning. Though they thus conceal themselves in the thick foliage, it is not through distrust; for when they are in an open space, they may be approached so nearly as to be attacked before they can get off. They are remarkable to utter cries, except during the season of reproduction, and then their voice is strong, sonorous, monotonous, and melancholy. They have many cries, from the sound of one of which their name is derived. All those whose habits are known to exist equally in the latter part of the woods, which they enlarge with their bills so as to form a comfortable and roomy residence. The number of eggs is from two to four, and the young are born totally naked, but their feathers begin to appear within two or three days. The occupation of the male during incubation consists in watching for the safety of his companion, bringing her food, and amusing her with a song, which, though we should call it insipid, is yet without doubt the expression of sensibility. Some of the Couroupita express the syllable pio, repeated many times in succession with a powerful yet plaintive tone. Their accent almost reminds one of the wailings of a child who has lost its way, and it is this that distinguishes them from other birds of the forests. As soon as the young are able to provide for themselves, they separate from their parents to enjoy that solitude and isolation which appear to constitute the supreme bliss and happiness of the species. These elements are composed of larvæ, small worms, caterpillars, coleopters, and berries, which they swallow entire. The male, at various ages, the female, and the young differ in their plumage, which has given rise to the institution of more species than any other tribe.

This succinct but elegant account appears to be, in the main, faithful; and indeed Mr. Gould states that he is enabled in a great measure to confirm it, from the information which he obtained respecting this group whilst he was engaged upon his monograph. But Mr. Gould adds a few facts in some degree contradictory. His friend Mr. John Natterer, who had many opportunities of observing these birds in a state of nature, informed him that he had seen them, though very rarely, congregating together, and more than one species in company; a circumstance which Mr. Natterer accounts for on the principle that instinct leads them by some migratory movement to abandon one district at a certain season of the year in search of another, where food is more abundant. These migrations, however, Mr. Gould observes, cannot be extensive, inasmuch as their wings are not adapted for a lengthened flight: besides, their food is so diversified, that the circumstance suggests to him, remarks, with its peculiar species; for example, none of the species inhabiting Mexico have been found in the Brazils, and vice versa.

With regard to the Geographical Distribution of the Trogonidae, Mr. Gould says that they appear, on general survey, to be divided between America, including its islands, and the islands of the Indian Archipelago; two or three species only having yet been discovered on the continent of India, and those, principally inhabiting the countries bordering the Indian Seas. The great nurseries for these birds in the Old World are, he observes, the islands of Ceylon, Sumatra, Java, Borneo, &c.; while over the whole continent of Africa only a single species has yet been discovered.

It is in South America, however, that we find the greatest number of species, and those of the most exquisitely plumage: nor is this all; for it will be further observed that, in accordance with the great geographical isolation which existed out of exist certain characters common to the species inhabiting each region, which, although not very apparent to the unpractised eye, constitute the basis of generic subdivisions, and doubtless have an influence upon their habits and manners. Between the American species and those inhabiting India and Africa, we not only find this broad line of distinction, but discover moreover that the birds of each country are themselves naturally resolvable into certain main subgroups, each possessing its peculiar characters, and as different in habits as in form.

Mr. Gould further remarks that the beautiful species of the group to which the subgeneric title of Calurus has been assigned is distinguished by a redundancy of flowing plumage, are not, as may be expected, so well fitted for flight, or for taking their prey on the wing, as are the more closely-plumed species to which the generic name Trogon goes. It is a matter of universal experience, according to Mr. Gould, that the gorgeous birds of the former group tenet the topmost branches of the loftiest forest-trees, clinging beneath them like parrots, and feeding more exclusively on fruits and insects than the Trogons. He then remarks, that Mr. Gould appears to have taken the names of the subgenera Temnurus, Natterer, Catarus, and Bahama, for the purpose of distinguishing the species, each of which he describes in a separate Key.

The habits of the Old World species are much less known than those of the American Trogons; but from the more robust form of their bill and their wide gape, Mr. Gould is inclined to suspect that they feed even more exclusively on insects than on fruits; independently however of the greater strength of the bill, the non-surrection of the edges of the mandibles, and the half-denuded face, they may, Mr. Gould remarks, at all times be distinguished by the rich brown outline of the wing-quills, and the corners of the eye, by the entire absence of bars across the outer tail-feathers. With respect to the brown colouring of the plumage, there are, he adds, it is true, one or two exceptions to the rule. Gould remarks, that they are not always accompanied by the tail-feathers when accompanied by the former character.

The subgenera into which the Trogons are subdivided by Mr. Swainson appear to Mr. Gould perfectly natural: and he adds a symphonic table with the species arranged under those subgenera, retaining, however, the generic name of Trogon, universally applied to the whole family in the body of his work.

Previous to the commencement of Mr. Gould's monograph, the number of species known was only twenty-two; to these Mr. Gould has added and characterized twelve others new to science, among which are three additional species of the subgenus Calurus, of which two only were previously known, and those were confounded under one name. The total number of species known when Mr. Gould finished his monograph was thirty-four, twenty-three of which are inhabitants of America and its islands, ten of the Indian Islands and India, and one of Africa; but he states that those prejudices have been removed, and he reason to believe that many will yet be discovered, both in the Old and New World, particularly in those remote regions which civilized man has seldom, or ever, visited.

Mr. John, an intimate and valued associate of Mr. Gould, has described the subtribe of the tribe Fissirostræ, which is the first of his order Paro- coes. The Fissirostræ are divided by him into subtribes viz. Fissirostræ Nocturnæ and Fissirostræ Diurnæ. The Trogonidae are placed under the second subtribe, between the Todior and the Meiætider, and consist of the following.

Genera.—Priotelus, G. R. Gray (Temnurus. Sw.); Apudlera, Sw.; Harpactes, Sw.; Calurus, Sw.; and Trojan, Mehr.

**American Trogons.**

The remarkable plumage and other habits of the Trogons did not escape the observation of the ancient Mexicans, in whose mythology one of the species, at least (Trogon paloinius), was celebrated. Another species, the Temnurus of the Mexicans, Trogon Curucu, Linna., was employed by them for the common term of the Mex., and the ill-sounding name of the figures and pictures (imagines) used on festivals, in war, and in their temples. They were probably kept in one of the two houses which formed the Royal Menagerie of ancient Mexico, one of these houses being appropriated to birds which did not hear by prey; the other to birds of prey, quadrupeds, and reptiles. Three hundred men, according to Cortes, were employed to take care of these birds, besides their physicians, who watched their diseases and applied the most efficacious remedies to them. At the pleasure of the proprietors, some procured their food, others distributed it, others took care of the eggs at the time of incubation; whilst, at other seasons, pleated their plumage—for the Trogons not only brightened in the possession of many species, but was very careful of their feathers for the sake of...
famous mosaic images and pictures, as well as of the other works which were made of them.

Examples.—Trogon mexicanus (Sax.).

Description.—Old Male.—Beak bright yellow; throat and car-coverts black, gradually blending with the green which covers the chest and the whole of the upper surface; two middle tail-feathers green, with black tips; the two next on each side wholly black; the three outer on each side black, with white tips; wings black, the whole of which, with the exception of the primaries, is finely doted with grey; a crescent of white encircles (Next male. The outer edge of the primaries being white; and by the tail being regularly barred with black and white, which character is most conspicuous on the outer edges.

Female.—Top of the head, throat, chest, and back dark brown, inclining to olive on the upper surface, and to russet on the chest; across the chest an obscure band of light grey, the lower part and vent scarlet; wings black, slightly flecked with brown on the outer edges of the secondaries and shoulders; the outer edges of the primaries fringed with white; two middle tail-feathers chestnut-brown, tipped with black; the two next on each side wholly black; the remainder strongly barred with black and white for nearly their whole length; bill yellow, clouded with brown. (Gould.)

Locality.—North of Mexico.

Mr. Gould states that this species is identical with the Trogon glaucus of Lichtenstein.

Trogon (Calurus) resplendens, Gould. Male.—Beak gamboge-yellow; head covered with long filamentous plumes, forming a rounded crest; from the shoulders spring a number of lance-shaped feathers, which hang gracefully over the wings; from the rump are thrown out several pairs of narrow flowing plumes, the longest of which in fine adults measure from 3 feet to 3 feet 4 inches; the others gradually diminishing in length towards the rump, where they again assume the form of the feathers of the back; these plumes, together with the whole of the upper surface, throat, and chest, are of a most resplendent golden green; the breast, belly, and vent of a rich crimson scarlet; the middle feathers of the tail black; the six outer ones white for nearly their whole length, their bases being black; feet brown. Total length from the bill to the end of the tail, 12 1/2 to 14 1/2 inches; wing 8 to 9; tail 7 1/2; length of longest plume about 4 feet.

Female or Young of the Year.—These have only rudiments of the long plumes, seldom reaching more than an inch beyond the tip of the tail; the feathers of the crest more rounded, and not filamentous; feathers of the shoulders but slightly lanceolate; outer tail-feathers white barred with black, the centre ones black; whole of the chest, throat, and head obscure green, remainder of the upper surface bright green; breast and belly greyish brown; vent fine scarlet; bill black. (Gould.)

Mr. Gould, after quoting Trogon personata, Temm. (PI. Col. 372) as a synonym, truly observes, that it is scarcely possible for the imagination to conceive anything more rich and gorgeous than the golden-green colour which adorns the principal part of the plumage of this splendid bird; or more elegant and graceful than the flowing plumes which sweep pendent from the lower part of the back, forming a long train of metallic brilliancy.

So rich a dress must be fatally attractive; and, accordingly, we find that this the most beautiful of a beautiful tribe is only found in deep and gloomy forests remote from the haunts of civilized man. This, Mr. Gould observes, may perhaps account for its being so little known to Europeans until within the last few years; for although the long plumes were worn as ornaments by the ancient Mexicans, and at a later period sent over by the Spaniards from time to time to Europe, yet it is only very recently that we have become acquainted with the entire bird; and he believes the first perfect specimen was received by the late Right Hon. George Canning, after whose decease it passed into the hands of Mr. Loudon.

It is improbable that the 'Two feathers of the Phoenix tayle,' mentioned in the Museum Travoisianum Lond., 12mo, 1660, were the long feathers of this species, which, once so rare, is now to be found in most collections of any note.

Mr. Gould observes, that the representation in the Planche Coloriées of M. Temminck is undoubtedly the first that was published; but he adds, that the author less evidently confounded it with a nearly-allied species discovered in Brazil, and figured in the Araucie Species Novae, &c., of Dr. Spinx. Mr. Gould feels assured that all those
who have noticed it under the name of _pavoninus_ will, upon comparing it with the original bird described by Dr. Spix, fully agree with him (Mr. Gould) in considering it as specifically distinct. He is induced to believe that the plumes of the species so named never extend more than a few inches beyond the tail, that the bird has no crest, that the whole of the tail-feathers are black, and that in size it is much inferior to _Trogon resplendens._

**Locality.**—Guatemala in Mexico, where it is called _Quereil._ (Gould.)

edge of each feather having a tinge of metallic green; two centre feathers of the tail dark purplish green; two next on each side dark olive green, the three outer on each side dark green at their base, largely tipped with white.

**Female.**—Upper surface and tail closely resembling those of the male; round the eye and throat rufous brown; becoming paler on the chest, which is slightly tinted with rosy pink; lower part of the abdomen and tail-coverts deep rose-red. Total length 11½ inches; bill 1½; wing 2½ tail 6½; tarsi 1. (Gould.)

**Locality.**—South Africa.

_Narina_, whose name this the only known African species bears, was a Gonaqua Hottenlot girl, whose charms and manners appear to have produced a great impression on Le Vaillant, and he devotes some pages to her in his _Travels._

Mr. Gould quotes him for information respecting the habits and economy of this bird. Its favourite haunts are the thickest parts of the forest; and there it sits, nearly motionless, on a low dead branch during mid-day: in the morning and evening it captures its food, consisting chiefly of locusts, beetles, and other winged insects, with the addition of caterpillars. Its flight is short and rapid; and it darts from its chosen perch on every passing insect, returning to the station which it had left, or settling near it. Its haunts are described as being in the extensive woods called Autemiquoi, and in those on the banks of the Gamo-toos River in the Caffre country. During the pairing season the male, which is at other times mute, utters frequently a melancholy cry. The eggs, four in number, nearly round, and of a rose white hue, are laid in a nest in the hole of a tree, and the female sits for twenty days. The account given of the young is extraordinary; for we find it recorded, that "the moment they are excluded they take flight, and follow their parents for a considerable period."

![Calopteryx resplendens](image)

**Upper figure, adult male; lower figure, female or young male.** (Gould.)

**African Trogon.**

_Example, Trogon (Apaloderma) Narina._ (Le Vaill.)

**Description.**—**Male.**—Bill yellow, with a tinge of blue; whole of the head, throat, chest, shoulders, back, and upper tail-coverts resplendent green; breast and under surface bright blood-red; the wings brown, the greater coverts and secondaries powdered with greyish white, the outer

![Apaloderma narina, male and female.](image)

This, if correct, is a rare instance of perfect development among the _Hirundines._ We know that the young of the Gallinaceous birds will run as soon as they have left the shell; but their plumage is most imperfect, and it takes a long time to develop the feathers which are to sustain
them in flight; whilst in the bulk of Insectory cases the nestling is hatched with scarcely anything more than a rudimentary down. The Humming-Birds (see the article) attain their plumage more quickly than most perching birds, and fly after their parents at the first essay; but they are born blind, and are unable to leave the nest for some days. The general account in Griffith's Aviary above noticed (p. 286), to the correctness of which Mr. Gould bears testimony, is entirely at variance with the particular assertion relative to the Naria Trogon; for the young Trogons are there stated to be hatched entirely naked.

Asiatic Trogons.

Example, Trogon (Apododerma) Reinwardtii. (Temm.)

Description.—Bill bright reddish orange; top of the head, back, and upper tail-coverts dark green; six middle tail-feathers black, with green refections; tops of the three outer feathers on each side the same colour as the middle ones, the remaining portions being white; centre of the wings and shoulders green, transversely rayed with fine lines of yellow; primaries black, with the exception of the outermost web, which is white; throat yellow; ear-coverts, sides of the neck, and chest olive-brown; belly and under surface yellow, becoming rich orange on the sides; tarsi yellow; bare skin round the eye blue. Total length from 12.4 to 13.6 inches; tail 7.2; wing 5.4.

Young.—Similar to the adult, particularly in the colours of the back and tail, a circumstance, observes Mr. Gould, which rarely occurs in the family, as in all the Trogons where the plumage of the female differs much from that of the male, the young birds generally resemble the former; while, as in the present case, where the sexes are very unlike, the young partake of the adult colouring, differing only in the markings of the wings and the rufous brown tint of the breast. (Gould.)

Locality.—Java and Sumatra, where it was discovered by Professor Reinwardt, whose name it bears.

This, Mr. Gould observes, is a scarce bird in cabinets of natural history, and he attributes its rarity to its being very local, remarking that the vast collections brought to this country by Sir T. Stamford Raffles and Dr. Horsfield did not contain an example.

Apododerma Reinwardtii: upper fig., adult male; lower, young bird. (Gould.)

Chalciodan Lizards, under the Acrorhync GYpgoidea Cylinders.

Etonic Character.—Teeth solidly fixed on the edge of the jaws, nearly all united together at their base, unequal, conical, blunt or tuberculous, a little compressed, and of unequal number in the intermaxillary bone. Nostrils lateral, small, oval, each pierced in a single plate, the nasa-

This cephalic plates in the only known species are not numerous, and are disposed as in the greater number of Amphibians. Two of these plates cover the eyes, which in all the species of the subfamily of Glyptodermal Cyclo-

saurs are entirely deprived of palpebral membranes. The compartments on the surface of the skin are nearly of the same form and size on all the parts of the body, differing thus from the Lepidosterna, on whose breast there is one a different form, and a large pair of others in other regions of the animal. There are no crypts on the edges of the cloaca.

Example, Trogonophis Wiegmanni, Kaup (Amphi-

bana degegens, P. Gen.). Localities.—Algiers, Bous, and Oran.

TROGUS POMPEIUS, a Roman historian who lived about the time of Augustus. He was descended from a patriotic family of the city of Dungeti (or Daino), and afterwards likewise bore the name of Trogus Pompeius, had served in the war against Sertorius, and received the Roman franchise, probably together with the name Pompeius, through the influence of Cn. Pompeius. His father's brother had been a prominent person of the Roman cavalry in the war against Mithridates, and his father had served under Julius Caesar, by whom he was afterwards em-

ployed as private secretary. Besides these general state-

ments furnishing us with dates, the historians Justinus (Fasti), we know nothing about Trogus Pompeius, except that he is called 'a man of antique eloquence and a most grave author.'

He was the author of a Universal History from the time of Ninus, king of Assyria, down to the year 8 B.C. It bore the title 'Historiae Philippicae et totius mundi origines et terrae situs,' and consisted of 44 books. The original work is now lost, and the only means we have of judging of its merit is an abridgment made by Justinus, which is still extant; and from this it is clear that the author founded his work on the best historical authorities that then existed. The name 'Historiae Philippicae' was probably chosen because the great body of the work, from book 7 to book 41, contained the history of Macedonia and of the kingdoms that were formed out of the great Macedonian empire, as the founder of which Philip was regarded. The usefulness and convenience of Justinus's abridgement, although it is very unequal in execution, has probably been the cause of the loss of the original work. The geography on which Trogus had treated at some length is entirely lost, as the epitomizer has excluded it from his work.

Piny (Nat. Hist., vi. 4; xi. 94) and some other writers mention a work by Trogus on animals, which is entirely lost.

(Yossius, De Histor. Lat., p. 98, &c.; Bähr, Geschicht-

der Rom. Lit., p. 409.)

TROIS RIVIERES. [CANADA, p. 214.]

TROI'TZK, is a town in the government of Orenburg in Asiatic Russia, situated on the right bank of the small river Ai or U, in 54° 10' N. lat. and 61° 23' E. long., 400 miles from Orenburg. The river Ai forms the frontier of the government towards the steppe of the free Kirghises belonging to what is called the Middle Horde. The town is surrounded with a wall and moat, and contains about 600 houses, with 3000 inhabitants. The public buildings are the cathedral, two mosques, a custom-house, a prison, the bar-

racks, and a school. On the opposite side of the river (over which there is a bridge) stands the bazaar, a wooden build-

ing in the form of an oblong parallelogram: the shops are very dark, receiving no light except through the open doors. It is divided from and entered by a line of shops from end to end into two halves; one half is called the Kirghise Bazaar, the other half is similarly divided into two squares, one called the Bokharian, the other the Russian Bazaar. There are only two narrow streets or doors, one leading to the steppe, the other to the bridge across the river to the town. In the Kirghise Bazaar the men, in shabby variously-composed and patched dresses, are seen with camels and horses; the women on saddled cows. The men engage in the sale of horses and oxen, and the women in that of
TROND, or TRUN, SAINT, is an inland town in the province of Limburg in the Kingdom of Belgium, in 120 E. long. 5° 43' N. lat., near Meebseck, on the high road from Brussels to Liège, where there was formerly a celebrated Benedectine abbey, founded in the seventh century. It was once a place of considerable strength, but the fortifications were razed in 1627. The population is something above 800; the inhabitants manufacture a considerable quantity of lace, and are well known for their skilled workmen, and for their freedom and liberality. The town is situated near a river, which was called the river of firearms, and in this place, at the village of Neuwinder, Marshal Luxembourg gained a victory in 1693 over King William III. of England; and in March, 1713, there was a sanguinary battle between the French under General Dumourier, and the Austrians under Prince Charles of Sax-Coburg, in which the former were totally defeated.

(Hassel, Geographie; Cannabich, Geographie; Stein, Handbuch der Geographie, edited by Kochslemp.)

TRONDHEIM. More commonly pronounced Tromso, is the most northern of the provinces of Sweden, extending from 62° N. lat. to 71° 10' N. lat. It lies between 5° and 11° E. long. North of the North Cape it extends more than 200 miles from west to east, but between 65° and 69° N. lat., its width hardly ever exceeds 60 miles. North of 69° however it grows wider, and in some places the width amounts to 150 miles. On the west and north it is bounded by the sea, on the east are mountains, so that a portion of the south the Norwegian provinces of Christiania and Bergen. Its area is stated to be about 60,000 square miles, so that it includes a very considerable portion of the kingdom.

In the south the province is entirely low and flat, and is subject to great inundations, such as those of 1815, which were followed by great famines, and numerous deaths. But in the north the soil is more fertile, and the climate is more healthy.

TRONDHEIM proper comprehends the bay of Trondhjem, or Trondhjem Fjord. Among the numerous inlets by which the rocky coast of this country is intersected, none is more subject to inundations than the Fjord of Trondhjem. Its entrance from the sea is near 63° 30' N. lat., and it runs about 60 miles inland, measured in a straight line; but as it forms, as it were, the section of a circle, its whole length measured is near 90 miles. Towards its eastern extremity it is divided into three arms by an island (Ytterbøe) and a peninsula, and these arms are called, from north to south, Verdsfjord, Ytterø fjord, and Beitsfjord. Beitsfjord is united to Trondhjem Fjord by a narrow channel about 5 miles in length. The width of Trondhjem Fjord varies in general between 3 and 5 miles, exceeding these dimensions only where short arms branch off from the main body of the Fjord.

The south mouth of Trondhjem Fjord lies on the northern declivity of the Lang Field and Dovey Field, which are portions of the Norrsk Fjellen. [Norrsk Fjellen.] The coast-line extends from Cape Stadiland, the most southern extremity of the province, to the entrance of Trondhjem Fjord, nearly due north of Mysen, and more than any other part of the Norwegian coast, intersected by arms of the sea, which do not, as is the case farther south, run in straight lines from the sea inland, but extend in different directions, so that the country near the sea is converted by them into islands, whilst the remainder forms numerous peninsulas. The largest of the islands thus formed are towards the north, nearly opposite Trondhjem Fjord, and are called Proye. The largest of the islands is called Mysen; it is not described, but it is a high island, and on an average 10 wide. These islands are rocky and high, but not mountainous, the heights on them rise only to the elevation of hills. Their soil is indifferent, and in many places composed of a stiff clay, peat, and sand, mixed with woods, in which deer are common. The islands which lie farther south and nearer the coast in general are much more elevated, and the summit of that of Tosteren, which lies south of the entrance of Trondhjem Fjord, is nearly as elevated. Along the whole of the outer coast...
no tracts of cultivable ground of any extent are met with, and the few hamlets which occur are inhabited by fishermen. The rocks are mostly hard, and in a few places only are there small woods of stunted trees, or rather bushes. A large number of sheep and goats feed pasture on them. The fish taken in the rivers which drain the country are cod, ling, herring, and, and they constitute the principal article of foreign trade in this part of Norway. The fords themselves penetrate to the distance of 60 miles from the open sea. Their average width varies between 1 and 2 miles, and they are very deep, but much exposed to sudden gales from the mountains, which, though of short duration, are extremely violent. Along the shores of these inlets (fjords) there are mountainous districts of considerable extent. They are cultivated, and yield most kinds of grain, except wheat, and several kinds of vegetables. The mountains and high hills, which separate the fords from each other, descend with a gentle declivity, which is partly covered with woods of birch, elm, fir, and pine, among which however forest-trees are not common, and is partly used as pasture-ground.

The interior of the country is occupied by the mountain region of the Norrña Fjellen. The highest part of it lies along the southern boundary-line of Trondhjem, where the Sne-hitten (Snøh-hitt) rises to 7480 feet above the sea-level. There are numerous other peaks dispersed over the country, but these are always covered with snow. But the base on which the Sne-hitten rests is a mountain-plateau, and its surface is from 3000 to 4000 feet above the sea. Its surface is uneven, partly owing to the numerous peaks, and partly because there occur many flat and tolerably wide depressions, which are often only partially free from snow during two or three months of the year. At that season a portion of it is used as pasture-ground. In some parts are small woods of stunted birch and willows, but generally it is destitute of wood. The most desolate portion of this table-land extends from the east of the Sne-hitten nearly due north, terminating at the entrance of Trondhjem Fiord with the lofty promontory of Walkeholm. On the west of this tract the table-land is covered by valuable table-lands of soil, whose width however never exceeds one mile. These valleys are in their lower districts from 2000 to 4000 feet below the adjacent mountains. They have the advantage of a very hot but short summer, and the greatest part of them is cultivated with much care, and yields abundant crops of rye, barley, potatoes, and flax. The produce of these valleys supplies that portion of the population which is engaged in fishing, with grain and other provisions, which it is not sufficient to meet the internal demand of the necessary supply is imported from other countries. The largest of these valleys are, from south to north, Romsdal, which is famous for its picturesque beauty, Eikidalen, and Drivalden. As to fishing nothing to the north of the Namsen is equal to them, except fish and some timber, it has only two small towns, Christiansund and Molde. Christiansund lies south-west of the elevated island of Tosteren, and is built on three small islands, enclosing a narrow arm of the sea, which constitutes its harbour. It contains about 3000 inhabitants. Molde, south-west of Christiansund, has only 1500 inhabitants. The inhabitants are partly engaged in commerce, but the greater number is the fishery of the Lofoten, to which there are a number of small vessels. Their commercial relations are almost exclusively with Spain, to which country the produce of the fisheries is sent.

The country along the southern shores of Trondhjem Fiord contains a much greater portion of arable land, and is more extensively cultivated and more populous. It is watered by four rivers which, as we have seen, are called Orkla, Gual, Vifj, and Stor-el. For the shores of the fiord to the Dovrefield the country rises in three terraces, whose lines of separation are marked by the Lake Salboe, which is about 520 feet above the sea, and the course of the river Gual, which rode from east to west. Each of the terraces is about 20 miles in width, and the lower terrace, along the shores of the fiord, is an undulating plain about 9 or 10 miles in width, which is however intersected with a few steep rocks. A large portion of it is cultivated. There are other south or eastern parts of Salboe, and in general about 10 miles from the fiord, the country becomes hilly, and the soil is stony. Only a small portion of it is under cultivation, and the remainder is indifferent pasture-ground. The second terrace is broken in all its extent, with the exception of the river valleys, which are from 1 to 3 miles wide, of considerable fertility, and well cultivated. The high hills and mountains which lie along these valleys are almost overgrown with pines, fir, and birch, and on both sides are protected from the open air by numerous rivers, which descend from the Dovrefield, and in some of the narrow valleys along their banks cultivation is carried on to some extent, whilst the adjoining mountains are not cultivated. There are about twenty-three individuals to each square mile of this region. Its commercial produce is exported from the town of Trondhjem. Respecting the roads which lead from this country to Christians, Rønas, and Sweden, see Norska Fjellen, vol. xvi., p. 284.

The small district of Rønas lies on the Dovrefield, close to the boundary of Sweden, and comprehends the country in which the Glommen-elf originates. It is much elevated above the level of the sea, for the lake Oressen, which may be considered as the source of the Glommen-elf [Norway, vol. xvi., p. 323], is more than 2400 feet, and the town of Rønas about 2200 feet above the sea. The country is very good for agriculture it is richly covered with the evergreen forests, the account of the cold of the climate the frost sometimes even in June kills the animals on the pastures. In this tract there are copper-mines worked with success. The road from them is brought to the town of Rønas, where there is a smelting-house. This town is inhabited by a population of about 1500 individuals, all of whom are employed in the mines or smelting-houses. The copper is carried to Trondhjem, where it is shipped. In the most elevated part of this country are a few families of Laplanders, who live on the produce of their herds of rein-deer.

Country North of the Trondhjem Fiord.—An immense mass of high rocks extends along the sea from the shores of the Norrña Fjord to the Kinn. The greater part of it rises above the line of trees, and it is considered by Von Buch as the most elevated mountain of Scandinavia in this parallel; for the great range which divides Norway from Sweden is here interrupted by the remarkable depression which is noticed in Norska Fjellen, vol. xvi., p. 284. This mountain mass, called Osakvenen Field, is unsuit for any purpose. East of it is a deep depression, but little elevated above the level of the sea, which extends 14 leagues from the mouth of the River Angir, of which the river of the same name is the chief tributary, and it contains only the Namsen-elf. It is called Nummedalen, and a part of it is cultivated, but the greater portion of it is covered with a forest of fine timber-trees. The same description applies to the valley of the river of the same name, which is also called Nummedalen on the north. The forests covering this country are the most northern large forest of timber-trees in Norway, and from Nansem-elf all the countries lying farther north are supplied with logs and deals. All the way to Vardolhus, and even to Kola in Russia, exactly a house or a church is found which is not built of logs from Nansen. The Nansen-elf is the largest of the rivers of Norway which drain its western districts and fall into the North Sea. It is too rapid to be navigable for boats, but timber is floated down. Along the whole coast of Trondhjem Proper the rocks, partly above and partly below water, are so numerous, that the navigation of this coast is extremely hazardous. It is literally dotted with such rocky islets, especially to the north of the island of Froyen, where a space of sea exceeding 200 square miles is covered with them, and in the vicinity of the three islands of Vigen.

Northland comprehends all the countries lying between the parallel of the island of Leköe and the Quarenanger Fjord. The southern part is called Helgeland, the central district Salten, and the northern portion Tromsoe. The islands of Lofoten and Senyen are also included in this district. Helgeland extends from the parallel of the island of Leköe to Cape Kunnen. The Kløven range is in these parts not more than 60 miles distant from the sea. The coast here also is rocky, but of moderate elevation, much more so than in the numerous islets, but they are short, only a few number 10 miles in length. Numerous islands, islets, and rocks line the shores. Some of the islands rise to a great elevation, as
Torgelmann (3000 feet), Alten (3420 feet), Dønnsøe (3500 feet), and Luøe (2157 feet). These are unfit for agriculture and only inhabited by shepherds. Other islands are low, and have some farms for breeding cattle, rather than for cultivation. Among these is Tøfø, which is mostly under cultivation, and on which the cattle are pastured along the coast. The interior of Helgeland is filled up by mountains rising from 1000 to 1500 feet, between which occur numerous narrow valleys and depressions, which in general are well wooded, though the trees rarely attain the size of those on the sea-coast. The quantity of land which could be cultivated; but in this tract agriculture is neglected because fishing is much more advantageous. In the valleys of the two rivers Vefsøen and Raen however eye, barley, and potatoes are grown. The most successful branch of fishery is that of the herring, and two-thirds of the large quantity which is exported from Bergen are taken on this coast. This fishery lasts from August to the end of the year. Near the polar circle and north of the valley of Rauen an extensive and elevated mountain-mass lies across the country, and terminates on the sea with Cape Kunnøen, which constitutes a remarkable feature in this part of Norway. It rises from the edge of the water with perpendicular sides some 3000 feet above the sea, and at a short distance from the sea it is 2000 feet high, and in a course of 4 or 5 miles it attains more than 4000 feet. The more elevated portion is always covered with snow and glaciers.

Salten comprehends the country between Cape Kunnøen and Ofoden Fjord (68° 30'). The Kilen range here approaches nearer to the sea, being hardly in any part 40 miles from the coast. At the extremity, in elevation, for the Sulteliten is 6155, and Mount Ankenæs 4880 feet above the sea. The space between the Kilen and the sea is filled up by peninsulas, and wide and deep inlets. The peninsulas are formed by high ridges of rocks rising with frightful precipices on both sides, and terminating at the top with a sharp ridge, in most places scarcely sufficient to afford a resting-place for a bird. The inlets penetrate so far into the land, that most of the islands are racks of the immediate range. Salten is the most desolate part of Norway. The steep sides of the mountains are nearly bare of vegetation. The small depressions which occur here and there are partly filled with swamps, and partly overgrown with stunted pine, birch, and fir. Even fiordwood is in most places scarce. The pastures are small in number and extent, and the cattle of very diminutive size, the cows not larger than a Newfoundland dog, and the sheep resembling large cats. Ofoden is low, and is a large low tract of cultivated land, which occurs near the sea between Salten-østen and Foldenøst, and on which the small town of Bodo is built, which contains about 300 inhabitants. Only barley and potatoes are grown here. There are few, and they derive their subsistence almost exclusively from the fishery of the Lofoten Islands.

The Lofoten Islands lie opposite the coast of Salten, and are divided from it by an arm of the sea called West Forden, which at its southern extremity is nearly a hundred miles wide, but narrows in advancing northward, until, at its most northern extremity between the continent and the island of Hindøen, it terminates in a strait hardly two miles across. The Lofoten Islands constitute a rocky chain, which near which the continent runs nearly due west, but farther to the west declines to the south-west. The islands and inlets of which this chain is composed are separated from one another by narrow straits, through which the sea flows during the tides with a rapidity resembling a torrent. In some parts it forms very deep and extensive eddies, among which the whirlpool called the Mulstrøm, and which is found between the islets of Moskenøe and Moskøe, has obtained celebrity, as it is impossible to navigate it without the strength of the tides, and it has caused much loss of life. All the islands are rocky, with high shores: those however which lie most to the westward rise only to a moderate elevation, and are divided into peninsulas, such as Flåtøstdark, and West Wägøe. East Wägøe rises to 3000 feet above the snow-line, and Hindøe to 3200 feet. The mountains however, except where their sides are too steep, are divided into cascades of rock, which in some months of the year become covered with a vital growth of grass, which supplies good pasture for a few cattle and sheep of diminutive size. In winter these animals live mostly on the heads and guts of fish, and other different kinds of sea-plants. One boat in the Wägøe of a few men contains a pass, and from which a small fleet of boats, of from 20 to 30 men each, goes fishing to the north during the summer season; those islands are visited by between 3000 and 4000 boats, each manned by four to five persons, and by 300 boats also from Balsfjord. The total production of this valuable branch of the fisheries is exported mainly to Bergen, and it forms there a considerable portion of the sea and of the fishers. The Faksefjord (near 69° N. lat.) rises to 4200 feet; and the mountain enclosing Malanger, the Stornørh near Tromsøe, and the ranges on Lyngefjord, are nearly as high. The last-mentioned are the mountains between 69° and 72° N. lat. Large tracts of them are always covered with snow, and glaciers descend on their sides. The deep and extensive fiords by which this country is indented have level tracts on their coasts, and here-in some cases-are open near the innermost recesses of the inlets; and though the climate is very severe, cultivation is carried on with tolerable success on these flats, especially in Balsøe, Lyngefjord, and Reinsfjord, where considerable quantities of ships' stores are raised. A part of the mountains is covered with woods, which contain a few timber-trees, so that logs and deals are exported. The pastures are much more extensive and better watered than those of the south; and, as the time is raised, are more numerous. Near 69° 30', the town of Tromsøe has been built on an island situated in the strait between the continent and the island of Hvaløe (Whale Island). The island on which the town stands is from four to five miles broad, and rises to the height of about 600 feet. The town contains about 800 inhabitants: it has some good houses, a saw-mill, and wooden quays along the harbour. It is a thriving place. The mean annual temperature does not exceed 40°. The annual rain does not exceed 40 inches.

Opposite Tromsøe are the Senyen Islands, so called from the largest of them. Senyen is very rocky, but not high, except towards the north-western extremity. Hvaløe rises to 2500 feet, and Ringvassøe is too high to be inhabited. The other islands are comparatively small, but also very high. On the two first-named islands are extensive pasture-grounds, and a few spots are cultivated. The inhabitants however derive their subsistence almost exclusively from the fishery. The last-mentioned trade is called Cod, halibut, and smelts are taken in large quantities.

Finmarken comprehends the most northern portion of Tromsøe, extending from Quænanger fiord to the extremity of the Senyen Islands. The land is divided between Quænanger fiord and Alten fiord, extends a mountain-range, which terminates near the sea in the isolated Ytuløenfjord, 3700 feet above the sea, the highest northern glacier (76° N. lat.). The country east of this range contains a more elevated and a lower region, of which the former lies to the north and the second to the south. The boundary-line between them runs along the Alten-ølffrom Kautokeino to Maasi, nearly south and north, and from Maasi to the interior of the lands of the Tana fiord. The highest mountains of the elevated region are found at the most northern extremities of the long peninsulas which lie between the gulfs or fiords of Alten, Pomøn, Læga, and Tana. They stand most isolated, and are divided from each other by valleys, which are filled up by an alluvial soil, so that it appears the mountains formerly constituted islands and the valleys straits. On the mainland itself, the highest portion of the elevated range is the mountain stretching northward from the Tana fiord, which extends on the whole as a plain, which insensibly grows lower as it proceeds southward. The surface of the plain is only interrupted by flat and wide depressions in the character of lakes, and between them by mountains, rising from 8000 to 9000 feet above it. On the north the plain is in general from 2500 to 3000 feet above the sea, but towards the south and east it sinks to 1500 feet. No trees are found on it except a few dwarf birches, which do not attain their full height. This plain is visited in summer by the inhabitants, as it produces excellent pasture for their rein-deer.
Permanent settlements are only found in the recesses of the fiords. On the other fiords the scanty population consists of persons who derive their subsistence from fishing. But on the Alten-elf there are a considerable number of agriculturists, who cultivate barley and potatoes, this being the most northern point of the globe where cultivation is carried on with success. There are numerous cattle, and the Finlanders, called Quins in this part, have dairy cattle. There are also some copper-mines, which are worked by an English company. As firewood is not abundant, the ore is shipped to Swansea in South Wales, and there smelted. Thus the shores of the Altenfjord are more populous than any part of Cape Finmarken's southern shores.

The lower region is in general a plain, which in its highest point, near the sources of the Alten-elf, is about 1200 feet high, but gradually decreases in height as it proceeds north and north-east. On this plain, few isolated mountains rise to a height of between 3000 and 4000 feet. From the last mountain a lower chain extends between the Laxafjord and Tanafjord, which terminates north of 71° N. lat. with Cape Nordlyk, the most northern promontory of the European continent. The surface of the plain is interspersed with innumerable smaller and larger lakes, and is mostly covered with rein-deer moss. It is therefore used by the Laplanders as winter pasture. The more elevated parts of the plain are overgrown with stunted birch.

On this plain rises the Alten-elf. Between Kautokeino and Maasi its course is slow, but at the last-named place it enters the mountains, where it dashes over perpendicular falls, until the valley through which it runs it becomes a mere fissure enclosed by precipitous rocks. No person has yet followed its course into the straits, through which it makes its way at the cataract of Pursorona, about 15 miles above Aftengard. The Tanafjord, which is much larger, running about 150 miles, is less rapid, and might be navigated, if the inhabitants of the country through which it flows had any occasion for it. An immense quantity of salmon is annually taken in this river, which are considered the finest in all Norway.

Several large islands lie along the coast of Finmarken, west of the Porsanger fjord. The largest of them, Seyland and Soroe, rise to a great elevation, and are inhabited by a few fishermen. On Qualie is a commercial place, Hammerfest, which has about 400 inhabitants. The harbour, being safe, is much visited by foreign vessels, especially Russian and English. In 1823 not less than 177 vessels entered it. The Russian vessels from Kola and other places come to fish or to buy fish, and bring hemp, flax and tow, sailcloth, linen, tar, nails and ironmongery, and sometimes considerable quantities of corn. Hammerfest is also the station for many vessels which are employed in the whale fishery about Chere islands and along the southern coast of Spitzbergen. The mouth of the northern island is Maguroe, a bare rock, which towards the north terminates in the Cape North, a huge mass of rocks rising to 1500 feet above the sea. At the eastern extremity of Finmarken is the island of Wardoi, which is the small fortress of Wardoehusen, with about 100 inhabitants.

Particulars on the climate of Trondhjem are found in Norway, vol. xvi., pp. 325 and 326.

Von Buch's Reisen durch Norwegen und Schweden; Ehresmann's Journey through Norway, Lapland, and part of Sweden; Breton's Scandinavian Sketches; Barrow's Excursions in the North of Europe; Barrow's Visit to Iceland by way of Trondyem; Laing's Journal of a Residence in Norway; Linsbæur's Besuch in Rosmalen, in Berghaus's Almanach, 1841.

TRONDHJEM, the capital of the province of the same name, is built on the southern shore of Trondhjem Fiord, at the mouth of the Nad-elf, which river nearly encircled it. It has regular and wide streets, with water-estans at their intersections. The houses are generally of two stories, and built of wood, hardly half a dozen of them being of brick. The cathedral is a Gothic building, a part of which was erected in the thirteenth century, and at a distance of about a mile is a small rocky island, Munkholm, on which a fortress is built. The roadstead for shipping is exposed to a heavy swell from the north and north-west. The population consists of between 12,000 and 13,000 individuals.
The properties of this order are very similar to those of Cruciferae, although there is little structural resemblance.

**TROPEOLUM.**

Tropaeolum, a genus of plants, the type of the tribe is Tropaeolum majus. It has a 5-petalled calyx, the upper lobe being furnished with a spur; 6 petals, unequal, the three lower ones smallest or altogether absent; 8 stamens, free from the base; 3 carpels, somewhat clothed, kidney-shaped, mucronate at the apex; the petals each ending in a bristle-like point. This plant is a native of Peru. It is one of the species of the genus that was earliest brought to Europe, and was cultivated in England by Gerarde. It has however been rarely supplantcd in cultivation by the next species. It has deep yellow flowers streaked with orange and red. The whole plant possesses an acrid flavour and odour which are peculiar to this order and the Cruciferae. It is on this account that all the species of Tropaeolum have obtained the character of Nasturtium, which is the type name of a genus of plants belonging to Cruciferae. The fruit of this plant is pickled, and eaten in the same way as capers; the flowers and leaves may also be eaten as a salad. There is a variety in the gardens with double flowers.

**T. majus**, Great Indian Cress or Nasturtium, has the leaves peltate-nerved, orbicular, somewhat 5 lobed; nerves not mucronate. This plant is also a native of Peru. It was introduced into England, according to Peter Collinson, says Smith, in the year 1686. It has much larger flowers than the preceding, but having the same colour and general appearance. The fruit of this, which is the only preceding species, is made into a pickle, for which its warm biting character renders it very fit. It is a plant that easily propagates itself by its own seeds, and is at this time almost naturalized in many of our gardens. Of this species, like the last, there is a beautiful double variety, which is deservedly a great favourite in our gardens and greenhouses. There is a species between this and the last, known in gardens as **T. hybridum**. It was first observed in the garden at Stockholm, and described by Linnaeus. Its flowers are yellow, but never mature their seeds, consequently it is only propagated by cuttings.

**T. adunca**, Hooked Indian Cress or Nasturtium, has petals somewhat kidney-shaped, with from 5 to 7 lobes, which are mucronate; the two upper petals lobed, mucronate, the three lower ones smaller, fringed; the spur hooked, and about the length of the upper petals. It is a native of both Mexico and Peru. It is a very tender plant, requiring greenhouse cultivation in this country.

**T. tricolor**, the Tricolor Indian Cress or Nasturtium, has a tuberous root; a slender, climbing, branched stem; leaves peltately divided with 6 or 7 ovalate entire and cuspidate segments; circular petals, unguiculate petals, a little longer than the rather closed, obtuse, entire, permanent calyx. This plant is a native of Chili at Coquimbo. It has a calyx of an orange-scarlet colour, and tipped with black, while the petals are yellow. It is one of the most showy and handsome of the species. The **T. tuberosum**, like this species, has tuberous roots which are eaten when boiled. It is a native of Peru.

**T. pentaphyllum**, the Five-leaved Indian Cress or Nasturtium, has 5 leaves which are obovate to lanceolate, entire and stalked; only 2 petals, which are sessile, acute, quite entire, shorter than the calyx. This plant has tuberous roots; the petals, and a greenish yellow calyx. It is a native of Bucareli, Mexico, and Brazil, and is naturalized in the province of Cisplaine. This plant was known in Europe for a long time only by Lamarck's description. It has however been lately cultivated in Great Britain, and an excellent plant has been introduced by Don to constitute it a new genus. The reasons he assigns for this are its fleshy juicy fruit and its valuable It is a native of China and has been extensively cultivated in Europe for a long time. It has however been lately cultivated in Great Britain, and an excellent plant has been introduced by Don to constitute it a new genus. The reasons he assigns for this are its fleshy juicy fruit and its valuable salivation, in both of which points it differs from the genus Tropaeolum. He calls it Chymocyclus pentaphyllus.

**T. auratum**, Purple Indian Cress or Nasturtium, has the leaves 5-petalled, with linear unequal laciniae; equal, entire, bilobed petals much longer than the calyx, with a spur shorter than the petals. This plant was discovered by Mr. Mirr, and first described in his "Travels in Chili," and had been previously seen by Mr. Bridges on the Cayram de Quillota, 4000 feet above the surface of the sea. The plant was not however seen in blossom in this country until the autumn of 1789, when it was cultivated for Mr. Jones, of the Botanic Garden, and Dr. Lindley and Sir Wiliam Hooker in the plant is from 1682. It is a native of Peru, and has been introduced to England by Mr. Bridges. The plant possesses entire petals, whilst in the other it is made to possess serrated petals. Dr. Lindley observes with regard to this interesting plant, that 'A few years since a blue nasturtium was placed in the same class as a hipping or a unicorn, for men minds were warped by theories of etymological and systematic series in flowers, which it was said could not interfere with each other. It was asserted that in those cases where a pure yellow is observable in a particular genus, no blue could possibly be produced; and that, on the contrary, where a blue colour exists in a genus, yellow was expelled. It is true that the hyacinth and aconite seemed to offer some difficulty in the way of these propositions, but it was alleged that the so-called yellow of the hyacinth was a bad green, and that the blue of the aconite was really violet. However, here is a genus in which all the species previously discovered were either yellow or some colour in which it was yellow and green. In many cases in the genus Tropaeolum, it has been considered as a mixture of sandy loam with leaf-mould and fibby peat, not sifted, is best. It will bear the open air in summer. When exposed to the open air, many of the species are annual, which would, if protected, be perennial. They may be either propagated by seeds or cuttings. They are all climbing plants when placed near anything to support them; if this is not done, they become prostrate. When grown in pots, they may be allowed to droop over the sides, a mode of growth which seems to suit many of them very well.

**TROSTULUM, Mr. Soverby's name for a genus of Ammumites [Coron Ammonites] apparently identical with Cricoro**

Trophis, a small genus of plants of the natural family of Arctopus, is named from the Greek word, to nourish, though the species are not very remarkable in this respect. The species are found both in the East and West Indies, though it is supposed by some that these may be generically distinct. They are dircuous; spike lax, axillary; male, perigon 3-leafed, spreading; stigma biloba. The species form myrtle trees with alternate entire leaves. T. americana, the Ramo-tree, is twenty feet high, and a native of the west coast of Africa, where the leaves and twigs make a wholesome fodder for cattle in the inland woody parts of Jamaica. The drupes are about the size of grapes, and have a pleasant flavour.

**Crocococcus Delavillei.**

**Trophis**, a small genus of plants of the natural family of Arctopus, is named from the Greek word, to nourish, though the species are not very remarkable in this respect. The species are found both in the East and West Indies, though it is supposed by some that these may be generically distinct. These species are dircuous; spike lax, axillary; male, perigon 3-leafed, spreading; stigma biloba. The species form myrtle trees with alternate entire leaves. T. americana, the Ramo-tree, is twenty feet high, and a native of the west coast of Africa, where the leaves and twigs make a wholesome fodder for cattle in the inland woody parts of Jamaica. The drupes are about the size of grapes, and have a pleasant flavour.
The T. aspera is a native of and common in all parts of India, sometimes shrubby, but it also grows into a small crocodile tree. Its leaves are oblong, unequally serrate, and so scabrous, as to be employed by the natives in polishing ivory. The berries are greedily eaten by birds. T. spinosa is another Indian species common : thorny; leaves oblong lanceolate, towards the base somewhat cordate, to the apex sub acuminate; female calyx twice the length of the ovary, and eaten by the natives in their curries.

TROPHY (ρήματα, τραπαζια) contains the same root as Greek trophe, to supply, to give life to, and was therefore originally a sign or memorial erected on the spot where an enemy had been conquered or put to flight. The custom of erecting such memorials of victory, particularly in the capital of the conquering nation has been more or less extended, and even to all nations from the most remote to the most modern times. It was most general among the Greeks, who used to erect trophies even after slight advantages; and it sometimes happened that both the belligerent parties, owing to some advantages they had gained, considered themselves entitled to erect trophies. It was further a practice among the Greeks seldom to erect trophies in any other place than the field of battle, and that immediately after the victory was gained: when an enemy had been conquered at sea, the trophy was erected on the point of the coast nearest to the place where the victory was gained. A trophy generally consisted of a victory or a temple, adorned with the spoils and armour of the vanquished. An inscription usually recorded the names of the conqueror and the conquered, and the whole trophy was dedicated to some divinity. It was often said, that trophies of very durable materials, in order not to perpetuate the disgrace of a defeated enemy or to keep up any ill-feeling for too long a period. But this was not always observed. After a naval victory the trophy was usually adorned with the beaks of the captured ships of the enemy, and this custom was adopted by the Romans at an early period. The Romans down to the latter period of the republic never erected any trophies on the field of battle: the spoils of a vanquished enemy were paraded in public and distributed among the gods of the temples of the gods, and partly applied as ornaments for other public buildings and places. When however the Romans adopted the custom of raising trophies on the field of battle, they usually consisted of more solid structures than the Greek, such as towers, columns, &c.

(Dictionary of Greek and Roman Antiquity, p. 1010, &c.)

TROPIC BIRD, Phaeton, Linn., a genus of palmiped birds, placed by some ornithologists among the Palaearctic species. This genus, so well known to navigators as the harbinger of the tropics, is distinguished at once by the two long slender tail-feathers, which have obtained for the species, of which they are ordinarily noticed, the name of en-queue. Their length of wing and comparatively feeble feet proclaim them formed for flight, and they are accordingly swift and untiring on the wing, disporting in the air by glides; and when on land (to which they do not often retreat for any length of time together, excepting at the period of nidification,) perching on rocks and trees. They rarely visit the torrid zone and its neighbourhood. M. Lesson remarks that the two species form a well-defined artificial and purely geographical group. Their habitual domicile in the torrid zone does not separate them from the land; and they can reach, as they do nearly every night, the isles and rocky shores that serve them as a place of rest. Nevertheless M. Lesson met with them so often in sea-tracts entirely devoid of land, and heard them often above his head in the calms and fine tropical nights, that he thinks they should be considered as oceanic birds. The same author remarks that abundant species of the genus, both frequent in the equatorial zone, often sweep these birds beyond their natural limits; and he thus accounts for seeing them, as he many times did, in 30° S. lat.

The common tropic-bird, Phaeton aetherus, he says, 'is no more uncommon in the Gulf of Guinea, or in the mer de l'Inde.' The other species, Phaeton phoeniceus, he remarks, appears to belong more particularly to the great equinoctial ocean. Nevertheless, he adds that though they are frequent on the islands of France and Bourbon. He describes the flight of these birds as calm, quiet, and composed of frequent strokes of the wing, sometimes interrupted by a sort of falls or sudden movements.

Mr. Swainson, speaking of the Frigate Pelicans (Tachy-petes), observes that their history no less than their whole structure is highly interesting. They are, he remarks, truly rapacious birds, endowed with a remarkably piercing cry, which through a loud voice and power of wing, and with the most determined audacity, attacking other birds nearly of their own size, and forcing them to disgorge or relinquish the fish they may have caught. 'We know not,' says Mr. Swainson, 'a more strange sight than half a dozen of these aerial birds soaring in mid-air, and suddenly falling down into the sea upon a shoal of fish that have approached too near the surface. At other times, a long, slow, stormy, height, that, notwithstanding their size, they appear but as a speck in the immensity of the ocean; their only means of propulsion: all their powers of motion, in fact, are concentrated in the wings; for the feet are so short and imbecile, that when upon the ground they may be approached with perfect ease. These birds, although common in the tropical seas, are not found beyond, and are thought to belong to but one species. The same regions, as their name implies, are inhabited by the tropical-birds (Phaeton), whose flight, although inferior, is frequently as high as that of the Frigate-bird: there are but two species, both having two of the tail-feathers very long.' (Classification of Birds.)

Mr. G. B. Gray makes the Phaetona, consisting of the genus Phaeton, the only one of his Pelicanidae; placing it between the Pelecaninae and the Pelicaninae. (List of the Genus of Birds, 1841.)

Phaeton, Linn. (Lepturus, Mahr; Tropic-bird, Leach.)

General Character. The trophic-birds, as a group, are remarkable, being all long-tailed and long-winged species. The bill is compressed, convex above, denaturated on its edges, inclining towards the end, pointed; nostrils linear, bordered by a naked membrane; face feathered; feet very short; wings long; first quill the longest; tail short, excepting two very long slender tail-feathers.

M. Lesson observes that the two species which compose this genus are destined to live within the twenty-five degrees of latitude next to the equator, either to the north or to the south. It is only very occasionally seen beyond the tropics of Cancer and Capricorn, and consequently their presence has always been considered by mariners as indicating that their ships were entering the equatorial zone, whence the name of Phaeton, son of Sol, given to these birds by the poetical imagination of Linnaeus.

The same zoologist, who had good opportunities of personally observing these birds, says that nothing can be more graceful than their flight. They glide along, most frequently without the least sign of the expenditure of energy, as if they might sustain the weight of the air, and at times this smooth progression is interrupted by sudden jerks (saccades). When they perceive a ship, they never fail to sail round it, as if to reconnoitre, and to situate it; every evening they come to the land, to rest in the midst of the rocks where they place their nests. Their food appears to consist entirely of fish. The long feathers of the tail are employed by the natives of the greater part of the South Sea Islands as ornaments of dress.

Example, Phaeton aetherus, Linn. 'The Tropic Bird' of Catesby, Sloane, and others. The following is Catesby's description:—

'This bird is about the size of a partridge, and has very long wings: the bill is red, with an angle under the lower mandible, like those of the gull kind, of which it is a species: the eyes are encompassed with black, which ends in a point towards the back of the head; three or four of the larger quill-feathers towards their ends are black tipped with white: all the rest of the bird is white, except the back, which is variegated with curved lines of black: the legs and feet are of a vermilion red: the toes are webbed: the tail consists of two long streamers, and they are armed almost of equal breadth from their quills to their points.'

'These birds,' says the same author, 'are rarely seen but between the tropics, at the remotest distance from land. Their name seems to imply the limits of their abode; and it appears strange that though they are spread from the south of either tropic, yet one of their breeding-places is almost nine degrees from the northern tropical, viz. at Bermuda; where, from the high rocks that environ those islands, I have seen them with the utmost regularity, but those cliffs being inaccessible prevented my seeing their nests and eggs. They breed also in great numbers.'
on some little islands at the east end of Porto Rico (Carolina).

Sir Hans Sloane, in his ‘Voyage to Jamaica,’ says: ‘The 5th of November we saw the Tropic-bird, or *Anis Tropocorum*, flying very high round the ship; they are very easily known by two long feathers in their tails; to me it seems to be rather of the gull than duck kind. They are common everywhere between the tropics, and rarely seen anywhere else, whence they have their name.’

‘They are ordinarily met with first in the voyage to the West Indies three hundred leagues off Dominics, or Deeds, towards Spain; though in the third voyage we made it neither we met with one in the midway between Spain and the Canaries, which every one wondered to see so near Spain. (Oviedo.) I suppose this accident might have happened when the sun was north of the equinoctial and towards the tropic of Cancer.’

‘The feathers in the tail are made use of as ornamental by the savages in their hair and nostrils.’ (Du Tertre.)

Brown (Jamaica) states that this species lives, like the man-of-war bird, within the tropics, and resembles it very much in make, flight, and manner of nourishment; but that it is seldom seen so near the shore. It breeds, he adds, on the most desolate rocks and lonely islands, and is often seen at very considerable distances from land.

There was a specimen in Tradescant’s museum.

\[\text{Figure: Phaethon Aethereus.}\]

The following is the description given by M. Lesson of the other species, *Phaethon phasianus*:

Length from the extremity of the bill to the origin of the tail, thirteen inches, six lines; of the bill from the point to the commissure, three inches, eight lines; breadth across the expanded wings, thirty-one inches. Length of the tail, five inches; of one lengthened tail-feather (brim) taken at the extremity of the tail, seven inches, six lines; of the second and smaller long tail-feather (brim) taken from its origin, six inches. Ten tail-feathers, without counting the long one, which, at its origin, is enlarged like the other feathers: the tail forms a fan. Feet, taken from the leg to the toes, three inches. Legs white, with a light bluish tint in some places; webs partly black, that between the hind toe pale flesh-colour slightly glazed with white. Bill red, denticulated; nostrils near the origin of the bill, rather large, presenting forwards a canal which scarcely extends to the middle of the blackish tint. Plumage satin-white: in front of the eyes a large brown spot. The anal feathers present a great black spot in their centre, as well as some of the feathers which approach the head. The long tail-feathers, the reddest, the smallest being of the deepest hue. The shafts of the greater quill feathers, of the tail-feathers, and the long tail-feathers (brims) are black, but towards the extremity they are white. Monot.:

**TROPICS** (orré, a turning), the circles of the earth parallel to the equator which pass through those places to which the sun is vertical at the solstices, being the extreme boundaries of the torrid zone. The latitude of the *Tropic of Cancer* is equal to the sun’s obliquity of the ecliptic, and the interval between the northern and southern tropics comprehends every part of the earth at which the sun is ever vertical. The northern tropic is called the tropic of Cancer, and the southern that of Capricorn. The first, at the commencement of the astronomical sign of Cancer; and when vertical at places in the second, at the commencement of Capricornus.

**Tropidolepis**, the name given by MM. Duméril and Bibron to a genus of Saurians (*Eufractus*), belonging to the Iguanian lizards.

**Generic Character.**—Head short, triangular, obtuse in front. Suscussor regions covered with a great number of scales, much smaller than the other cephalic scales, and carinated, like them. A moderate occipital scutellation. Nostrils lateral, tubular. No palatine teeth. Throat, with two or three entire transverse folds. One or two longitudinal folds on the sides of the neck. Tympanic membrane a little sunk. Anterior border of the ear subdenticulated. Trunk very slightly depressed; a fold of the skin along each flank. Scales of the back small, uncarinated and without borders. The tail long, with three borders. A small dentilattent crest, from the occiput to the end of the tail, which is long, subconical, very slightly depressed at its base, and surrounded with vertical carinations of carinated scales. Toes and claws slender. No femoral pores. (Dum. and Bib.)

MM. Duméril and Bibron observe that three principal characters establish the differences between this genus and *Callosaurus*. These are—1. The femoral pores, which, a longitudinal row under the throat, and the presence of a small dentilac-ted crest from the nape to the caudal extremity. Moreover, the suscussor regions are furnished with a great number of scales, one-half smaller than the plates of the other parts of the head, the small scales of the upper region of the trunk are uncarinated, those of the lower region tricarinated, and the border of the ears subdenticulated; finally, the longitudinal cutaneous bony fold from the axilla to the groin is less developed than in *Callosaurus*. For the rest, the genus *Tropidolepis* more resembles *Callosaurus*, but it has the trunk and tail rather less depressed, and the nostrils more distinctly tubular (Erpodeologie).

Only one species is known, *Tropidogaster Blainvillei*. Locality unknown.

**Tropidolepis**, Cuvier’s name for a genus of Saurians resembling the *Agama* in their teeth and form, but uniformly covered with imbricated and carinated scales. Their skin pores are very strongly marked.

**Example.** *Tropidolepis undulata* (Agama undulata Daudin), an American species, remarkable for the white cross which it has under the throat on a dark-blue ground. MM. Duméril and Bibron, more exactly, *Leptodolepis* (Sceloporus, Wiegm.; Tropidurus, in part Wagu.), among the Iguanian Lizards or *Eunote Saurians*, thus characterize the genus—

Head short, flat, rounded in front. A great occipital scale; great transverse plates. No palatine teeth. Below the neck smooth; on each side a kind of oblique slit. Trunk short, depressed, with an imbricated scaling, carinated on the back, smooth under the belly. Neither dorsal nor caudal crest. Tail short, but little elongated. Tail short, but little elongated. Scales carinated.

**Example.** *Tropidolepis Dumerillii* (*Scincus aureus*), *Pelon*; *Tiliqua Kingii* and *Tiliqua Napolonii*. Gray. Four varieties, one entirely black. (See Dum. and Bibr., Erpodeologie, vol. I.)

**Locality.**—New Holland.
TROPHIDOPHORUS. [Scincoidans, vol. xx., p. 74.]

TROPHIDYRHYNCHUS, the name given by Mr. G. R. Gray's arrangement of the Meliphagidae.

Sub Fam. 1. Myzomelinae. 

Genera: Myzomela, Vig. and Horst.; Acanthorhynchus; Gould; Gyicephale, Sw.

Sub Fam. 2. Meliphaginae.

Genera: Meliphaga, G. R. Gray; Pachyroma, G. R. Gray; Pilotois, Sw.; Antornis, G. R. Gray; Philemon, Vig.; Physloris, Boie; Meliphaga, Lewin; Anthoceros, Vig. and Horst.; Acanthopus; Gould; Entomonyx, Sw.; Tropodryrhynchus, Vig. and Horst.

Sub Fam. 3. Melithreptinae.

Genera: Plectocephalus, G. R. Gray; Manohorina, Vig.; Prophodes, Vig. and Horst.; Eidopus, Sw.; Melithreptus, Vig.; like the last, but the body narrower, with squamiform, imbricated papillae. Palate toothed or not. Intermaxillary teeth simple, conical. Maxillary teeth slightly compressed; the first simple, the succeeding ones trifidulate. Each of the nostrils opening in a single plate, situated entirely below the summit of the rostral canthus. Eyes. Membrane of the tympanum distinct, reticulated within the auricular opening. No squama collar under the neck, but a small fold of the skin before each shoulder. Scales of the throat, breast, and belly composed of small, delicate, smooth lamina, with a round or sub-rounded border, and imbricated femoral pores. Each of the feet with five slightly compressed toes. Tail covered by two rows of small, wide, flat, imbricated scales.

MM. Duméril and Bibron state that the Tropidosaure, form a small but very natural genus, easily to be distinguished from the others which, with it, compose the group of Celodont Leioleptidae. On one side, the Tropidosaure, by its squamous tongue, its femoral pores, and the entire absence of a collar, differ from the Tachyglossum, whose tongue has chevron-shaped folds, which have only insular pores, and a collar of scales in front of the breast. On the other side, this same absence of collar, joined to the rounded form behind, and the imbricated condition of their ventral scales, prevents them from being confounded with the numerous genera of Lizards properly so called, in which there always exists across the lower region of the neck, and on the body, the quadrilateral plates more or less developed, disposed in a quincunx.

MM. Duméril and Bibron remark that the Tropidosaure lean in their general form both towards the lizards and scales; and Mr. Swainson thinks that the quadrilateral plates are more or less developed, disposed in a quincunx.

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jaw-teeth are short, equal, compressed and trilobated for the most part, only the ten or twelve first being rounded and pointed. All equally warn mesial pores. The size of the scales varies according to the species, but in all the cases mentioned with a carina, terminating most frequently in a sharp point.

MM. Duméris and Bibron further state that they know none which have the scales of the belly carinated. In some species the form of the head is that of a four-faced pyramid little elongated; in others somewhat ovate, and its horizontal circumference has the figure of a triangle obtuse in front. The cephalic plates are very variable in diameter and form; but they are always angular. There is a large external and much larger internal subocular region greater than the other. The occipital scale is so small, that sometimes it is lost in the midst of the others. The tympanic membrane is slightly sunk; sometimes the anterior border of the ear is strongly dilatated, sometimes only slightly, sometimes not at all. The species with a slender body have it rounded and carry a long and conical tail; those whose trunk is short have it a little compressed, and in those cases the tail is moderate and slightly flattened at the base. The length of the limbs is not considerable, the toes are simple.

MM. Duméris and Bibron divide their genus Proctotreus into two groups.

1. The Leioleperis.

Species which have the neck smooth or level.


2nd. The Phygodes.

Species with the neck folded on each side: nine in number, and all from Chile.

Example, Proctotreus cyanogaster, Dum. and Bibr. N.B. MM. Duméris and Bibron remark that their genus Proctotreus corresponds to the division Leioleperis established by Wiegrum in his genus Tropiduris.

TROPPOU, a town in the margravate of Moravia, proper to Austria, is bounded on the north by Prussian Silisia; on the south-east and south by the country of Prerau; on the west by Olmitz, and on the north-west by the Prussian county of Glatt. Its area is 1000 square miles, and the population 230,000. It contains several lordships, and those parts of the principalities of Lichtenstein, Lagesdorf, and Neisse, which were retained by Austria when the remainder of Silisia was ceded to Frederick II. of Prussia. There are many mountains in the circle, among the most remarkable of which are the Altvater, 4000 feet high, the Bischofskappe, 3000 feet, and the Hungerberg, with a splendid waterfall. There is only a small portion of low and level ground; the climate however is temperate. The principal rivers are the Oder, the Oppa, and the Morava; the latter is the most limited voyage. The chief products are oats and potatoes, and flax is the staple of the country. The breeding of horned cattle is neglected, but more attention is paid to that of horses and sheep. The principal minerals are iron, marble, slate, lime and turf. Most of the mountains are clothed with forests, yet wood is dear. The inhabitants, who in the northern parts of the circle are Germans, and in the southern Slavonians, are an industrious race, who very carefully cultivate their ungrateful soil. There are various manufactures, especially of linen and woollen cloth, some tanneries, and paper-mills.

The principality of Tropopp, which forms the southern part of the circle, is bounded on the north by the Oder, and on the west by that of Prussia. On the death of Gasthoem, duke of Tropopp, in 1614, Charles, the last of that line, died without leaving an heir, and it fell to the crown of Bohemia, and was mortgaged in 1614 by the emperor Mathias to the private house of Lichtenstein, to which it was formally ceded in full property in 1772. The prince of Lichtenstein, on the left bank of the Oppa was indeed ceded to Prussia by the treaty of Breda, but still remains the property of the prince of Lichtenstein. The Austrian portion has about 80,000, and the Prussian 56,000 inhabitants.

TROPPAU, the capital of the principality and of the circle, is situated in 48° 56' N., lat. and 14° 39' E. longitude. It stands in a plain, on the right bank of the Oppa, at its confluence with the Oder, and about 30 miles from the town of Oppa, in the suburbs of Katherinendorf, situated on the left bank of the Oppa, which has above 3000 inhabitants. The town has on the whole a cheerful appearance, with straight and sparsely broad streets, and some tolerably large and handsome squares. There are several churches, the principal of which is the Gothic church of St. Mary, the church formerly belonging to the Jesuits, and that by the French and the public buildings are the theatre, the senate-house, the palace, now converted into public offices, and some others. The gymnasium has a Silesian museum, a good library, and valuable collections of natural history. Tropopp is the seat of a bishopric, and has a little daily public office, and of the principality, and has a considerable manufacture of linen and woollen cloth, which are the staple articles of its commerce.

Tropopp was chosen, in 1820, for the meeting of the Congress which assembled in consequence of the revolutions effected by the standing armies in Spain, Portugal, and Naples, at which the principle of armed intervention was asserted. There were present at this Congress the emperors of Austria and Russia, the king of Prussia, the crown-prince of Prussia, the grand-duke Michael of Russia, and the archduke Rudolph, cardinal-prince-bishop of Olmütz, likewise on the part of Austria, Prince Metternich, the Austrian councilors of War, and Wacke; on the part of Russia, Count Nessielrode and Count Capo d'Istria; on the part of Prussia, Prince Hardenberg and Count Bernstorff; the French ministers, M. de Ferroynay and Carman; Lord Stewart, the English ambassador; the Count de Vienne, the minister of France, Ruffo, Count Goldowin; Prince Wolczaky; Prince Minskoff; M. von Alopiaus, Prussian minister; General von Gruenwald, Count von Zich; Baron Lebzeltern, and many other French and Austrian ministers, exclusive of the swiss, whose negotiations was a convention between the great powers not to recognise any constitution which deviated from the legitimate monarchial political system of Europe. England and France appeared however to desire a reconciliation of the differences between Austria and Russia; they both endeavoured to advocate a system of neutrality, the bases of which were laid down in a detailed note by Lord Stewart. Great Britain declared that it would take no part in affairs of principle, and France, under a word of its prince, made its accession to the alliance against Napoleon dependant upon certain conditions, which were not agreed to by Austria, Russia, and Prussia. The three latter powers united not to recognise the revolution at Naples, and it necessary to use coercive measures against it, so as to perpetually bind each other to maintain tranquillity in their dominions. Napoleon endeavoured to justify the state of the kingdom in an official note of the 1st of October, 1820, which was addressed to the congress, in which the French, to all the courts of Europe; but the sovereigns of Austria, Russia, and Prussia sent a letter to the king of Naples, inviting him to come to Leybach, there to appear to the congress in person. It was a revocation of Napoleon's promise; his words were not in accordance with his actions, and the negation was endangered by the Neapolitan revolution, on which, King Ferdinand, with the assent of the Neapolitan parliament, proceeded on the 13th of December, from Naples to Leybach, at which place the result of the Congress was finally decided.

(Brockhaus, Conversations Lexicon; Stein, Geog.; Hasel; Cannabich; Oesterreichische National Encyclopedia.)

TROUBAUDURS, the name given to those poets in the Romance language, or langue d'oc, who lived in southern France, eastern Spain, and southern Italy, in the twelfth and thirteenth centuries. (Romance Language.) The name is a French form, from the Provençal troubard, a derivative of the verb trobar, to find, and means an inventor, one who composed in the ancient language of the province, with the same meaning, and served to designate the poets of northern France, or of the langue d'Oïl. The Troubadours were distinct from the jongleurs: the former were the real composers of the verses, and many of them were kings, and in the Middle Ages, while not necessarily occupied in poetic composition; whilst the jongleurs were strolling minstrels, who did not compose poetry, but sang the lays of the troubadours, and accompanied them with their musical instruments. The troubadour derived their name from their troubadours however were skilled both in music and singing; but those who were not, retained a jongleur in their service. According to the spirit of chivalry, the nobles had to provide for their bard or troubadours, on the one hand, for the serving followers of war and minstrelsy, and oftentimes required musicians both poets and musicians for their exertions to amuse them.
It was in the south of France that the poetry of the troubadours originated. That fertile region, blessed with a climate similar to that of the barbarians than the northern provinces of the kingdom, had retained more of its old Roman civilization; it hardly felt the civil wars of the Merovingian dynasty, and escaped both the disasters of the Normans and the decline of the Carolingians: it became independent of the French crown by the revival of the kingdom of Bourgogne, or of Arles, and by the power of the great vassals, the counts of Toulouse and of Poitou and the dukes of Aquitaine. Some of the Romanesque emperors of France had governed the counts of Barcelona acquired by marriage the possession of Provence; and the whole region bordering on the Mediterranean on both sides of the Pyrenees, from the Ebro to the Var and the Rhône, then became a sort of independent kingdom. The troubadours were considered one of the highest and most sacred professions; and when a man spoke the same, or nearly the same, Romance dialect. It was in the twelfth century that the poetry of the troubadours attained its perfection; that poetry was essentially lyrical and mostly amorous; and was characterized by simplicity, or rather paucity, of ideas, and by a strained refinement of expression, and peculiarity of form, which made it quite distinct from the classical models. In that age and country of chivalry, every noble beauty had in her train some one or other of these poetesses; and she who had the best selecte...
tory and antiquities; and those few appear to have been borrowed from monkish chronicles, or from the Vulgate, or from scholastic
sentences. Nor do they seem to have had much intercourse
with the Moorish schools of science established
in Spain, or to have derived from that quarter any fund of
sciences.

In the fifth volume of his work, as already observed,
Raynouard gives an alphabetical catalogue of all the poets
who appeared to him worthy of the name of troubadours,
with biographical notices of most of them. The MSS. of
Provençal poetry: they are three hundred and fifty
in number. Professor Diez of Bonn, in his 'Leben
und Werke der Troubadours,' has collected further information
concerning troubadour biography, and has arranged his
subjects in a chronologically correct order. He begins with William IX., duke of Aquitaine
and count of Pottiers, the oldest troubadour on record.
He was born a.d. 1071, went with a large force of Crusaders to the East, narrowly escaped with his life, and
returned home to indulge in sensual pleasures, and sing of
love and also of war and its dangers. But his poems on
this last subject are lost. He is thus described by native
biographers: 'The count of Pottiers was one of the most
agreeable men in the world, and one of the
greatest seducers of women, a knight skilled in arms and the
affairs of love. He was gifted with poetry and singing,
and of a long time travelled about the world that he
might better consult the ladies. He was of the
kind and order. He begins with William IX., duke of
Malmesbury. Among the other distinguished
troubadours there were, Bertran de Born, lord of Haute-
fort, a restless intriguing man, placed by Dante in his
'Paradiso,' who has also arranged the
history of Henry II. of England against their father; Arnaud
Daniel, likewise mentioned by Dante, as also Sordello
of Mantua; Pierre Vidal, who became mad through love;
Janu't Rude, lord of Blaye, who, becoming enamoured
of the countess of Tripoli solely through reports which he heard
from pilgrims of her attractiveness and goodness, took the
cross and sailed for Tripoli, fell ill on board, was landed
half dead, and carried to a hospital, where the countess,
hearing his strange story, went to see him, to the great joy
of poor Rude, who thanked God and expired in her
arms, and was buried with great solemnity in the church of the
Templars; Guillaume of Cabestanga, whose fearfully
tragic and was the result of illicit love; Arnaud de Marcelli,
called by Petrarch the lesser Arnaldo; Pierre d'Avauergue,
who wrote a kind of review of his brother troubadours;
Fouquet of Marseille and others, an account of whom may
be seen in works above referred to; Rabadoschi, or
'History of Italian Literature' (vol. iv., b. iii., ch. 2), gives
an account of the Italian 'trotivari,' or troubadours, chiefly
from a MS. collection of their works in the Este or
Marlerio library, written about the year 1254. Azzo VII.
of Este, marquis of Faenza, in his works above referred to,
at one time the language and poetry of the
troubadours were in fashion in most of the courts of
Europe. They were the intermediate step between the old Roman
literature and that of the Italian and Spanish languages.

Among the few specimens we have of verses by ladies
addressed to their poetical lovers, a little poem of Clara
d'Anduze is characterized by much graceful elegance and
earnestness of feeling: she told him that her lover that she devoted
her heart to him, and that if she were now the mistress of
her person, he who possesses it should not have obtained it.
The countess of Die expresses her unreserved adoration
for his beauty more explicitly.

The singular institution of the Courts of Love is closely
connected with troubadour history. Their existence has
been denied by some, but Raynouard seems to have
established the fact, especially through the evidence of a
work in Latin written by Mauo Ataude, chaplain to the
court of France about the year 1170, entitled 'De Arte
Amatoris et Reprobulion Amoris,' in which there are
frequent references to the Courts of Love and their decisions
in the troubadour songs, and to a volume of 'Loves,' which
was compiled we do not know by whom, but was quite
in accordance with the decision of the courts. These Courts
of Love were wont to assemble in various towns and castles
of their domain; they consisted chiefly of ladies, to whom some
knights acted as their ghastly, and the country of
Champagne is mentioned as having held a court of sixty
duchesses. The countess of Flanders, Ermenarde
viscountess
of Narbonne, Eleanor of Guinven, queen of Henry II.,
at the court of Love in Poitiers, and many others of her
decisions remain on record. A question having been put
to Ermenarde concerning a lady who, being in love
with a knight by whom she was beloved, married another,
whether she was authorized to repel her former lover, and
the case was referred to the Counts of Love-Ermenarde, a
supervenience of the marriage bond cannot exclude the
former love, unless the lady declares she will renounce
love altogether and for ever. Again, a knight was in love
with a lady, and she, having rejected him with cold
wagings she said at last that she would listen favourably
to his suit, if she should happen to lose her present love.
Soon after the lady and her lover married. The other
knight not agreeing to a principle of the Code of Love,
reminded the lady of the chivalrous promise he had
now married, and had consequently lost her love. The
lady refused, saying that she was still in love with and
was beloved by her former lover, who was now her husband.
Queen Eleanor, being applied to, said: 'We dare not dispute
the solemn decision of the countess of Champagne, who
declared that love cannot exist between husband
and wife;' we therefore approve that the lady in question
should fulfill her promise.'

The Code of Love given by Maître Andre, the origin
of which is involved in obscurity, consists of thirty-one
articles, and is quite in accordance with the spirit of the
above decisions, from which perhaps it was compiled.
The first principle is, 'The nobles, and in the
closest of order.' Some of the clauses are expressed with a kind of delicacy, and bear
evidence of being the work of a female mind, such as
françois de Champenois, a friend to the
invita sumate amansi. Facilis perceptio contemptibile
republic amorem, difficilis eum carum facit haberi. Quilibet
amantes actus in coitione coitatio finitur. Quo non
relat amantis non potest. Amor, cora consueta durum
cultrum. Amores semper eorum smorum, &c. It is
not easy to trace in the above tenets the principle and practice
of the pericles or serventia of Italy and Spain in its
more refined form. Petrarch himself was well acquainted with
the poems of many of the troubadours and
the love of the troubadours was often Platonico through
either necessity or the self-respect of one of the parties.
It was very probable; that it was often not so is abundantly
proved by the records of the troubadours themselves,
and the revenge of outraged husbands is told in more than
one fearful tale. And as Sir Walter Scott remarks, in 'Anne
of Geierstein,' vol. ii., the other troubadours who narrate
small incident of this kind bestow all their pity on the adulterous
lovers, and make no allusion to the
woman given to the injured husband, whom they hold up to
execution. This is of a piece with their system of ethics.
A strange admixture of pious ideas with those of love is
often observed in the conversations of the chief patron of
Mary to inspire his beloved with tenderness for him.
Hughes de la Bacheliere swears by the Holy Gospel
that he never begins to recite a paternoster without immedi-
ately turning his whole mind and heart towards his lady.

Besides the works quoted in the course of this article,
Professor Diez has written also Die Poetier de Troubadours
nach gedruckten und handschriflichen Werken derselben
uitgeest. Emkowa, 1826; and Raynouard has published
Le dictionnaire latin avec un nouveau Chrest de
Originales des Troubadours, Paris, 1836: we may also notice
Mrs. Dobson's Literary History of the Troubadours.
London, 1807.
The other species of Salmo inhabiting Great Britain are the S. umbla, the Northern Char, and S. salvelinus, the Welsh Char.

(Wilson's Rod: Yarrell's British Fishes.)

TROVER (from the French word trouver, to find), the name of a special action on the case. It was invented for the purpose of giving to the plaintiff and defendant to the personal chattels which are the subject of it. It is applicable to questions respecting the right to personal chattels only. This action is maintainable by one who has either an absolute or special property in the chattels and has a right to possess them, or may be brought either by the actual owner or an occasional bailee, a carrier, &c., or a mere finder against all except the rightful owner. The declaration states the property claimed and the chattels in which it is sought. In certain personal chattels, naming them distinctly, their amount and value; that he afterwards casually lost them, and that they came into the possession of the defendants by finding, who, afterwards, converted them to his own use; for which the plaintiff claims damages. This form and the fiction respecting the finding were contrived for the purpose, by assuming a right of possession in the defendant, of enabling the parties to try the bare question as to the right between the plaintiff and defendant to recover or retain the goods. In answer to this declaration the defendant may either plead not guilty, under which plea, since the new rules, the only question raised is the mere fact of the protest. The goods, the plaintiff may prove all the circumstances under which, admitting the conversion, he claims a right to retain the goods. The fact of the conversion is proved by showing that the defendant upon being required to deliver up the goods, either destroyed them, or has assumed the right to dispose of them.

When an act of conversion has once been completed, no subsequent act by the defendant can, as is said, purges the conversion; that is, the right of action, having once vested in the plaintiff by the act of conversion, is divested by any subsequent act of the defendant. But such a subsequent act, as for instance the return of the goods, may reduce the damages to a merely nominal character. The act of conversion must be maintained by a defendant, or tenant, in common, or partner against another, unless in the case where the chattel has been destroyed by the other. This rule is founded on the principle that the possession of one is, by reason of the joint property of all, held to be the possession of all, and therefore no act of conversion can be said to have been committed.

The other pleas which are an answer to this action are, a denial of the property of the plaintiff in the chattel; (Paco, Possession, Possessory,) or the plaintiff's averring that six years have elapsed since the act of conversion was committed; or any circumstances showing that the defendant has a right to retain the goods, as from having a lien thereon, or having been converted into something else. The inquiry into the character of these defences scarcely belongs to the present article, with the subject of which they are only incidentally connected, and they have already been fully treated on under their respective heads.

The plaintiff must prove that the nature and value of the goods correspond to a certain extent with the statements in the declaration. If he succeeds in obtaining a verdict, the jury may give damages not to the amount of the value of the goods, and also such sum in addition as may cover the amount of interest during the time subsequent to the conversion. This action differs from the action of detinue as being brought to recover damages, while the object of the detinue is to recover the actual goods in specie. [Definite.]

(Salmo, N. p., 'TROVER,' Comyns Dig., 'Trover.')

TROWBRIDGE, SIR THOMAS, The date of the birth of this eminent commander is not strictly known, but he is said to have been the son of Richard Trowbridge, Esq., of Candleshill, or Cavendish Square, London. He was brought up in the naval service under Admiral Sir Edward Hawke, and served as a post-captain in 1780, and a commander and post-captain in 1782. After serving with appellation against the French in India, Trowbridge returned to England in 1783, as captain of the admirals' ship, but he was so successful as Commodore (afterwards Admiral Sir Johnblanket, upon a particular service in the Indian seas. His origin from that expedition, in command of the Casam Frigate, of 32 guns, with
The inhabitants of the Troad were most probably of Thracean origin. (Strabo, p. 500.) Diodorus, v. 47-49; Herod. vii. 75.) At the time of the Trojan war they had reached a higher state of prosperity and civilisation than their opponents the Achaeans. They were a people who inhabited the ridge which the Hellespont separates from Europe, and who were anciently entirely intermingled with the Hellenes of Asia Minor. In after-times this tract of country preserved its name, and under the Romans it formed a separate district of Mysia. It was bounded on the west and north-west by the Agrian Sea and the Hellespont; on the east, by the coast of Asia Minor. After the city of Troy was destroyed, the site of it was contained within the confines of the promontory of Lectum on the south of the river Rhodius, which falls into the Hellespont below Aydos on the north. Its eastern boundary was a ridge of hills which, bending westwards, meet the coast of Asia Minor. In the sea-coast of the promontory of Lectum, its western boundary, the Hellespont, is but a short distance from the site of the ancient city of Troy. Strabo gives a much greater extent to the Troad, making it reach to the river Euxinus on the east, and to the Caicus on the west (c. xiii. p. 581-586); but, in this view, Strabo included a number of other places, which at a late period were united with Mysia, states which were only his allies. (Homer, Iliad, ii. 826, &c.)
town appears to have gradually decayed after the time of Alexander, and a new town of the same name was built somewhat below the spot where the Semois is joined by the Seine. (Strab., xiii., p. 567.) In the times of the Roman occupation, there flourished a genuine antique Troy from which they derived their descent.

The first king in Troas is said to have been Teucer, whence the Trojans are also called Teucernae. Dardanus, one of his five oublouring chiefs, married a daughter of Teucer, by whom he had two sons, Iulus and Erechtheus. The latter became the father of Tros, from whom the names Troy and Tros are derived. He had three sons, one of whom was Dardanus, the founder of the Trojan dynasty, which became the capital of the country of Troas. In the reign of his successor, Laomedon, the city was said to have been fortified with walls by the assistance of Poseidon (Neptune) and Apollo. Soon after this Troy was taken by Hercules, but was restored to Priam, the son of Laomedon, who reigned for a long time in peace and prosperity, until his kingdom was attacked by the united forces of the Greeks, in consequence of his son Paris having carried off Helen, the wife of Menelauus. After a siege of nine years the Greeks took and destroyed the city of Troy. This event is usually placed about the year a. d. 1184. After this time the history of Troy, which until then is fairly preserved, becomes completely lost to us, although, as we indicated above, it must have continued for a considerable time afterwards. The most important among the remaining towns of the Troad were Dardanus (the capital of Annea), Thebe, and Bybula.

Upon the topography of Troy and its neighbourhood we need not mention the earlier works of Pooecke, Le Chevalier, Choiseul-Gouffier, Spor, Wood, Wheeler, and others. Those who seek more complete information may consult Leake, Travels in Asia Minor, c. 6; Forchhammer in the Journal of the Geographical Society of London, vol. xii., whose essay is accompanied by a topographical survey of the ancient town by Mr. A. H. Spratt, and other officers of the British Royal Navy. Von Eckenbrecher. Ueber die Lage des Homerischen Iton, in the Rheinisches Museum für Philologie, for 1842, p. 1-49, with two maps, one representing the ancient and another the modern condition of the country. Compare also Strabo, xiii., at the beginning; Plin., H. N., c. 30 or 33; Mannert, Geographie der Griechen und Römer, vi. 3, p. 440, &c.; Geog. Alle Alte, i. p. 115, &c.

Besides the celebrated Troy, there are some other towns in antiquity which bore this name. 1. A village near Memphis in Egypt, and near a mountain called the Trojan mount (Towney aps; Strab., xvii., p. 609). It is believed to have been founded by the Trojans who accompanied Menelauus; and this pasture land of pictures and monuments of his Trojans landed on their arrival in Italy (Dionys. Hal., i. 93; comp. Stephanus Byz., under Troia, who mentions some more places of the same name.

The Troy (Annea) of the Augustan Age.

TROY WEIGHT. Neither the etymology nor the time of introduction of this denomination is well known; the received opinion is that it took its name from a weight used at the fair of Troyes: this is likely enough, since we find more than one large town, the weights of which became standards: thus we have the pound of Cologne, of Toulouse, and, perhaps, also of Troyes.

That there was a very old English standard pound of iron weights is certain, and at Troyes, for instance, the Troy pound was known long before the name Troy was given to it or another. There was also the merchants' pound of fifteen ounces, and the Tower pound, having twelve ounces of its own, but less than the Troy pound by three quarters of an ounce. Though the Troy pound was mentioned as a known weight in 2 Henry V., cap. 4 (a.d. 1414), and 2 Henry VI., cap. 13 (a.d. 1423), the term was not applied to the legal standard pound till 12 Henry VII. (a.d. 1492), at which time the word merchant seems to have been the origin of Avoveroun weight.

The Troy pound has continued to be the legal standard down to the present time, though only actually used in weights of above five hundred hundred weight, and in drugs. It had precisely the same limitation of use in the time of Eliza, who is supposed to have lived in the time of Edward I. There is no doubt that it was originally the pound of silver, the pound sterling, and there is evidence that this pound was sometimes described as divided into twenty parts called silver shillings. The famous statute of Henry I. (a.d. 1260) (Sterling) makes a standard for it which is well known.

The pound Troy is now divided, for gold and silver, into twelve ounces, each ounce into twenty pennyweights, and each pennyweight into twelve forty-fourth of a grain. For medicines, it is divided into twelve ounces, each ounce into ten drachms, each drachm into three scruples, and each scruple into twenty grains. A cubic foot of water weighs 75-7374 pounds Troy. [Weights and Measures.]

TROY, FRANCIS DE, was born in 1614, and was the son of Nicholas de Troy, under whom he commenced his studies, but, at the age of nineteen, became a disciple of Nicholas Lort at Paris. At the beginning of his career as an artist he painted historical subjects, which however he partly abandoned, being more inclined to portrait; but, on being appointed professor in the Academy, he had, according to custom, an historical picture, and chose for his subject Mercury and Argus, which was so highly admired that he immediately received commissions to paint several both sacred and profane subjects, among which was a very fine picture for the church of St. Genevieve. He likewise painted for the duke of Maine a grand picture, called the Fontainebleau. He died in 1650, aged 85 years.

(Pilkington, Lives of the Painters, edited by Fuseli; Bryan's Dictionary of Painters and Engravers.)

TROY, JOHN, a painter, was born in 1676, and was instructed in his art by his father Francis. When he had made considerable progress, he went to Italy, and having studied at Pisa and Rome, returned to Paris, where he acquired great reputation as an historical painter, so that Louis XIV. conferred on him the order of St. Michael, and afterwards appointed him director of the French academy at Rome; a station which filled with great honour, setting a bright example to the young students, not only by his own industry and devotedness to his profession, but by his private virtues. He died in 1752, at the age of seventy-six years.

The portraits of this artist and of his father, painted by themselves, are esteemed among those of celebrated painters in the Florence Gallery.

(Pilkington, Lives of the Painters, edited by Fuseli; Bryan's Dictionary of Painters and Engravers.)

TROYES, a city in France, capital of the department of Aube, 86 miles southeast of Paris. It is by the road through Provins and Nogent-sur-Seine, or 105 miles by Melun and Sens; in 48° 18' N. lat. and 4° 4' E. long.

Troyes was known to the ancients by the name of Augustobona ("Itinerarium Antonini") or Augustobona (Alyove-rekWana, Potolemy), and was the chief town of the Trecasses or Trescaes, a Celtic nation, from whom it took, towards the close of the Roman period, the name of Trescaes, Trescaeses, Trecasses, (for Trescaes, with several variants, is written), and at a period still later that of Trecce (Gregory of Tours), from the oblique cases of which the modern name Troyes has been derived. It was plundered by the Normans a. d. 880, and in the feudal period was the capital of the important county of Troyes or Champagne; the manufactures of the town date from the time of Thibaut or Thibaud IV., count of Champagne (a.d. 1102 to 1122). In the civil troubles of the reign of Charles VI., Troyes was taken by the duke of Bourbon, or Burgundy, (a.d. 1420), the marriage of Henry V. of England with Catherine of France, daughter of Charles VI., was concluded, and the treaty arranged by which Henry was appointed to succeed Charles in the French throne, was taken from the English by Charles VII., a.d. 1429.

Troyes is on the left bank of the Seine, which flows on the northern and eastern sides of the town; it is surrounded...
by walks, which, though antient, are in tolerably good condition, and is entered by six gates. The ramparts are planted with trees, and there are other trees at their foot, so that the town is surrounded by a double alley of trees: the ditch and moat form a garden or park which is maintained by the inhabitants. The streets are irregularly laid out, and are, with some exceptions, narrow and crooked; the houses, many of which are of wood, are generally ill-built; and in fact the town has undergone comparatively little alteration for the last four centuries: the gables towards the streets are built of wood painted or plastered, and are frequently adorned with coarse carving, and have dark penthouses which overhang the shops. Vaysse de Villiers mentions that the houses built in this framework of timber covered with plaster, are some of them so light that they are built and kept in store; and removed when purchased to the spot where the purchaser desires to have them fixed; and that sometimes they are afterwards removed bodily. The neighbourhood of the town is pleasant.

There are three parish churches, namely, the Cathedral of St. Pierre, St. Jean, and La Sainte Madeleine; and five successor churches, or chapels of ease, namely, St. Nicolas, St. Pantalon, St. Remi, St. Urbain, and St. Nizier. The Cathedral of St. Pierre is a fine specimen of Gothic architecture, though not equal to some other of the French cathedrals in size and wealth. The church has coloured windows, in good preservation, which adorn the side aisles of the nave, especially three beautiful rose or circular windows, and the handsome pavement of the choir, are among the features which attract the greatest notice. The church is lofty, the windows throw a strong light on the interior; the plan has never been completed: there were to be several towers, but one only, 192 French feet, or about 233 English feet high, has been erected. The church of St. Jean is remarkable for the narrowness of the nave: it contains a fine tabernacle (a shrine placed on the altar to contain the pyx), sculptured by Girardon; and a fine painting of the baptism of Christ, by Champaigne. The church of St. Nicolas contains a figure of St. Nicolas in bronze, by Girardon, regarded as one of the finest works of that sculptor. The churches of La Sainte Madeleine and St. Urbain are considered as very beautiful, and St. Nicolas has a handsome front. All the churches of Troyes are more or less rich in painted windows: those of St. Nizier and St. Pantalon are in black and white; those of La Madeleine are equally beautiful for colouring and for design. Of the other public buildings, the Hôtel Dieu, or hospital, is a handsome building of the last century, remarkable for a fine iron railing which separates the garden or court from the street: the Hôtel de Ville, or town-hall, has a handsome stone front, the work of Mansard, adorned with columns of black marble; the gate of St. Jacques or St. Jean de Bluteau is a fine tower and gateway: the Church of St. Nicolas having been pulled down, the site is sometimes assigned to Caesar, though it appears to have nothing of the Roman character about it. There are beside these the theatre, the episcopal palace, the wine-mast, the Customers, the sugar-houses, the shambles, and the gaol and house of correction.

The population of the commune of Troyes in 1826 was 25,567; in 1831, 23,749 for the town, or 39,143 for the whole commune; in 1836, 35,563. The manufactures of Troyes are important, and are promoted by the distribution of the waters of the Seine through the town, by means of numerous canals which were constructed by Thibaud IV., count of Champagne, in the 12th century: the chief articles are printed cottons, damask, muslin, and other cotton goods; blankets, flannel, cloth, and other woollen goods; linens, printing paper, playing cards, chamois and other leather, gloves, leather breeches, hats, wool-cards and comb, spinning-wheels, knitting-needles, agricultural implements, furniture, musical strings, leaden utensils and wares, and whiting. There are dye-houses, bleach-grounds, bleach-works, and twine-works, weaving, knitting of hose, which form a principal branch of the manufacturing industry of Troyes, are carried on by the peasantry in the rural districts, who combine this manufacture with their agricultural pursuits. The condition of the workmen in Troyes is tolerable; the wages, however, when compared with those of other parts of the middle ages the fairest of Troyes was of great importance; and a large portion of the trade of France with Germany and Switzerland was transacted at them.

The navigation of the Seine at the beginning of the last century was very considerable: there were five new works needful to keep up the navigation, the river has ceased to be navigable above Méry, which is many miles below Troyes. In 1802 a canal to follow the course of the Seine, from Troyes to the junction of the Aube, was commenced by order of Napoleon; the works were suspended before they were greatly advanced, and recommenced in 1826; we are not aware what progress they have since made. Several important roads converge at Troyes.

Troyes is the seat of a bishopric, the diocese comprehends the department of Aube; the bishop is a suffragan of the archbishop of Sens and Auxerre. There are several fiscal and administrative government offices; a tribunal de première instance, or subordinate court of justice; a tribunal de commerce, or commercial court; three justices of the peace, with their respective cantons or districts; a chamber of commerce, and a council of prud'hommes; a prison and house of correction, baths and a theatre.

Printing was established at Troyes in the 15th century, and there were a few years since five printing-offices. The public library contains 45,000 volumes and 4000 manuscripts. There is a society of agricultural and industrial literature, for the instruction of the public in matters relating to the agricultural interests of the commune; the establishment was the natual place of Pope Urban IV., the son of a shoemaker; of Juvenal des Ursins, an historian of the middle ages; of the brothers Pierre and François Pitou, and of Jean Passemant, all three distinguished at the revival of learning, and the last one of the authors of "Le Saire Ménippée," of the sculptor Girardon, and the painter Nuydard. The arretissement of Troyes commenced in 1823 a plan of arranging the commune; the population in 1831 was 37,431. It is subdivided into nine cantons or districts, each under a justice of the peace.

(Malte-Brun, Géographie Universelle, Dictionnaire Géographique Universel; Dupin, Forces Productives de la France; Vaysse de Villiers, Itinéraire Descrit de la France.)

TRUCK SYSTEM. TRUCK ACT. Truck, which means exchange or barter, has come to be appropriated to signify the payment of wages of labour in goods, not in money. By the truck-system the amount of paying wages, together with the mass of its tendencies and results. The Truck Act, 1 & 2 Will. IV., c. 36, 37, is an act passed in 1831, which repealing all the previous acts passed for the same purpose pay a tax of £500 a year, to be used for the prevention of payment of wages in truck in the departments of industry therein enumerated. The wages of agricultural labourers and domestic servants are computed on the principles of the operation of the Truck System. The evidence published in the Report of the Select Committee of the House of Commons appointed in the last session (1842) to inquire into the operation of the law which prohibits the payment of wages in goods, or otherwise than in the current coin of the realm, and into the alleged violations and defects of the existing enactments, shows that, notwithstanding the Truck Act, the truck-system is still in extensive operation in mills, factories, iron-works, collieries, and workshops of every description. A criticism of the evil tendencies of the system. These evil tendencies will be found also ably explained in the debates in parliament to which the introduction of the Truck Act gave rise in the years 1830 and 1831, and especially in the speeches of Mr. Littleton (now Lord Haddington), the author of the act, Mr. Herries, and Mr. Huskisson.

It is to be observed, in the outset, that the chief part of the evils of what is called the truck-system is incidental, and not inherent in the system itself, the evil arising out of the power of the master over the workman, which enables the former to use this mode of paying wages to defraud and oppress the latter. A master may pay the wages of his workmen in part in truck, in articles of food, clothing, &c., either by agreement, or only the understood consent of his workmen; and if he supply these articles at prices no higher than those at
which they are to be procured elsewhere, and study to meet the various wants of the workmen and their families, the utmost harm that can result is the loss to the workmen of the moral and economical lessons which the disbursement of money-wages is fitted to supply, and the interference with the business and profits of neighbouring retail shopkeepers; and there will always in such cases be some advantage to set against these, so far as the securing of a lodging for the workmen is concerned, their husbands money-wages carefully, and cultivate habits of prudence; others would probably spend recklessly and at the alehouse what the system of payment adopted by managers of workshops of this character does not depend, as tradesmen are, on retail profits. There are indeed circumstances under which the truck-system, practised by wise and benevolent masters, is a great benefit, without alloy of evil. Large works are carried on in remote districts where there are no shops, or so few, that in the absence of sufficient competition, they are both bad and dear. These works give constant employ to a large number of workmen, who are born, live, and die on the premises; and I have seen that, if there were any residue of stores of his own with necessaries and other articles at wholesale prices, setting what they have against their wages: he provides medical attendance and schools for their children, and in the case of evading their wages; and establishes benefit-clubs, to which he makes them contribute in the same way: here no tradesmen are injured, and the workmen are greatly benefited by the favourable terms on which they obtain commodities, and the taskmaster, who avails himself of any advantage which fulfils purposes generally sacrificed where the truck-system is adopted. Such a case as this was supplied by Sir John Guest's iron-works at Dowlas in Glamorganshire, an ironmaster, who, instead of selling his goods to a speculator, as in the case of Mr. Evans's evidence in the Report on Payment of Wages (pp. 64-8). The truck-shop formerly kept on these works was discontinued in 1831, when the Truck Act came into operation. Mr. Evans says:—'They used to buy largely, to keep the prices regular, and in one year they lost 3000/. by a purchase of flour: they never raised the price: we were then in an isolated position upon the top of a hill; now we are in the middle of the town, and in 1831, of the discontinuance of the shop, 'the men resented, and asked us to continue it, in order to regulate the prices.' The other arrangements for schools, benefit-clubs, and medical attendance continue.

In the latter case there would be no remote situation and want of shops, which suggest the adoption of the truck-system, and render it capable of being used with peculiar advantage, also imply a want of competition of employers, and petticoats and petticoats for the benefit of his employer, and thus increase the danger of its being used to the detriment of the workmen. Where the truck-system acts beneficially, it is owing entirely to the justice and benevolence of the individual truck-masters. On the character of the master everything depends. In the hands of masters of opposite character, and under circumstances, whether of scarcity of employment, of isolated situation, or of combination among masters in the same business or through the aid of some monopoly, or deplac the workmen with more or less at the mercy of his employer, the payment of wages in truck may be, and continually has been, and is still extensively used, for the defrauding and oppressing of workmen. Masters compel workmen to take goods from them, which are supplied at a higher price than they might be procured from traders; and the workmen's wages are thus actually diminished in amount, while they are still estimated by the same mode of rate. To compel the workmen to take articles of inferior quality, or more of a particular article than they desire, which leads to their depriving themselves of other articles that would render their general condition more comfortable, and which they can make use of at all, and are obliged to sell again, of course at a loss. If the masters do not supply every article needed by the workmen, and the latter have still to go to shopkeepers to supply these, they have little or no use for them in that half of the wages which they care to stop what is due to themselves at their own prices out of wages; the shopkeepers are less likely to give credit; and if they give it, they stand a great chance of not being paid. In the accounts kept between masters and workmen, the former have all their own way, and the latter are cheated, over and above the cheating of prices; settlements of accounts are at long intervals, and the workmen never know exactly how they stand in their masters' books; some masters make it an object to have the workmen always in debt to them, which prevents them from being able to support their families with the wages which they receive. The workman's means of comfort are diminished, his condition and his character are deteriorated: he does not look beyond the truck-shop, and his wages being absorbed by the same master, he has no means of making provision for the future.

These are the evil results of the truck system, and the ways in which injury is done by it to workmen, and at the same time to masters who do not adopt the truck-system, or who do not use it fraudulently; and who cannot therefore compete in prices with those who do, and to shopkeepers who both lose their customers, in the articles of chief demand among the poor, and have over difficulty and risk in respect of payment for those articles for which workmen still need to resort to them. We shall select a few instances of these evil-practices from the Report which has been already quoted, premising that the cases here instanced were done directly and openly, is now done by various contrivances, such as tickets of an advantageous character, as in the cases here instanced in this Report. At the same time truck is practised openly and without attempt at evasion, to a great extent; which shows that the provisions of the act, well con- tingent, are as effective as they are useless.

Three witnesses, one of whom had been himself a victim of this injustice, relate the following transaction:—Fifty wool-combers, in the employ of Messrs. Turner and Bloom, were compelled on several occasions to take, for the price of one piece of stuff, such a piece of worsted stuff, measuring twenty-eight yards, undyed, for which each was charged 1l. 1s. It was agreed that 1s. a week was to be stopped out of each man's wages, till the stuff was paid for. Mr. Fisher, who was one of the 50, was a housekeeper, and had some of the three weeks, each of them was set to piece of work of the value of 7s. 6d., which was all put against each man's debt, and afterwards, before the debts were cleared off, 2s. a week was still deducted from his wages. The dyeing and finishing of each piece of stuff cost each man 4s., and without that, it was neither usuable nor saleable. Jeremiah Davidson, one of the men, gives evidence, that he wanted to sell some of them to his neighbours, but could not sell them: he had 3500/., being wages for dyimg, 1l. 5s. the 28 yards; they said at the nearest place they could go they could get it at 8d., and it stood me in nearly 1l. I. My mistress cut it up for 4s. 6d. and had some of it, which was dyed in the same way that we had to sell to live upon: we had not a bite or a sack to live upon while we were working this lather of wool extra.' (Report, pp. 23, 24.) It is an aggravation of the cruelty of this transaction that the men are prohibited by law from hawking the goods thus forced upon them, for sale, without a licence. Davidson had worked for these masters for rather more than two years, and during the whole time had been subject to this practice of supplying goods and deducting wages for them. John Fisher, working for Mr. Walker, a worsted manufacturer near Bradford, was paid his wages part in money, and part of it in potatoes and dirt. I do not have any objection for fear of losing my business, I wanted to take three stone of these potatoes; he says, "Oh, three stone will be nothing at all, you might take rather more, it will only be settled at so much a week," and so he let him have four stone and a half. After, his master wanted him to take more: "I said, "We have had a sufficient of them, and have been obliged to sell eight stone of them for 2s. 3d. on purpose to raise a cheap care and above the heathing of prices; the latter half of the wages which you could make use of at all, and are obliged to sell again, of course at a loss. If the masters do not supply every article needed by the workmen, and the latter have still to go to shopkeepers to supply these, they have little or no use for them in that half of the wages which they care to stop what is due to themselves at their own prices P. C., No. 1591.
The profits receive than (p. states

William Morgan, a miner and collier in Monmouth- shire, relates that in the Abercynon works, the workmen set the goods to them, and get an order on another part of the house for the money paid for them. We must not take the money away, but pay it all back there; not even one penny to have a pennworth of balm; and if we want a penny or two to pay any man whatever, we must buy the things and pay for them: article: if we want a quarter of potatoes from a huckster, we must sell some of the articles.... I have been forced to buy potatoes with shop things, and pay my lodgings with shop things; and I was not looked on in my lodgings, because I had no money to pay them. I lodged at a baker's house, and I was obliged to bring currants to him to pay the rent, and lose 1d. in the pound. (p. 108.) We select the following cruel example of the working of the system from the evidence of Mr. Pitcher, a clerk and cashier in iron-works in Monmouth-shire:—It is the case of a workman whose child died; he could get no money; there was nothing to be had at the works; he asked for his wages and it was decided, he must go without. He was bound to take goods out of the shop he was welcome; that was the answer, that he might take goods out of the shop, and bury his child; and he was obliged to take goods up and sell them, and then bury his child, and then take them up again. Mr. Shepherd, a grocer and draper in the island of Portland, where the truck-system is universal, says it frequently happens that quarrelary in full work find themselves unexpectedly deprived of their employer, when they have a settlement of debts, or an account of place, at the end of six months. He mentions an instance of a man who, expecting to receive £5, found himself brought in 10s. in debt. (p. 115.) The Rev. F. D. Perkins of Monmouth gives the following instance:—"They do not know how their account is going on, and they overrun it, sometimes without meaning to do so; that is, the poor people cannot read, the account is kept by the master, and the workmen have books. I have seen these books, purporting to be a list of the articles which they have had, but it was impossible to understand it, for the accounts are kept in hieroglyphics. I have said to a man, "Do you not understand your own account?" and he has said, "I do not know." "What does this mean?" I have said. Mr. Shepherd: "I do not know."..... The account appears to be kept in a way that the master can alone tell what it means; the men are not at all aware of what they are spending." (p. 141.) Mr. Shepherd mentions an instance of profits realized by the practice of truck. Mr. Oldfield, clerk to Messrs. Stainton and Jones, solicitors, Chorley, Lancashire, states that 'the whole of the mill-owners in Chorley, with the exception of one in the cotton-trade, are in the habit of getting something like 50 per cent. out of the shop. (p. 84.) Autey, a hosier, at Bradford, estimates the profits made by the truck-masters about Bradford at 25 per cent. on the goods they supply. I will give you the instance of a person living three miles from Shipley, at Idle:—she can purchase goods in Idle at 6s. in the pound less than she can at the shop; when she has to take them out from the shop, she pays 2s. 6d. per stone upon flour, 1d. per pound upon sugar, 2d. per pound upon tea and oats, cheese, bacon, and other articles in the same ratio. Two miners from Monmouthshire state that they would rather receive £5 a week in money, and could do better with it than their present nominal wages of £1. paid in truck. (Evidence of W. Morgan, p. 108, and of Howard, p. 110.) Mr. Shepherd, of Portland, is asked, with reference to the quarry-masters of that island: What do you suppose the quarry-masters would pay to keep 1 per cent. on the supply of the articles?—I should say from 10s. to 12s. per week. Have they ever run as high as 25 or 30 per cent.?—I cannot say that; I think they do. (p. 116.) Mr. Shepherd of bills of which Portland quarrymen are charged 60s. and 63s., for a week's work, which Portland quarrymen are charged 60s. and 63s., for a week's work, I cannot think will pay 10s. or 11s. for a week's work. There are a few instances selected out of the many con- tained in the very interesting Report of the Select Committee on the Payment of Wages of the evils of the truck- system. They feel the weight of this system, and its evil tendencies of the payment of wages in truck with its tendencies for good. It is to be feared, from the nature of the case, that the number of masters who will use it to the exclusion of any other scale, is very limited. The number of those who will use it for their benefit; and the results realize this apprehension. The cases in which, with good masters, it is capable of being turned to the deserved advantage of the workmen and the public, are few; and in these cases the good may always be effected by shops kept by persons other than the master, who are brought there by him, and who are necessarily, from the custom which is within the master's control, amenable to him, and who, therefore, can be made to keep such shops where they are wanted. Generally, where the system is practised even by good masters, there will be disadvantage as well as advantage. Where the masters who practise it are not benevolent and just, the evils to which it may be turned are those that we have described and exemplified; and the power which the master possesses over his workmen, the profit which he may make by using truck fraudulently and oppressively, and the abundance of labour in proportion to the number of workmen engaged, and the comparatively not advanced, which are combined to produce extensive evil from the truck-system. And the evil always increases with the increase of other evils which fall hardest on the workmen. The truck-system is still in its incipient stage. Mr. Walker. I have no hesitation in advocating the prohibition of payment of wages in truck; and we do not think that much benefit would be derived from a plan recommended by one or two witnesses before the Committee, in lieu of total prohibition, which we will give in the evidence. If any law could be framed to have it done by licence, so that the master should be licensed to supply the people by truck, under certain regulations as to the mode by which it should be done, and the amount of the deduction, the simple process under the review of some of the local courts, the sheriff or quarter-sessions, or the ordinary meetings of justices, it would be very beneficial. (See also the Evidence of Mr. W. Dixon, p. 80.) The good to be derived under certain circumstances from a truck-shop kept by the master, may, as we have already observed, be always derived, with the master's aid, from a shop kept by some one else; and we cannot conceive the possibility of licensing a system which would be proof against all the means of evasion to which truck-masters may and will resort. It is right to add that the two witnesses whom we have quoted are both from Scotland, where a law which gives trade-marks, power of arresting wages in the hands of masters for workmen's debts; which is found very grievous to the working-classes, who are encouraged by trade-masters to contract debts and then prosecuted with this law, renders the truck-system a resort to the operations of tradesmen, and gives it a peculiar and local value. There have always however been found persons to contend against any legislation whatever on this subject; and we will give, as far as we can, a list of the principal arguments by which the opinion of such persons is principally supported. Legislation against truck is often condemned as an interference with the rate of wages, which is governed by the natural laws, and which the legislature cannot attempt to regulate without doing mischief. But there is an obvious distinction between the rate of wages, and
315 a particular mode of paying wages which affords facilities to the master of cheating and oppressing his workmen, and enables him actually to lower wages while, preserving them at the same money-rate, he does not appear to do so. Those, then, are all manufactories and trades in which the natural laws which govern the rate of wages, but to protect the powerless workman against the master who would increase his own profits fraudulently and at his expense, and to secure to him the advantages to be derived from the regular receipt of money-wages and the management of his own expenditure. It is legislation, not to determine the contracts which shall be made between master and workman, but to secure the latter the fulfillment of the former, and to enable him to support himself in money. This distinction was forcibly put by Mr. Huskisson, in his speech on Mr. Littleton’s bill, on the 5th of July, 1830,—one of his last speeches. "Why should the legislature not do towards the poor and helpless part of the community what it had ever been the policy of the law to do towards all those who were unable to protect themselves? It was the duty of every state to ensure the fulfillment of contracts, in the sense in which those contracts were made. There were many instances of such legislation doing this, as well as instances of its interference for the protection of those who could not protect themselves, or who perhaps could protect themselves, but were not able to do so. Wages, for instance, were not fixed not for the protection of the most helpless, the least informed, the most friendless part of society, but for the protection of those who might be obliged, from circumstances, to have recourse to money-lenders. That act provided that every contract should be void unless the payment, contracted for in money, should be actually paid in money. Why then should we not extend the same protection to those who had no friend to guide them, and who were consumed by the extortion of those who regarded only their own advantage, and never thought of the sufferings and affections of those whom they employed. (Huskisson’s Speeches, vol. iii., p. 336.)"

The following is a summary of the Truck Act, often known as Mr. Littleton’s Act, which was passed in 1831. It declares all contracts for hiring of the artificers afterwards enumerated, by which wages are made payable in any form of money, or by which wages consist in any form of goods, wares, implements, hardwares, or any articles, or of such wages as are derived from them, or from any materials used in any of such last-mentioned trades or employments; or in or about the making or preparing of bone, thread, silk, or cotton-lace, or of lace made of any mixed materials, and worn to be exempted from the act. The 23rd clause declares that nothing in the act shall prevent the supplying to artificers of medicines or medical attendance, of fuel, materials, tools or implements to be used in his trade or occupation if a miner; or of hay, corn, or other provision to be consumed by any horse or beast of burden, or the letting to any artificer the whole or part of any tenement, or the supplying of vienals dressed under the roof of any employer and his servants without payment or money, or any part of the above accounts, or on account of money advanced, "provided always that such stoppage or deduction shall not exceed the real and true value of such fuel, materials, tools, implements, hay, corn and provender, and shall not be in any case made from the wages of such artificer unless the agreement or contract for such stoppage or deduction shall be in writing and signed by such artificer." The interpretation clause (25th) gives a most extensive meaning to the word "provision." Any agreement, promise, or device to contrive, collude, or arrangement whatsoever on the subject of wages, whether written or oral, whether direct or indirect, to which the employer and artificer are parties, or to which any of such persons are bound to each other, or whereby either of them shall have endeavoured to impose an obligation on the other.

Such are the provisions of the Truck Act. Well adapted, as it would appear, for the purpose of protecting the workman against this species of oppression by his master. It is yet extensively violated and evaded. The attention which has lately been called to this subject by discussions in parliament, and by the Report of the Committee whose investigation of this subject has been the first ever instituted by the legislature, will probably have the effect of inducing the government to appoint inspectors to secure the effectual carrying out of the act.

The evidence presented by the Select Committee on Payment of Wages shows that the truck system is practised extensively in the cloth manufactories about Bradford in Yorkshire; in the mills in Lancashire, especially about Bury; in the nail-trade and about Dukinfield in Staffordshire, where it is carried on principally by a set of men called factors or foggers, who are middlemen between the nailors and the nail-smiths and manufacturers (see the interesting evidence of Mr. Leech, pp. 91-64). In the collieries of the North, both in the counties of Monmouth and Glamorgan, and in the stonework quarries of the Isle of Portland, where the usual time for settlement of accounts is six months, and sometimes accounts are not settled in twelve months or eighteen months. In Namur, the habitual practice is pretty general (pp. 133-9); and in the agricultural counties of Devon, Dorset, and Somerset, among the farmers, to whom the present act does not apply, but whom there does not appear to be any proper reason for excepting from legislation against truck.
(See the evidence of the Rev. C. E. Walkley, of Laurence St. Clyst, Devonshire.) The Rev. W. Ferguson, of Reculver, Oxfordshire, says: "As a matter of&e; #.I practice prevailing in his neighbourhood of paying the agricultural labourers at public-houses in which the farmers have an interest, on Saturday nights, and often even on Sunday mornings. They know that they can come home completely drunk; they cannot sit in the public-house doing nothing" (p. 106). This is virtually a form of truck, and a very pernicious one. The witness adds: "It is one of the finest agricultural districts in England, but I am bold to say that I never met with the labouring classes in such a state of ignorance and immorality. I have lived several years at Newcastle-on-Tyne, where manufactories abound, but I never had an opportunity of seeing anything to compare with the state of truck which has been increasing in the last six or seven years, during which time there has been a steadily increasing depression of trade and manufactories. The spread of truck is a sign of a depressed condition of the working classes; but it is a melancholy sign which gives warning of the evil effects of its own, and which it is right that the state should interfere to get rid of. It makes the prevailing distress fall more heavily than it otherwise would on the workman, who is robbed to relieve the master. TRUE. (Astronomy.) This word is used in a somewhat technical sense. The place which a star or planet appears to occupy in the heavens is not called its true place; but if it would correspond with the effects of the refractions, parallax, &c., were removed, that if the observer saw from the centre of the earth, and without the light passing through any refracting medium.

TRUMAN, REV. JOSEPH, B.D., an English theological writer of the seventeenth century, whose works have been long neglected and generally forgotten, and of whose personal history very little is known, was born in April, 1662, at Gedling, in Nottinghamshire. An account, however, of another account says at Stoke in the same county. His family was of respectable station, and his father appears to have at one time filled some public office. He himself, after a school education at Gedling, under the minister of the parish, Mr. Lawrence Palmer, of whom he was a person of considerable learning, was removed to the free school at Nottingham, and thence proceeded to Cambridge, where he was admitted a pensioner of Clare Hall. All that is known of him after this is, that having finished his studies at the university he was ejected into the living of Cromwell, that he was ejected for refusing to read the Book of Common Prayer soon after the passing of the Act of Uniformity, and that he then resided for some years in Mansfield, and that he died after a short illness in the house of a friend at Sutton in Derbyshire on the 29th of July, 1671.

This is the only account of three small theological treatises: 'The Great Propitiation,' published in 1669; 'An Endeavour to correct some prevailing opinions contrary to the Doctrine of the Church of England,' in 1671; and 'A Doctrine of Natural and Moral Impotency,' the same year. All these performances are held by his admirers to display extraordinary powers of ratiocination; but the last is looked upon as his best work. A new edition of it, with a 'Biographical Introduction by Henry Rogers,' was published at London in a small octavo in 1844, and, though it may ever be thought of its right to the rank claimed for it by its modern editor, it certainly deserved to be rescued from oblivion, were it only as a contribution to the history of the subsequent theological philosophy described by Mr. Rogers as 'being the first systematic and elaborate attempt not so much to establish the doctrine of man's moral inability (still less the doctrine of moral necessity generally),

as to illustrate the wide distinction between that and natural infirmity.' To reconcile the form with all ideas of human accountability, and to vindicate it from the pernicious consequences which some of its advocates, and all its opponents, would feign [fain] attach to it.'

Truman was a hard student, and was distinguished for his powers of observation, and for the vivacity of his conversation. One of his favourite studies was English law: he is fond of introducing a legal illustration in his metaphysical expositions and deductions. With all his sharpness of intellect however, it is admitted that he had very peremptory notions of anything out of the province of mere logic. His style is singularly rugged and inartificial, to the extent of being sometimes nearly inexplicable upon any syntactical principle. Though thoroughly practical, his mind was not shorn of all the vanity of his time. Truman is said to have regarded many of the spots upon which his party took their stand in opposition to the established church as sufficiently insignificant; he evinced his conscientiousness by the sacrifice he made in giving up his living rather than comply with all the demands of the law; but after he thus became what was called a nonconformist, although when opportunity served he was always ready to preach to those of his own way of thinking, he continued, we are told, usually to attend the services of the establishment; nor did he drop his intimacy with any of his old friends among the clergy. Among his particular associates are mentioned, besides Baxter, Stillingfleet and Tillotson, several other of whom he is said to have consulted at Clare Hall. For these particulars we are indebted to the memoir of Truman by Mr. Rogers, who has collected all that is to be found respecting him in Calamy's 'Account of the Ejected Ministers,' Nelson's 'Life of Benjamin Hoadley,' &c.

TRUMBULL, SIR WILLIAM, a diplomatist and statesman of some eminence, and, during the reign of William III. for some time secretary of state, was born in 1656, at Easthamstead, in Berkshire, the son of William Trumbull, Esq., of Easthamstead, who represented Berkshire in parliament; and his grandfather, who had the same name, was one of the clerks of the privy council in the reign of James I., and carried the dispatches of Brussels to the king from Charles I. He was educated up at a school at Oakingham, and afterwards went to St. John's College, Oxford, but afterwards became a fellow of All Souls' College. He took the degree of L.L.B. in 1659, and of L.L.D. in 1667. In the interval between these two degrees he had travelled in France and Italy. After taking the degree of L.L.D. he practised as an advocate in Doctor's Commons, and enjoyed an extensive practice. In 1671 he was admitted a fellow of his college, and in 1672 he obtained the reversion of the clerkship of the signet, then held by Sir Philip Warwick, which came to him on the death of the latter in 1682. In 1683 he accompanied Lord Dartmouth to Tangier in the service of the English ambassador, Sir Charles Pratt. On his return to England he was knighted, and in November, 1685, sent as envoy extraordinary to the court of France.

'He was sent envoy to Paris,' says Burnet, 'on Lord Preston's being recalled. He was there when the Dutch war was declared and the Duke of Nantes was repealed, and saw the violence of the persecution, and acted a great and worthy part in harbouring many, in covering their effects, and in conveying over their jewels and papers to England, which disgusted the court of France, and was not very acceptable to the court of England, though it was not then thought fit to disown or recall him for it. He had orders to put in memorials complaining of the invasion of the principality of Orange, which he did in so high a strain, that the last of it is like a denunciation of war.' Trumbull was recalled from Paris in 1686, when James II. had thrown off the mask from his designs to establish popery in England with the aid of France; and he was afterwards appointed as ambassador extraordinary to the Ottoman Porte. He remained at Constantinople until 1691, the revolution having occurred while he was there. On his return to England he was appointed to succeed Sir Robert Walpole as secretary of state. He was also governor of the Turkey Company. He resigned the secretarieship of state in December, 1697, and retired to Easthamstead, to pass the remainder of his days in quiet. At the time of his withdrawal from public life he had purchased and endowed the University of Oxford. Lord Hardwicke says, in a note to Burnet's 'History of his Own Times' (vol. iv., p. 366, ed. 1833), 'Secretary
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TRUMBULL resigned about this time in disgust with the lords of the region, which he judged a misfortune more than a mystery. A similar account of the causes of his retirement is given in the 'Shrewsbury Correspondence.'

Sir William Trumbull occupies a place in literary as well as political history, and has the distinction of having aided Dryden with his counsel while he was engaged in translating the 'Aeneid,' and of having been the first to recommend to Pope the translation of Homer. Dryden thus gracefully mentions in his preface to the translation of Pope's 'Aeneid,' 'I must also add, that if the last Aeneid shine among its fellows, it is owing to the commands of Sir W. Trumbull, one of the principal secretaries of state, who recommended it (Roscoe's edition, vol. viii.) Mr. pope in 1700 passed some time at Trumbull's house, as I have made it mine; for who could confine weakness when he enjoined a fresh labour? I could not but invoke the assistance of a muse for this last office:

"Extravm hane Amicas"
"Negit quia carmina Gallo..."

(Dryden's Works, by Scott, vol. iv. p. 100.)

Pope's father lived at Binfield in Windsor Forest, in the immediate neighbourhood of Sir William Trumbull's place at Easthamstead; and here, as is well known, Pope's boyhood and commencing manhood were passed. The old retired statesman and the young poet were almost inseparable companions, and both were members of the same Roman authors, and were in the habit of riding with one another three or four times a week, and latterly every day. The first of Pope's pastoral's was addressed to Sir W. Trumbull:

"Yes that, too wise for pride, too good for pow'r,
Enjoy the glory to be given to men,
Away from all the world can boast,
To all the world illustrously are lost!"

When Pope went to London in 1705, he corresponded with the amiable old statesman. Some of the letters which passed between them are printed in Pope's works (Roscoe's edition, vol. viii.) Pope in 1700 published some specimens of translations from Homer, which had previously communicated in manuscript to Sir William Trumbull. The latter wrote to him (April 9, 1708), 'I am confirmed in my former application to you, and give me leave to renew it upon this occasion, that you would proceed in translating that incomparable poet, to make him speak good English, to dress his admirable characters in your proper, significant, and expressive conceptions, to make his works as useful and instructive to this degenerate age as he was to our friend Horace, when he read him at Prænesta:

"Qui quid sit pulchrum, quid teneor, quid uide, quid non."


When Pope visited Binfield to bid it adieu before taking up his residence at Twickenham, he found Sir William Trumbull dining, and parted from him, as he wrote to his friend Mr. Blount, 'as from a friend of my forebears, with lifted hands the miseries to come, from which he is just going to be removed himself.' Sir William Trumbull died on the 14th of December, 1716, aged eighty years. Burnet says of him, that he was the eminence of all our civilians, and was by much the best pleader in those courts, and was a learned, a diligent, and a virtuous man. Pope's character of him in 'Epitaph on Sir William Trumbull' is as follows:

"An honest courtier, yet a patriot too,
Just to his place, and to his country true.
Pill'd with the sense of age, the fire of youth,
A sense of wrongs and a zeal for truth,
A generous faith, from superstition free;
A love to peace, from rage and hate.
Such this man was, who now, from earth removed,
As length enjoys the liberty he loved."

TRUMBULL, JOHN, an American painter, was the son of the governor of Connecticut of that name. He took an active part in the war of independence, and after the peace came to England, with a view of perfecting himself as a painter under West, in order to carry into execution a favourite design of painting a series of pictures of the principal heroes and events of the Revolutionary war. He completed many of these pictures, and several of them have been engraved. The first of these series painted by Trumbull was the Battle of Bunker's Hill, in which General Warren was killed: it was engraved or being engraved by the celebrated J. G. Miller at Stuttgart, in 1775. The death of General Montgomery, another of the series, was engraved by the Dutch engraver F. Clemens, in London, in 1708: it is considered Clemens's finest plate. G. Ketterlins, at St. Petersburg, commenced copies of both these plates, but their completion interrupted by his death in 1798. Also the Benton's were engraved in mezzotint a picture by Trumbull of Washington standing on the sea-shore, with a black in the background holding his horse; and likewise a portrait of Washington. A very fine standing half-length portrait of Washington was engraved by J. Cheesman, after Trumbull. There are other plates by other engravers after this painter. He was still living in 1813. (Meusel; Flisell; &c.)

TRUMPETER (Ornithology), the vulgar name for Psophia crepitans, misprinted Trophaea crepitans in the article AGAMI.

Mr. G. R. Gray makes the Psophine the first sub-family of his Arideas. The Psophine, in Mr. Gray's arrangement, consists of the genera Psophia and Cariama, and immediately precede the Grauina.

Mr. Swainson placed Psophia under the Megopodine. [Megapodiine.]

TRUNCATED, cut off, or abridged. Thus the part of a cone or pyramid which remains when the vertex and parts adjacent are separated from the rest by a plane section, is called a truncated cone or pyramid.

TRUNK OF TREES. (Forestry.)
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borough comprehends a part of Kenwyn parish, chiefly occupied for agricultural purposes; and the whole of the parish of St. Mary, which is almost entirely occupied by houses. This parish had, in 1831, a population of 2826, and an area of 190 acres. The town however had spread beyond the municipal boundary, and comprehended a considerable proportion of the houses and population in the parishes of St. Clement, and in the extra-municipal part of the parish of Kenwyn: St. Clement's parish had an area of 3520 acres, and a population of 2885; Kenwyn had altogether 3730 acres, with a population of 8492; making a total of 6,555 acres, and 14,502 inhabitants in 1831, of whom 8468 were in the town itself.

The town of Truro is situated at the confluence of the Allen and Kenwyn (two small rivers, whose junction forms a stream, a furlong wide, flowing into the Carrick road); it is not more than 1 mile from land beyond the borough, and is divided by portions of the opposite banks. It is well built: the streets are partially paved and lighted under an act obtained a.d. 1796, and including in its operation all streets and passages in the old borough and half a mile beyond its boundary.

St. Mary's Church is in the centre of the town: it is a handsome building of perpendicular character, with a spire of modern erection. Kenwyn Church is within the municipal boundary, but stands half a mile north-west of the town. There is a chapel-of-ease to Kenwyn in the town, and there are several places of worship for Protestant dissenters and Methodists.

There are assembly-rooms which may be converted into theatre; county library; a literary society, called the Cornwall Institution; a county infirmary, and a small borough gaol.

The trade of Truro is considerable; and the town is the residence of several of the gentry of the county, and is in the possession of an important mining-district. Some tin is smelted, and tin and copper are exported: the manufacture of carpets was formerly carried on, but we know not whether it is continued. The imports are iron, coal, and timber. There are two weekly markets (Wednesday and Saturday), both well supplied with meat and fish and other provisions; the Wednesday market is also a corn-market.

There are four yearly cattle-fairs. The Easter sessions for the county of Cornwall, and for the borough of Truro, are held at the Crown Inn, the residence of the ears of Cornwall, an ancient inn and gaol. These sessions are conducted by Mr. Warden of the Stannaries, which is a court of record, is held here also.

Truro is one of the coinage towns for the coinage of the tin: the process is carried on here only and at Falmouth.

The borough sent members to parliament in the reign of Edward I. The boundaries of the borough were enlarged for parliamentary purposes by the Boundary Act, considerable portions both of St. Clement's and Kenwyn parishes being added, and these new boundaries have been adopted in the Municipal Reform Act for municipal purposes also: the borough thus enlarged is by the same act divided into two wards, and has six aldermen and councillors with a Mayor and Alderman of the peace. The number of parliamentary electors, in 1833-4, was 556; in 1839-40, it was 644: showing an increase of 88.

The living of St. Mary is a rectory of the clear yearly value of £320, with a glebe-house; that of Kenwyn is a vicarage (united with the vicarage of St. Kea), of the clear yearly value of £203½, with a glebe-house; and that of St. Clement is a vicarage, the yearly value of which is not returned. All are in the rural deanery of Powder, in the archdeaconry of Cornwall, and in the diocese of Exeter.

There were in the three parishes, in 1835, forty-nine dayschools of all kinds, with 1674 scholars, viz. 598 boys and 551 girls, and 525 children of sex not stated; one of these schools, with 22 children, was passed for a national by the Board of Education and an allowance from the Earl of Falmouth, and one appears to have been a national school. There were also eleven Sunday-sCHOOLS, containing 1027 scholars, viz. 522 boys and 505 girls.

(Lyson's Mon. Brit. & Parliam. Paps.)

TRUS. [Herna.] TRUSSING. The principle of trussing, as applied to the timber framework of roofs, is explained under Roof, vol. iv. pp. 170-1. It remains to notice some of the principal methods in which that principle is applied to the support or strengthening of beams or girders, or which may, by its judicious application, be made available for much larger spans or in the support of much larger weights, than simple beams of any practicable dimensions.

The rods or bars which are added to a girder for the purpose of trussing or supporting it may be applied in two sets, one on each side of the girder, and connected together by a tie at the necessary points. Or the beam or girder itself may be divided longitudinally into two halves, or fitches, separated just so far as to admit a single truss between them, and held in the right position by the insertion of small blocks. In true girders formed from two fitches, the solid half is the truss, and the hollow half the apex, and passing through an iron plate which bears against the under side of the beam. This bolt corresponds with the king-post in the truss of a roof, and the lower part of the beam, between c and e, acts the part of a tie-beam.

(Fig. 1)

[Diagram of a truss]

By screwing up the nut f, on the lower end of the king-bolt, the beam is cambered, or slightly curved upwards, as shown in the cut, and so long as it retains this curve the weight laid upon it may eventually be transmitted to the trussing-bars, being transmitted to them through the king-bolt.

The defects of this mode of trussing consist in the reverse of the trussing-bars, being transmitted to them through the king-bolt.

The defects of this mode of trussing consist in the circumstance that the beam will not, so long as it retains the cambered form, act as a tie against the weight placed against it, or the reverse of the trussing-bars, being transmitted to them through the king-bolt.

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Notwithstanding these obvious defects, observes Mr. Ainger in a communication to the Society of Arts (Transactions, vol. xviii. p. 101), this mode of trussing continued to be much employed till about the year 1816, when Mr. Barlow, among other valuable experiments, compared girders trussed on the principle above described with a solid piece of timber of the same section, and found the latter to be on the average not considerably weaker.

These defects are remedied by connecting the lower ends of the inclined bars, which are, though not very properly, called trusses, by an iron rod stretching in a perfectly straight line from the upper to the lower ends and capable of the required degree of tension by means of screws or keys. This addition makes the truss perfect in principle, its strength being limited only by that of the materials employed, which may be either iron alone, iron and wood. In some cases the inclined bars are not continued upwards until they meet in an apex, and a third bar, in a horizontal position, is placed between their upper ends. This horizontal piece resembles the straining-sail of a truncated roof [Roor, Fig. 11.,] and the vertical bolts, of which two are used, take the place of queen-posts.

In the paper by Mr. Ainger referred to, it is observed that trusses on the above principle are difficult and somewhat expensive to make in an exact manner, and a more economical plan is described, which, though not equally efficient, adds very greatly to the strength of the timber. The description is illustrated by a representation, of which Fig. 2 is a copy, of a girder thirty-four feet long, used to support a. leaden flat, and which had been found to stand without sensible alteration for two years. The beam a b is cambered in a similar degree to that shown, and the truss consists of a series of iron rods, a c, c d, and d b, placed against iron plates or abutments notched into the timber at a and b, and connected together at the joints c and d, by bolts similar to those used in the chains of a suspension-bridge, the rods being doubled and embedded in cement between them. The truss forms, in fact, a suspension-
bridge, supporting the middle of the beam at c and d by means of small blocks inserted between it and the connecting-bolts. The ends of the trusses, a and b, are prevented from approaching each other by the upper part of the beam, which is maintained in position by large headed bolts. A girders may be used, and in order that it may be, notwithstanding the extension of the fibres by the cambering of the beam, notches may be cut about one-third through the substance of the beam, as after the beam, are filled in with wedges of hard wood or iron. The upper edge of the beam is thus enabled effectually to resist the tension of the rods, the strength of which forms the only limit to that of the girder. Several varieties of this plan of suspension-trussing are given in Herbert's 'Engineer's and Mechanic's Encyclopaedia,' vol. i., pp. 158-161. It may be applied, like the former system, either to single girders or to those consisting of two Bitches. Ainger gives a formula for calculating the size of the iron trussing-rods, which, for a beam thirty-four feet long, should have a cross-section of rather more than a square inch for every ton weight to be sustained in the centre of the beam. It was found by experiment that a single iron beam eight inches square and twelve feet long between the supports, strengthened by iron rods one inch square, applied as in Fig. 2, would support between 4000 and 5000 pounds, which is more than double the weight it would sustain without trussing. A girder of the same dimensions, trussed with iron braces on the principle of Fig. 1, but with the addition of an horizontal tie-bar one inch square, appeared to possess no greater strength to resist fracture, although about the larger edge, and the weight it was less, owing to the iron braces being less compressible than the fir-wood, which, on the suspension principle, has to resist the tension of the rods.

To remedy this apparent deficiency, Mr. George Smart, inventor of the ingenious truss called the 'bow-and-string rafter' ('Rooft. fig. 33), in experiments tried to ascertain how far the strength of a beam is increased by confining its ends, so as to prevent them from approaching each other when the centre is heavily loaded, found that a lath which, when simply laid on two points of support, broke with a load of 11 lbs. placed in the middle, would sustain 270 lbs. when the ends were firmly secured by wedges. This experiments led him to the construction of trussed beams of great length, in wrought-iron as well as in wood. In 1826 he submitted to the Society of Arts a wrought-iron beam adapted for use in bridges, roofs, floors, and other constructions in which stiffness, strength, and lightness are required, the invention of which he was rewarded with his silver Vaulcan medal. This beam or girder is made by welding the ends of an arched bar of wrought-iron to a longer straight bar, and then turning the ends of the straight bar either up or down, as may be most convenient for fixing, according to the particular use to which it is to be applied. Blocks of well-seasoned wood are then inserted at intervals between the arch and the straight bar, to prevent buckling, and the whole is secured together by iron straps inscribing the blocks and the iron bars. Mr. Smart conceived that wrought-iron beams made in this way would support so much more weight than those of cast-iron of similar dimensions, that they might be made of any given strength for one-half the cost of cast-iron girders; and he refers to the application of such a beam to sustain a very heavy mass of brickwork over a gateway leading from the Poultry, under circumstances which would have precluded the use of timber. Very light timber beams were made by Mr. Smart upon the same principle; and so strong was his confidence in the application of trussing upon an extensive scale, that he published a design for a foot-bridge in London, to support the weight of the post office, in a single span.

Cast-iron beams are frequently trussed with wrought-iron rods, in a similar manner to those of wood, and are applied to very great strength and length. The best summers used over large shop-windows, to sustain the front wall of the house, are often made in this way; and similar girders are much used in the construction of railway bridges. The bridge which supports the line of the London and Liverpool railway between Minories and Wallbrook is an example. It has a clear span of sixty-three feet, and is supported by six massive trussed beams, weighing about fifteen tons each. When used in bridges or roofing, timbers may be applied to the iron, supported and upheld by ledges formed for the purpose, to render the fitting of the joints and other timbers easy.

Trussing has been applied with advantage to the raising of sunken floors, and the repair of beams which, from sagging or from the ravages of dry-rot, have become dangerous. In the fourteenth volume of the 'Transactions' of the Society of Arts, pp. 149-152, is an account of a method of raising a sunken floor, which had been successfully practiced by Mr. F. Richman, and for which he was rewarded with the silver medal of the Society. A floor on which he had operated had sunk in the middle to the extent of five inches, and had become very tremulous, in consequence of the removal of a truss partition, in order to throw out of the angles of the cornice of the room below being valuable, it was desirable to apply a remedy from above, which was accomplished by removing the floor, and applying to each side of the sagged a cast-iron arch, of which the span equal to the length, and the height and spring equal to the depth, of the beam. The ends or abutments of these arches were united by tie-rods of wrought-iron. Four equidistant holes were then cut transversely through the beam near its middle and one of these was placed a short bar, having an eye projecting on each side of the beam. Through these eyes were passed vertical bars or trussing-bolts, which rose above the top of the beam, and were there connected together by cross-pieces, which rested upon blocks attached to the cast-iron arches. By screwing down nuts upon the upper ends of these bolts, as the arches themselves could not yield, the beam was compelled to rise, and was thus restored to its former position. The cast-iron arches and their tie-rods were formed of several small pieces, so that they might be very conveniently applied; but for the method of accomplishing this, and for other matters of detail, we must refer to Mr. Richman's account of his experiments, which is illustrated with an engraving. In the same volume (pp. 153-164) is an account of the means adopted by Mr. Alfred Ainger for supporting the decayed timbers of the roof of the church of St. Mary the Virgin of London, which were supported by iron trusses or cradles. This operation was performed under circumstances of unusual difficulty, some of the beams being so much decayed by the dry-rot as to have lost all bearing power. The ingenious contrivances adopted, which were rewarded by the Society of Arts with their large gold medal, prevented the necessity for destroying a richly ornamented ceiling, the restoration of which would probably have cost 5000 pounds.

TRUST ANXII. In twelfth trusts, which is in fact only a new name given to a use, is well defined by Lord Coke in the words employed by him for the definition of the latter term, viz.: 'A confidence reposed in some other, not issuing out of the use, but as a thing creating, annexed in privy to the estate of the land, and to the person touching the land, for which cessu que use has no remedy but by suiposu in Chancery.' (Co. Litt. 272 b.) The explanation of the terms of the above definition, and an account of the origin of uses and trusts, and their connection with each other, will be found under Uses. The purpose of this article is to give a general account of the nature, constitution, and objects of trusts, of the liabilities of trustees, and of the rights and estate of the cessui que trusts, that is, of the persons beneficially entitled under trusts.

The first division of trusts is into simple and special. The simple trust was expressly made exactly with the antient use, and is where property is simply vested in one person for
the benefit of another, the terms of the trust not being specified, but left to the construction of law. The special trust on the other hand, is where property is vested in a trustee for purposes particularly pointed out, and where therefore he is not the simple depositary of the estate, but is bound, in his character of trustee, to the active performance of duties. Special trusts are divided into ministerial and discretionary; the former being such as require for their performance only the ordinary qualities of a rational agent, the latter such as involve the exercise of more or less of judgment and discretion.

1. Of the Various Trusts.

1. And, first, as to trusts created by the act of a party.

A declaration of a trust is regarded in equity as a gift or conveyance of property to the persons who are the objects of the trust, and where the capacity of the declarer is a trust, limited by the same rules as the power of disposing of property at law. Thus persons under the disabilities of coverture, insanity, lunacy, or idiocy are incapable of creating trusts wherever they would be incapable of conveying at law.

By the common law, trusts might be created by parole, but by the seventh section of the Statute of Frauds (29 Car. II. c. 9) it was enacted that all declarations, or creations of trusts or confidences in any lands, tenements, or hereditaments, shall be manifested and proved by some writing, signed by the party who is by law enabled to declare such trust, or by his last will in writing, or else they shall be utterly void at law. The words 'lands, tenements, and hereditaments' in this clause have no application to personal estate, trusts relating to which are therefore not affected by the statute; but they comprise chattels, both moveable and immovable, and conveyances in any way express or implied, must be in writing, if not to be observed that the statute does not require trusts to be declared in writing, but only to be manifested and proved by writing; and therefore, though the language of the 9th section as to grants and assignments of trusts renders it probable that the intention of the act was that the declaration itself should be in writing, it is established that the statute is satisfied if the trust be manifested by any subsequent acknowledgment on the part of the trustee, however given. Where, under his last will, he has answered in Chancery, or by a recital in a deed, &c.; and though the writing itself must be signed, the terms of the trust may be collected from a paper not signed, provided it can be clearly connected with the signed writing. (3 Viz., 696; 2 Vern., 288; 2 P. W., 412.)

The enactments of the Statute of Frauds with respect to wills, as now modified by 1 Vict., c. 29, also indirectly affect the substance of trusts.

2. As to trusts created by operation of law.

A trust created by operation of law is a trust of necessity. It arises either by the operation of a statute directly, as in the case of voluntary devises, or indirectly, as in the case of mala fide devises. A trust of necessity, or necessitous trust, is a trust created by operation of law, which is not prohibited by a particular statute, but which is presumed to be intended by the legislature, when it has made a necessity of it. Such a trust can arise in the case of estoppel, by dealing with the land of a holder in possession, for purposes of conveyance, in a manner which, without any express or implied declaration of the holder, would amount to the grant (446.)

When the owner, or the person otherwise entitled to the disposition of property, shows an intention to exercise it in favor of another, or declares, by words or acts, that there is a want of consideration, will execute that intention, however informally expressed. Thus when a person has contracted with another for the sale of his estate, he becomes thereby the holder in possession of that estate, and may, without expressly devising his lands, direct them to be sold for payment of debts and legacies, the lands will descend to the heir as a trustee for the creditors and legatees.

Trustees being considered merely as the instruments through which a trust is to be carried into execution, the Court of Chancery will not allow a trust to fall to the ground from the want of trustees, or their refusal to act, but will apply the trust to the purpose for which it was created. In general all persons capable of acquiring the legal estate in property are capable of being trustees, and are bound by the trusts declared of it; though an exception should perhaps be made with respect to property vested in the king, against whom there is no remedy in Chancery, though the subject might sue the crown by preferring a petition of right. (Hardres, 467; 1 Ves. 446.)

The fitness of a person for the office of trustee however depends also on the nature of the trust, and to join in the requisite assurances relating to the property: fenes covert and infants, on account of the disabilities they labour under, are not proper persons to select as trustees of conveyances on their own estate, whether by the grantor, or by an officer of trust, to the use of personal chattels, not of lands or chattels real, as he could not sue or be sued respecting such property; besides which, the legal estate of the property of the minor when the trust is an express one, is considered as found, in the king. (Gibb. On Uses, 43; 2 Mer., 431.)

The manner in which settlements of property are affected by the question of consideration has already been explained. [Settlements. ] When a trust is founded on a valuable consideration it will of course be carried into execution, whether it was originally well-created or not; but where the trust is merely voluntary, the Court of Chancery will not interfere to give effect to an imperfect settlement. A trust can be declared only by the testator, that trust, from its nature, is an executory one; it is not a trust created by operation of law, and it is, therefore, in equity, a personal trust, and the Court will execute it, though voluntary. (18 Ves., 99, 140.)

The objects proposed by the trust must be conformable to the rules of law; for nothing will be permitted to be done under cover of a trust which could not be done by a direct legal conveyance. Thus the rules against perpetuities, those with respect to restraints on alienation, &c., are equally applicable to trusts and to legal estates; and if the testator, by the operation of law, created no consideration is essential, and the Court will execute it, though voluntary. (Hardres, 465.)

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A trust may be created either directly, by express declaration, or indirectly, without mention of a trust in words, by the expression of an intention, which the court of equity will execute as a trust.

In direct declarations of trust technical words are not necessary; but it is established as a general rule that where they are employed, they are to be taken in their legal and technical sense. A distinction however is made in this respect between what are called trusts executory, in which the limitations are complete and final, and trusts executory, in which the expressed limitations are not intended as complete in themselves, but only as directions or instructions for a settlement to be afterwards executed. To the former the rule is strictly applicable, while with respect to the latter the court will endeavor to execute what appears to be the intention of the party. But the court will not allow the use of inappropriate technical words; and the only difference in this respect between executory trusts in marriage and estates in gross is, that the known objects and purposes of the former afford more restriction, while in the latter can in general be collected only from the language of the instrument. (Fearn, Cont. Rem., 94, 114.)
No general rule can be laid down as to when a gift will be considered as beneficial or as a trust; but the court may decide upon the probable intention of the settlor as derived from the general scope of the instrument. The presumption thus arising may be rebutted by positive parol evidence of the intention of the settlor. (2 Vern., 453.) Again, a trust results, by operation of law, if the settlor has laid out in the purchase of stock or land and the stock or land has been held by the same equitable interest to which the money laid out in the purchase was subject. (8 Ves., 46; 1 Atk., 4c.) In the same manner, a trust or other personal estate vested in a fiduciary character obtained a renewal of a lease in his own name and at his own expense, the trust which was annexed to the original term will attach upon the renewed lease, and the lessor will be entitled only to the amount of expense incurred. (11 Ves., 430.) The third kind of trust by operation of law arises wherever the property passes from the trustee into the hands of a person who takes by a derivative title. The sort, devisee, or personal representative of a deceased trustee takes the property in the same character, and is bound in the same equity. Where the trust estate has passed to a stranger by conveyance, it is to be renewed by the same equitable interest to which the money laid out in the purchase was subject. (2 P. W., 678.) If however the grantee was the purchaser of the estate for an adequate consideration, then, he took with notice of the trust, he will be bound by it, though the trust was not determined or extinguished at a bond fide purchaser, without notice of the trust, is not affected by it; and his title, even in equity, cannot be impeached. (15 Ves., 350; 2 B. & B., 316.) By the 8th section of the Statute of Frauds it is enacted that "where any conveyance shall be made of any lands orements by which a trust or confidence shall or may be used for the purpose of imposing construction, or to transfer or extinguish by act or operation of law, and in every such case such trust or confidence shall cease of the like force and effect as the same would have been if that statute had not been made; anything therein contained to the contrary notwithstanding." This section appears to have been introduced into the statute in order that the extent of the enfranchisement might be left to implication; for as resulting trusts depend, of course, upon the effect of a rule of law, it is not easy to see how they could be affected by the previous enfranchisement, which refers to trusts created by the instrument.

It has been doubted whether, where a purchase was made in the name of a stranger, and the payment of the consideration purchased was afterwards to be charged upon the instrument, parol evidence could, since the Statute of Frauds, be admitted in proof of the fact; but as trusts by operation of law are expressly excepted from the statute, it appears that parol evidence would, be admissible, and probably it would now be so. P. C., No. 1592.

held. (10 Ves., 517; but see Sanders, On Uses and Trusts, c. 3, sec. 7, div. 2.)

1. Of their estate and office of trustee.

Whenever a trust is created, it is a general rule that a legal estate, sufficient for the purposes of the trust, shall, if possible, be implied; and also that the legal estate thus implied shall not extend beyond what the purposes of the trust require. Thus, the court has in many cases extended the estate, so as to make it commensurate with the objects to be effected, and even sufficient to do that which, at first view, it might seem the settlor did not intend. (1 Ves., 495.) On the other hand, the court has not extended the estate which trustees would have taken by the wording of the instrument. (7 T. R., 433.) But these rules, so far as they relate to devises, must now be considered with reference to the 50th section of which it is declared that where any real estate, other than a presentation to a church, is devised to a trustee or executor, such devise shall be construed to pass the whole estate which the testator had power to dispose of in the property, unless a definite term of years, absolute or determinate, or an estate of freehold, be thereby given to him expressly or by implication.

The legal estate in a trust in a trustee has in general the same properties and incidents as if the trustee were the beneficial owner. Thus it is liable to curtesy, dower, and free-bench, and at the common law it was subject to forfeiture to the king and escheat to the lord; but the law is now differently applied. (2 W., 110; 1 M. & W., 417.) Within a whereby, when a person dies seised of land as trustee or mortgagee, without an heir, the Court of Chancery may appoint a person to convey; and it is declared that the extent of the trust is not to be limited by the declaration or conviction of the trustee or mortgagee. The legal estate in the property, whether real or personal, may be conveyed or assigned by the trustee, who may likewise devise or bequeath it; it will not always pass in a will by the same words as other property; and the question in each case is one of presumed intention. (8 Ves., 417.) But trust estates, whether real or personal, must not vest in assignees upon the bankruptcy of the trustee (Willes, 602; 1 M. & S., 517; and the great attendant danger of the Involvent Acts (7 Geo. IV., c. 57, and 1 & 2 Vict., 110) must, it seems, be governed by the same rule. Judgments and executions for debt affect trust as well as other property, but of course the creditor cannot convey the trust, and becomes himself a trustee by construction of equity. (1 Bro., C. C., 278; 1 P. W., 277.)

2. Of the general properties of the office of trustees.

Acceptance of the office of a trustee may either be by express declaration, or be implied from his proceedings to perform the duties of it. No general rule can be laid down as to what particular acts will constitute an acceptance of the office by a trustee, which is a question which must be considered in every case; it may however be stated generally that every voluntary interference with the trust-estate will be construed as an acceptance of the trust; and that where a trustee acts ambiguously, he will not be allowed afterwards to take advantage of the doubt, and deny that he acted in the character of trustee. (2 Ves., j. 678; 1 Ves., 552.)

But as no one is capable of undertaking a trust, it is the power of the person appointed a trustee to renounce the office by what is called a disclaimer, which, if he intend to decline the office, ought to execute without delay. A disclaimer ought to be made by deed, and should purport to be a disclaimer, and a conveyance, which, as it transmits the estate, would, strictly speaking, imply a previous acceptance of the trust, though instruments of this kind receive a liberal construction. (2 Swanst., 372; 2 M. & K., 278.) An intention to disclaimer may also be inferred from the conduct of the trustee (1 M. & K., 193), though it would be very imprudent for any one to leave the question of his acceptance or renunciation of a trust to be matter of construction. As to what amounts to a disclaimer of the trust, which is the question from the disclaimer of the office in equity, see Disclaimer. The effect of a disclaimer by one trustee is to vest all the powers of the office in the co-trustees who accept the trust. (5 Mod., 425.)

The general powers, and qualities of the trustee's office may be stated under the following heads:—

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A trustee having once accepted his office cannot afterwards resign it. The only modes by which he can be released are a decree of a court of equity, a power reserved on the instrument creating the trust, or the consent of all the persons beneficially interested in the estate. (2 Sch. & Lef., 246.)

(4.) If the office of a co-trustee, which implies personal confidence, cannot be delegated (2 V., 640), though a trustee may sometimes perform a mere ministerial duty through an attorney or proxy, (1 Ves., 413.)

(5.) Where one of several trustees dies, the joint office may be exercised by the survivors. This is a consequence of the general maxim of law, that though a bare authority given to several determines by the death of one, if the authority be coupled with an interest it survives. (Co. Litt., 113 a, 181 b.)

(6.) A trustee is not liable for the acts of his co-trustee in which he has not joined, and this is equally true whether there is a proviso to that effect in the settlement or not. (Bridg., 35; 18 Ves., 254.) And even if a trustee joins in a receipt for money required for the purposes of the trust, for the sake of conformity only, he will not thereby become responsible for any misappropriation of the trust money, as that will be upon him to prove that his co-trustee was the person by whom the money was received. (11 Ves., 224; 1 Ed., 147.) The rule is different with respect to co-executors, each of whom has an absolute control over the property committed to him, and therefore is responsible for any improper application of the trust, whether he joins in giving receipts (Amb., 219; 3 Swans., 64), though whenever their joining together in doing any act is necessary, the same rule applies to them as to other trustees.

(7 Ves., 137). But if a trustee allows money to remain improperly in the hands of his co-trustee, or is cognizant of a breach of trust committed by him, and takes no measures to protect the estate, he will become himself responsible. (11 Ves., 301.)

(6.) Trustees cannot derive any private advantage from the administration of the trust, and therefore all profits made by the trustee in the management of the trust estate, in whatever manner, belong not to him, but to the cestui que trust. (2 M. & R., 684.)

III. Of the duties of trustees.

Trustees of personal estate are bound to use all due diligence in getting in and reducing into possession all property that may come into their hands, taking the time of the commencement of the trust (1 Mad., 290), and in providing for the safe custody of the property. (1 Ed., 148.) They are also bound, where trust-money can be converted into personal property, to convert it on proper security, so as to render it productive to the cestui que trust.

In the absence of any specific direction as to investment in the trust-deed, the rule is that the Trustees ought to invest in the public funds. They cannot lend on personal security, or invest the money in the stock of any company, or on mortgage, without express authority. (1 Cox, 25; 7 Ves., 150; Jac., 234.) And even where they are empowered to lend on real security, they should not advance more than two-thirds of the value of the estate. (M. & C., 8.)

Where a trust-estate consists of renewable leaseholds, it is in general the duty of the trustee to provide for renewals, and to be an express trust to provide for the fines out of the rents and profits. The trustees should lay aside a proper proportion of the annual income for the purpose. (17 Ves., 485.) If there be no express direction for payment of the fines, the estate may be charged with the amount of such a fine, and the rule of the court is that the tenant for life and remainder-man must apportion the fine between them according to the value of their respective interests. (1 Bro., C. C., 440; 9 Ves., 560.)

If the contingent remainders are bound, until the eldest son of the settlor attains twenty-one, to do no act to destroy the contingent remainder; and if they commit a breach of trust, they will be liable to indemnify the person entitled to the benefit of the purchase under the trust. (1 Ed. Co. Ab., 380.) After the eldest son attains twenty-one, the trustees, to preserve contingent remainders, were formerly considered to have a discretion in joining or not in the destruction of the remainder; and the question whether they were in any case answerable for the exercise of that discretion (1 V. & B., 642) but the law upon this point must now be considered as settled with reference to the 3 & 4 Vm., c. 74, under which a trustee is bound to act for the benefit of the beneficiaries, and regards settling of the trust, providing he is not in the actual act of the settlor, or his agent, or with respect to settlements made before the passing of the act, though he may continue protector, he is not answerable to the court for the exercise of his discretion.

Trustees for sale, whether expressly so or by implication, have, in the absence of any express restriction on their powers, the right to use all reasonable discretion as to the mode of sale. If, however, they do not act for the benefit of the beneficiaries, they are liable to be compelled to enter into any other covenant than that against incumbrances by their own acts. As to the cases in which, in the absence of any express provision, their receipt will be disparaged to a purchaser, see Sugden, Fad., and Purch., c. xi., s. 1. The general rule is, that a trustee for sale cannot become the purchaser of the trust property either for himself or as agent for another; and the cestui que trust is at liberty to set aside any such purchase, however fair. Though no advantage should have been gained by the trustee. (3 Ves., 750.) But a trustee is not absolutely prohibited from purchasing from the cestui que trust under certain circumstances, though the transaction is at all times subject to the right of the cestui que trust to be heard upon the application of the court. (9 Ves., 244.) Upon setting aside a purchase by a trustee, the court will in general allow for all repairs and improvements effected on the property. (11 Ves., 226.) The cestui que trust will not be entitled to relief unless a reasonable time has been allowed for the transaction within a reasonable time; and if while suis juris, and with full knowledge of his rights he expressly confirms the purchase, he will not be allowed afterwards to set it aside. (5 Ves., 680; 12 Ves., 205.)

Charities are either such as are managed by individual trustees or established by charter as eleemosynary corporations. Charitable trusts of the first kind are, like any other trust, affected in all respects by the law of trust, the Court of Chancery: but where charities are established by charter, a visitorial power over the governing body arises of common right in the founder and his heirs, unless where he has specially nominated other persons to that office. The Court of Chancery has nothing to do with this visitorial power, though when the king is the visitor, or the heir of the founder cannot be found, or is lunatic, the visitorial power is exercised by the Charter, with the advice and concurrence of the Court. But however a body corporate, the Charter has no jurisdiction with respect to the administration of the property of charitable corporations, the governing bodies of which are, with respect to their management of such property, subject and accountable to the Court. The Court, therefore, does not inquire whether individuals or a corporation, to confine the application of the funds strictly to the purposes declared by the founder or donor; and they should never assume the responsibility in any manner of overstepping such purposes, however necessary or advisable such a course may seem, without the sanction of the court, which, though it cannot divert the charity funds into a totally different channel without the authority of an act of Parliament, has sometimes extended the application of the trust to purposes beyond the strict intention, but closely connected with it. (3 Russ., 530.) Trustees of charities have no power to make an absolute disposition of the charity estates, though when the application is to the disposal for the accomplishment of the charity, the Court has sometimes granted them authority to do so. (2 Swans., 300.) Nor can they accomplish the same end indirectly by granting long or unreasonable leases (2 Russ., 300); but they may be directed to apply the funds in the management of the estates, as well as in establishing rules for the government of the charity.

IV. Of the powers of trustees.

The powers of trustees are either general or special. It is impossible to define exactly the general powers of trustees, the extent of which depends in each case upon the particular circumstances of the trust estate. It may however be laid down as a general rule, that whatever is improper or unreasonable with regard to the nature of the trust, without suit (4 Ves., 509); though, if a suit has already been instituted for the execution of the trust, whereby
the management is taken out of the hands of the trustee, he ought to take no step without the sanction of the court. (10 Vess, 104.) As to the different kinds of special powers, see Uses. Questions frequently arise upon powers given to trustees, depending upon the manner in which they are expressed or deemed to vest in them. If an estate is limited to trustee for his or her heirs, it vests absolutely in them and the survivors or survivor of them; but the words are not to be understood to the same extent in the limitation of a mere legal power. Thus a power is exercised only so long as the circumstances of the trust correspond to the words of the limitation. Thus a power to execute may be exercised by the survivors only so long as the beneficiaries are to survive. Thus a power to four trustees and the survivors of them cannot, it seems, be exercised by a single survivor: but a power given to executors, if annexed to the executoryship, will continue to the single survivor; and so, it seems, will a power given to trustees, and annexed to their office, as where an estate is vested in them, and a power is conferred relative to the trust. This construction arises from the trust being coupled with an interest, which continues in the survivor. (Sugd., Powers, c. 3, § 2.) And inasmuch as a power, though not coupled with an estate, is, when imperative, considered as a trust, and will equally be carried into execution by a court of equity, it may be concluded that a power of this kind may also be exercised by the survivor. If a power be given to continue, and one of them disclaim, it seems the power may be exercised by the continuing trustees (4 Vess., 97); but if the trustee assigns the estate, the power, not being appellant to the estate, will not be exercisable. But when a power is found, the words of which are such as to make it exercisable by a person not in possession of the estate, will the assignment withdraw it from the grantor. (Amb. 309.) The special as well as the general powers of trustees are affected by the institution of a suit, so that they cannot be afterwards exercised without the sanction of the court.

V. Of allowances to trustees.

It is a settled rule that a trustee is not entitled to charge for his own services in the management of the trust estate, whether he be a professional person or not; and the rule applies not only to trustees expressly nominated, but to all persons bearing a fiduciary character, such as executors, mortgagees, receivers, and committees of lunatics' estates. (10 Vess., 103.) Exceptions to this rule have been admitted in the cases of trustees for the estates of absentees in the West Indies and executors in India; but the rule against such allowances to trustees is but a general one in the absence of express directions by the settlor to the contrary, and there is no objection to a trustee's receiving remuneration for his services, or to his being allowed to make professional charges, if the intention of the settlor to that effect is expressed in the settlement. It is presumed that the power may even be vested with his custum que trust for an allowance, though bargains of this kind are very narrowly watched by the court. Trustees not being allowed to charge for their services upon the trust estate, the matters and where the business of the trust is troublesome or complicated, call in the assistance of agents at the expense of the estate.

A trustee, though not allowed to charge for his trouble, is entitled to all his expenses out of pocket; and even a specific remuneration given by the settlor to the trustee is no reason for their not receiving an allowance for expenses. (7 Ves., 480.) The expenses incurred by a trustee in his own proper person may be appointed by the settlor a charge upon the estate, to the satisfaction of which the trustee is entitled before he can be compelled to convey. The general rule with respect to the costs of trustees incurred in legal proceedings is, that they shall be allowed as between solicitor and client, if there be a fund under the control of the court out of which they may be paid. (1 Sum., 201.) But this rule is subject to numerous exceptions, depending upon the circumstances of the case. The law presumes that the settlor, or the surviving trustee, either in the course of the suit itself or in the matters of which it arose. A trustee who disclaims by answer in chancery is entitled to costs as between party and party. (7 Ves., 16.)

VI. Of the relinquishment of office by trustees.

A trustee may be discharged from his office by the consent of all must be obtained, however numerous they may be; and if any of the custum que trust be incompetent to consent, or be not yet in esse, as in the case of a limitation to unborn children, no complete discharge can be obtained.

A trustee may be discharged in virtue of a special clause to that effect contained in the instrument under which he is trustee. A proviso to this effect is usually introduced into settlements combined with a power either to the settlor or the co-trustee the co-trustee in the event of any of the number happening to die, or being desirous of being discharged from, or refusing or declining, or becoming incapable of acting in the trust. The transfer of the trust is not complete until the new trustees become possessed of the power, and a conveyance or assignment of the property has been executed. When the trust-estate consists of funded property, a transfer of it is effected into the names of the continuing and new trustees, and then the appointment by the donee of the power, and a declaration of trust by the old and new trustees, is made by one deed. But when the property consists of any chattels real or personal other than stock, the deeds are necessary, one whereby the property is assigned by the old trustees to a provisional trustee, and another, generally endorsed on the former, whereby the provisional trustee re-assigns it to the continuing and new trustees upon the trusts of the settlement.

When a settlement is made and the trust has been vollary executed by a single conveyance operating under the statute of uses, made by the old trustees to the use of the continuing and new trustees upon the trusts of the settlement, the remaining generalsettlor or the trustees, and does not invest them with the fee-simple, but only with some particular estate, such as an estate to preserve contingent remainders, though the meaning of the words used in the common form of a power to appoint new trustees plainly is that every new trustee should have the same powers as the old trustee had, it has become usual to consider it essential that the new trustees should have a seisin to serve the uses in the same manner as the old; and by this purpose the settlor has been understood to mean, not only that the persons who are to succeed one whereby the new trustee is nominated, the whole uses of the settlement are revoked, under a power supposed to be implied for that purpose, and the use and estate appointed and conveyed to a stranger in fee; and another (which may be indorsed on the former) whereby the stranger re-conveys to the uses of the settlement. Thus, whether the power of revocation supposed to be implied exists or not, the estates are effectually vested in the old and new trustees by the actual conveyance.

Powers of appointing new trustees are strictly construed, and cannot be properly exercised except under the precise circumstances contemplated in the power, and it is always considered the original number of trustees ought to be maintained. For this reason it would be improper to appoint one trustee to do the duty of two retiring trustees (2 M & K., 682;) and where there is a direction that any number of being reduced, the number others should be nominated by the survivors, it has been determined that they might supply vacancies before the numbers were so far reduced, but that then they were compellable to do so. (5 Ves., 925.)

A trustee may get himself discharged from his office at any time by application to the Court of Chancery, by petition if there be a suit already pending, and if not, by bil. (1 J. & W., 251; Lloyd & Gould, Bk. 8, ch. 5, sect. 11.) Ct. Gen. & 1 V. & Wm., c. 69, s. 22, by petition in the cases mentioned in the act, where a conveyance or trust could not otherwise be obtained.

VII. Of the estate and rights of the custum que trust.

1. As to what it consists of. In cases of the simple trust the whole rights of equitable ownership consist in the right of possession and the right of disposition, or as they are technically expressed, the jus usu et frumenti.

The equitable owner has in general a right to the possession of the estate, but where there are several parties interested either contemporaneously or in succession, it is in the discretion of the court to determine whether possession is to remain with the trustee or be given up to the custum que trust. The right of possession of the custum que trust is recognised in a court of equity only, for at law the trustee is considered as the owner,
and the estate que trust as tenant at will only. The trustee as tenant of the legal estate may recover in ejectment from his own cestui que trust, who has no defence to the action at law, and is only entitled to apply for an injunction in equity. (8 T. R., 122; 1 B. & B., 446.)

Upon the ground that the cestui que trust and the beneficiary are, he is entitled either by the express language or by the equitable construction of statutes, to various privileges connected with real estate. Thus the 2 Hen. V., st. 2, c. 3, and the subsequent statutes relating to 10. the same subject, have been constructed to apply to the cestui que trust, and not to the trustee. By 7 & 8 Wm. III., c. 25, s. 7, the right of voting as a freeholder of a county was conferred on the cestui que trust, if in possession of the land, the 2 Wm. IV., c. 53, s. 18, the cestui que trust of copyholds or of any lands whatever except freehold, of the required yearly value, is entitled to vote at elections of members of parliament whether in possession or not. So also, by 9 Anne, c. 5, an equitable estate forms a qualification for sitting in the House of Commons.

The cestui que trust of cottahls is also entitled to the use and possession of them during the continuance of his interest; and upon this ground they do not, upon the bankruptcy of the tenant for life, fall under the rules as to goods in the order and disposition of the bankrupt with the consent of the true owner. (10 Ves., 491.)

The estate also is entitled to the whole equitable interest may, in virtue of the jus disponendi, call upon the trustee for a conveyance of the estate. But he has no such right when the trustee holds upon trust for the benefit of another. But even when he is entitled to the whole estate, whether by the create or by the usurious interest, but the legal estate is in the trustee is necessary to answer some ulterior purpose relating to the trust, such as to preserve contingent remaindermen. (3 Mad., 426.) It sometimes happens that the cestui que trust is entitled to call for a conveyance, but from the disability of the trustee, or from some other accidental circumstance, it cannot be obtained by the ordinary means. Various acts have at different times been passed-endowing the government in the province of which have been extended and consolidated under the 11 Geo. IV., & 1 Wm. IV., c. 60.

In cases of special trust, the right of the cestui que trust is to have a specific execution of the intention of the settlor to the extent of that cestui que trust's interest. If there be but one cestui que trust, and he capable of consent, the specific execution of the trust may be departed from; and so where there are several cestui que trust, what is left to each cestui que trust may be decided so as to secure the interests of any cestui que trust without his consent.

2. Of the nature and properties of the estate of the cestui que trust.

Equitable interests may be assigned, and the assignee may, like the original cestui que trust, compel a conveyance from the trustee by bill in equity, without making the assignor a party. (3 Russ., 583.)

Ownership of equitable interests in lands and equitable tenants in tail, might, before the Fines and Recoveries Act (3 & 4 Wm. IV., c. 74), have passed their equitable estates by those assurances, and may now do so under that act by the same modes of assurance and with the same formalities as if they were legal.

The purchaser of an equitable interest should take care to inquire of the trustee whether he has had notice of any prior incumbrance upon the equity of the vendor, which will attach on the purchase and thereby affect his interest in the misrepresentation (10 Ves., 470); and the purchaser should also, upon the execution of the conveyance, give notice to the trustee of his own equitable title, whereby he will secure protection of all prior incumbrances who have not given such notice. (1 Russ., 30.)

Equitable interests in property are transmissible by devise, and require the same solemnities as legal interests. (1 T. R., c. 26, s. 5.) Possession or receipt of the rents and profits of equitable estates is considered in equity equivalent to seisin at law, and adverse possession of the one is attended with the same effects on the title as disseisin of the other. (2 J. & W., 1, 153.)

A tenant in common or copyhold is subject to the courtesy of the husband, but was until lately exempt from dower and free-benefit; now however, by the 3 & 4 Wm. IV., c. 105, the title of dower attaches upon equitable in the same manner as upon legal estates, though subject in other respects to be defeated by the alienation, devise, or other declaration of intention on the part of the husband.

The effect of marriage is the same upon equitable as upon legal estates, and the husband's right to the trust of a term of years belonging to his wife, in the same manner that he may assign her chells real at law. (9 Ves., 98.)

Judgment creditors have, by the Statute of Frauds, sec. 18, an execution at law against the equitable freehold estate of a debtor in the hands of his trustee, when the debtor has the whole beneficial interest; but if he have a partial interest only, or the estate be not freehold, the judgment creditor may have no execution at law. (21 & 22 Geo. III., c. 53, s. 1; 45, c. 18.) The equity obtains the same satisfaction out of the beneficial interest as he would be entitled to at law out of a legal estate. (4 Mad., 504.)

The equitable interest of the cestui que trust in lands is liable to extents from the crown; and though not forfeitable at common law for attainer of treason or felony, it appears to be clearly within the scope of the 33 Hen. VIII., c. 20, s. 2, which gives the same effect to attainers by common law or statute as to attainers by authority of parliament, but it is not subject to sequestration. (Hardres, 479; Freem., 130.) The same statute applies to extents of redemption. Trusts of cottahls, whether real or personal, are subject to forfeiture. (11 Geo. IV., & 1 Wm. IV., c. 60.)

The estate of the cestui que trust is governed as to descent by the rules of the common law.

Trusts of chattel interests were always considered as assets in equity, but it was a question whether a trust of a personal estate should be governed by the rules of the estatute of Frauds, by the 10th section of which a trust in a personal estate, if not a trust in lands, was deemed to be a trust by the common law. (2 Atk., 293; but now, by the 3 & 4 Wm. IV., c. 104, all a person's estate or interest in lands, tenements, or hereditaments, corporeal or incorporeal, or other property, what soever may be, is deemed as a trust in lands, which words apply equally to legal and equitable estates, and are made assets for the payment of debts as well by simple contract as on specialty. Trusts of chattel interests will be legal assets in the hands of the executor. (Mod., 306; 4 Ves., 94.) Simple trusts of real estate are legal assets by the above-mentioned section of the Statute of Frauds; and it seems that complicated trusts and estates of redemption, which are not within the statute, will be governed by the rules of the common law, and not by the rules of redemption (2 Ch. Rep., 143.) It appears that under the 3 & 4 Wm. IV., c. 104, real estates are, with respect to simple contract debts, to be taken as equitable assets, but that they are not altered by the mode of administration of trusts of cottahls nor of equitable freehold interests, in so far as they were assets before the act.

3. It is a maxim of equity that a trust shall not fail for want of a trustee. If the intention of the settlor be clear, but he has omitted to name a trustee, or the trustee dies or becomes incapable of taking the estate, the trust attaches upon the person on whom the legal estate has devolved. (Wilm., 21, 22.) When powers given to trustees are not discretionary, but imperative, they are, as above mentioned, considered as trusts, and the court will protect the cestui que trust from the failure or neglect of the donee of the power. Where the discretion of the donee is to be governed by a rule which the court can apply, it will do so; but where there is no rule or measure by which the discretion of the trustee was to be governed, the court executes the power in the manner which appears most reasonable, and in general proceeds upon the principle that equality is equity. (4 Hep., 194.) Where a discretion is given to the trustee in respect of the objects to whom an appointment is to be made, questions sometimes arise, when the power comes to be executed, as to the priority of the objects, and the mode of distribution. When the power is in favour of 'relations,' the court, except under particular circumstances, appoints to relations within the statute of distribution, and in most cases it seems that the distribution will be made per capita, and not per stirpes, and that the words 'next of kin' occurring in such a power are settled to mean 'nearest of kin,' to the exclusion of those
who would take by representation under the statute. (2 M. & K., 780.)

The ceasus que trust is entitled to have the administration of the trust-estate placed in proper hands. Thus, the court will dismiss a trustee upon its being shown, upon application by bill to the Court of Chancery, that he has acted improperly, or has become incapable of acting at all. In such cases, the personal estate where the original number of trustees has been diminished, the ceasus que trust may have the vacancies supplied. (5 Ves., 772.) The ceasus que trust may also file a bill against a trustee, either for preparing him to the execution of an act of duty, or to restrain him from doing any act not within the scope of the trust, or which would be prejudicial to the estate. (1 Bro. C. C., 177; 11 T. R., 101.)

If any person shall alienate the trust-estate, the ceasus que trust may follow the estate into the hands of any person who has acquired it, whether he had notice of the trust or not; and even into the hands of a purchaser for valuable consideration, if he had notice at the time of his purchase. As to the limit of time and extent within which the ceasus que trust may institute proceedings for the recovery of his estate, see Statutes of Limitation.

It is said, that the ceasus que trust has also a remedy against him personally by way of compensation. The amount of the loss is considered as a simple contract debt against the estate of the trustee, and payment of it may be enforced in the same manner as for any other debt. The same rule would apply when a trustee having derived advantage or not from the breach of trust, makes no difference as to his liability. Where trustees are jointly implicated, it was formerly thought that the ceasus que trust might procure against any of them singly; but the contrary has since been settled. (1 Sim., 219.) But the ceasus que trust will not be entitled to any remedy against his trustee, if he himself, being not a legal incapable, had notice in the breach of trust, or subsequently acquiesced in it, or a fortiorti, if he has executed a formal release to the trustee. (3 Swans., 64.)

In cases of breach of trust by trustees of charities, the ordinary mode of redress is by way of information in Chancery, in the name of the attorney-general, in which case another person must be joined as relator to be answerable for costs. By the 32 Geo. III., c. 101, commonly called Sir Samuel Romilly's Act, a summary remedy is provided in cases of abuse of charitable trusts, enabling the parties to proceed by petition. The 11 Geo. IV. and 1 Wm. IV., c. 60, extends to all cases in which the court is authorized to make summary orders in cases of charities and trust estates. It is provided in the same act that the court may appoint a receiver or manager of charitable funds when the charities have been unintentionally, it is settled that the account will not be carried back beyond the filing of the information, or of notice to the trustees of the intention to dispute the application. (Jac. 448; 2 Russ., 45.)

VIII. There are two rules of equity with respect to trust estates which are of very general application. The first is, that what the settlor has directed to be done shall be considered as done; so that it shall not be in the power of trustees, by neglecting the performance of their duty, to affect in any way the interests of the ceasus que trust. Thus where money is directed to be laid out in land, or land is directed to be sold, equity will construe the will accordingly. This constructive conveyance however subsists only until a ceasus que trust, competent both from interest and personal capacity to elect, declares his intention as to the character in which he will take the property. (Election.)

The second rule, which is almost a consequence of the first, is, that no act of the trustee shall alter the nature of the trust. (21 Geo. III., c. 68.) This rule of construction is to be understood only of acts not authorised by the trust; and with respect to ceasus que trust, who are sui juris, universal, but is subject to some exceptions with respect to trust-estates belonging to lunatics. This rule is founded upon the idea of the lunatic's property to the prejudice of his representatives, will not refuse to do so if it appear to be clearly for the benefit of the lunatic himself. (2 Ves. Jun. 72.) It was formerly thought that the court might exercise a similar discretion in the case of infants, but it is now settled otherwise. (10 Ves., 122.)

(Sanders, On Uses and Trusts; Lewin's Law of Trusts and Trustees.)

TRUJILLO. [PERU.]

TRYPHIODYNUS (Τρυφιώδυνος), a Greek grammarian and a poet, who was a native of Egypt, and appears to have lived in the sixth century of our era, about the reign of the emperor Julian. (Proc. Soc. of Antiq. 1821.) His works are not known. We possess by him an epic poem of 681 verses, on the destruction of Troy, which bears the title Ἰδίων ἀδόκειον (Excidium Troj). The narrative of this poem is exceedingly dull, and so much like a mere chronicle of events, that some critics have thought the work to be only a sketch or outline drawn up by the author with the intention of working it out into a longer poem. But there is no reason for thinking that the author was capable of doing much better things. This poem was first published, together with the works of Q. Smyrnaeus and Coluthus, by Aldus, at Venice, without date. The best modern editions are those of J. Merrick, Oxford, 1741, 8vo, and J. Chambers, London in 2 vols., by N. Fischlinus, and notes by various commentators; of Th. Northmore, London, 1791, 8vo; and, lastly, that of F. A. Wernecke, Leipzig, 1819, 8vo. This is the best critical edition, and contains most of the notes of former editors.

Besides this Tryphiodorus now extant, he wrote various otherms, such as on the 'Battle of Marathon' (Μαραθωνικά), on the 'Story of Hippodameia,' and on the 'Sufferings of Odyssey.' This last poem, which is called Οδύσσεια λυπηκροτέρα, is a strange specimen of the low state of poetical taste at that time. The author, according to Eustathius (Ad Odyssey, p. 1379), contrived to compose this poem without making use of the hexameter verse. (Compare Suidas in Tryphiodorus.)

TSCHERKASK, OLD (Старая Тище已有 рек), the former capital of the Don Cossacks, is situated in 47° 27' N. lat. and 39° 56' E. long., in a large but very low island formed by the Don and the Aksai (branch of the Don), over which there are floating bridges. It is traversed by canals, and consists of an irregular mass of houses. On both sides of the canals there are wooden houses built on piles. The town is subject to frequent inundations, and in spring the communication between the houses must be by boats, the ground-floor being generally under water from April to June, the marshes and pools that remain during the summer occasion many accidents. But this situation was chosen from the difficulty of approaching it at a time when the country was constantly exposed to the sudden attacks of the Tartars. The town is surrounded with a strong rampart. Of the six gates of the town, there is a great treasure of jewels, gold, and silver taken in war. According to Clarke, there were, when he visited it, 15,000 inhabitants, almost all Cossacks, and some Tartars, Greeks, and Armenians. In consequence of the many disadvantages of this site, it was resolved, towards the commencement of this century, to remove to another spot. It appears that a beginning was made in 1805, but the Cossacks were so unwilling to leave the old town, that it was not till after the peace of 1814 that much was done towards the building of the new place.

TSCHERKASK, NEW (Новый), is situated at the distance of about four miles from the old town, on a dry elevated spot. Cannabich states that, in 1809, the building of the town was not begun, and that it was not until 1814 that much was done towards the building of the new place. Among the public buildings there are a gymnasium and eight churches; one of them, which is very large, was built in honour of the memory of Platoff, the celebrated Cossack. The streets are wide and swept, all the offices, the schools, hospitals, are removed to the new town, the population of the old town gradually decreases. The chief trade is with Taganrog, to which place fish, caviar, salt, wine are exported.

(Hassel, Handbuch; Cannabich, Lehrbuch; Stein, Lexicon.)
TSCHERNIGOW. [Carrington.]

TSCHIRNHAUSEN, EHRENFRID WALTHER

Von seinem Leben, der Elemente der Mathematik, und der Philosophie, and for finding the modern analysis might be dispensed with; and in 1704

he read in Paris, at a meeting of the Academy, a 'Memorie'

on the subject of quadratures, together with investigations of their rectifications and quantities. At the commencement of the following year he

remained in Paris, and there was established a relation to those curves which are called mechanical, and in this he affirms that the process which he used was applicable to curves of all kinds. The process excited some notice at the time in the Academies of Bernoulli, L'Hôpital, and other mathematicians will be found among the Mémoires which have been inserted in the volumes published by the Academy, but it now passes into history.

In 1686 and 1687 Tschirnhaus published at Amsterden two philosophical works, of which the first is entitled

'Medicina Corporis,' and in this rules are delivered for

preserving health. The other is called 'Medicina Menti.

It contains a development of the perceptions of pleasure

and pain in the mind, and of external objects by means of

the senses, but it constitutes chiefly a course of logic for

persons engaged in the study of the mathematical sciences.

In this he considers the curves, and he has shown the property of a curve line which has since borne his name. It is formed by dividing the quadrantal arc of a circle, and the radius passing through one of its extremities, into a like number of equal parts, and drawing lines through the points of division to the circumference. The points of intersection are in the curve line. For its

equation, see QUADRATRAX.

Tschirnhaus rendered considerable service to his country by the establishment of the Glarean, which ranked among the nobility of the canton, had been

long established. One of his early instructors was Zwingli,

afterwards the eminent reformation; and at a later time he studied at Basle, under Glareanus, the poet and scholar of Erasmus. Having accompanied Glareanus to Paris, he remained in that city till 1530, when he returned home; and the rest of his life, with the exception of the

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He died in October, 1708, and was buried with pomp at

the town of Saxony, as founder of its own establishment for

executing works of magnitude in glass, Tschirnhaus obtained from the elector permission to form one, and, this succeed-

ing, two others were soon afterwards founded. The first

lesser which he cast and ground was of the kind called
double convex. It was more than one foot in diameter, and its focal length was 32 feet. He appears to have used it as a telescope, for he states that, without either a tube or an eye-glass, he had seen through it the whole of a town at the distance of about a mile and a half (about seven English miles). Nearly at the same time he made a double-convex burning-glass, 3 feet in diameter and 12 feet in focal length, which weighed 15 pounds. The diameter of the image which it focused was 14 inches, and by means of a small lens placed between the former and the focus the diameter of that image was reduced to about two-thirds of an inch. The effects produced by this concave mirror were described by Tschirnhaus in the 'Micrographia' (1665), and in the account it appears that it was capable of burning wood when green, and even when wet; it melted thin plate of iron, and vitrified slate and earthenware. This mirror was purchased by the duke of Brunswick, then regent, and given to the Academy. Tschirnhaus afterwards made a similar lens, which he presented to the emperor Leopold, and this prince in return would have created his a baron of the empire. The philosopher however declined the honour, accepting only a portrait of the emperor and a chain of gold. He also made a concave mirror of thin copper, about 4 feet in diameter and 12 feet in focal length, and the effects produced by it, which were similar to those produced by the glass lens, are de-
scribed in the 'Acta Eruditorum,' Lips., 1687. It is stated that the rays of the moon, being concentrated by the lens or by the mirror, though they produced a brilliant image, gave no sensible degree of heat; and the like circumstance is related to the lunar rays when concentrated by the great lens which was executed in 1692 by Mr. Parker in London.

It is certain that the principles of the infinitesimal calculus were, in the time of Tschirnhaus, not generally admitted among mathematicians, and the Saxon philosopher was one who gave the preference to the more elementary processes of the ancient geometry in researches relating to the properties of

elements and their curvatures. He concluded that the

simple methods are the most correct, he concluded that

the modern analysis might be dispensed with; and in 1704

he read in Paris, at a meeting of the Academy, a 'Memorie'

on the subject of quadratures, together with investigations of their rectifications and quantities. At the commencement of the following year he

remained in Paris, and there was established a relation to those curves which are called mechanical, and in this he affirms that the process which he used was applicable to curves of all kinds. The process excited some notice at the time in the Academies of Bernoulli, L'Hôpital, and other mathematicians will be found among the Mémoires which have been inserted in the volumes published by the Academy, but it now passes into history.

In 1686 and 1687 Tschirnhaus published at Amsterden two philosophical works, of which the first is entitled

'Medicina Corporis,' and in this rules are delivered for

preserving health. The other is called 'Medicina Menti.

It contains a development of the perceptions of pleasure

and pain in the mind, and of external objects by means of

the senses, but it constitutes chiefly a course of logic for

persons engaged in the study of the mathematical sciences.

In this he considers the curves, and he has shown the property of a curve line which has since borne his name. It is formed by dividing the quadrantal arc of a circle, and the radius passing through one of its extremities, into a like number of equal parts, and drawing lines through the points of division to the circumference. The points of intersection are in the curve line. For its

equation, see QUADRATRAX.

Tschirnhaus rendered considerable service to his country by the establishment of the Glarean, which ranked among the nobility of the canton, had been

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expenses of the funeral.
The parish of Tuam has an area of 13,799 acres: its greatest length is seven miles, its greatest breadth four; the population in 1821 was 14,219, of whom 6883 were in the town. The parish extends to the north of the Shannon, on the banks of Clare and Dunmore, and the half barony of Ballymoe, but the town is wholly in Dunmore and Clare, chiefly in the latter. It occupies a low flat site on both sides of the river from the Lough Corrib into Galway Bay, and consists of several streets, the principal of which meet in the market-place in the centre of the town. The streets are not lighted, flagged, or cleaned, and are a little narrow for the number of persons that use them, and some of them are large and handsome. The cathedral, which is also the parish-church, is on the west side of the town: it retains some portions of ancient Norman architecture. It is a small building, capable of accommodating not more than four hundred persons. North of the town the foundations are the remains of an old church, and there are vestiges of others in different parts of the town. The Roman Catholic cathedral is on the east side of the town, and is a handsome cross church of richly ornamented Gothic architecture: at the west end is a lofty tower, under which is the principal entrance, formed by an elegant pointed arch with rich moldings; at the east end is a lofty oriel window.

The university of Tuam was founded by charter of James I., A.D. 1613; but the corporation has been dissolved, and the lands and revenues of the town have been incorporated with those of the borough of Galway. The corporation consists of the mayor, the town-burgesses, and the town-council, of which the last are elected by the body of freemen and twenty-four burgesses, who are elected by the body of freemen and twenty-four burgesses, who are elected every four years. The mayor and council have the same judicial authority as the lord mayor and council of London, and the jurisdiction extends over the town and city of Dublin, and over the county of Meath, and the town and city of Drogheda, and the county of Louth.

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the archbishops of Tuam had laid claim many years before. In the middle of the 11th century it was further augmented by the incorporation of the bishopric of Maglo or Mageo (now Mayo). Ware supposes this incorporation to have taken place a.d. 1210, but Usher and Harris (in his edition of Ware) bring it down to a.d. 1599. The diocese was annexed to Armagh, but not incorporated, a.d. 1741; and the united dioceses of Killala and Achonry [KILLLALA] were annexed to the diocese of Tuam, a.d. 1835. In 1839 the see was made a metropolitan see by pedicillate dogs; and its pro-

The diocese of Tuam, including the old dioceses of Mayo and Sligo, comprehends a greater part of the county of Galway, a considerable portion of Mayo, and a small part of Roscommon. It is bounded on the west and south by the Atlantic, on the east by the bishoprics of Kilmacudagh and Clonfert, on the east by the bishopric of Elphin, on the north-east by that of Achonry, and on the north by that of Killala. There is a small detached portion east of the main part of the diocese, surrounded by the bishoprics of Clonfert, Elphin, and Meath. The dimensions of the diocese of Tuam are given by Dr. Beaufort at 60 Irish or 77 English miles for the length, and 59 Irish or 63 English miles for the breadth. The area, number of parishes, benefices, and churches, are given by the author, as follows:

<table>
<thead>
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<th>Deans</th>
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<tr>
<td>Galway</td>
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<td>Roscommon</td>
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The area is equal to 1,624,467 acres, or 2,550 square miles English measure.

The 'Report of the Commissioners of Public Instruction' (Parl. Papers, 1835, vol. XXXIII.) gives 90 parishes, forming 34 benefices (viz. 15 single parishes and 19 unions), and having 31 churches, and 18 other places of worship for the accommodation of the parishioners. There were at the same time 194 places of worship for the use of the free churches and 10 for Protestant dissenters. The population of the diocese in 1834 was nearly 600,000, of whom only about one in fifty belonged to the established church. The remainder were almost exclusively Roman Catholics, the number of Protestant dissenters of every denomination being little more than 400. The gross yearly revenue of the archbishop was returned in 1833 at 820£. 3s. 9d., viz. 700£. 1s. 3d. for the see, and 120£. 0s. 6d. for smaller benefices; the net revenue was 699£. 9s. 0d., viz. 401£. 17s. 9d. for the see, and 2271£. 11s. 3d. for the benefices. The chapter consists of a dean, a provost, an archdeacon, and eight prebendaries. There is one vicar choral, who also occupies the same position in the church. The gross yearly income of the vicar-choral was returned at 197£. 0s. 7d. The dean and chapter had no corporate revenues divisible among the members: the gross income of the 'economy estates' for the payment of salaries to the organist, &c. was 174£. 10s. 10d.

The number of schools in the diocese, by the 'Report of the Commissioners of Public Instruction' (Parl. Papers, 1835, vol. XXX.), was 454, viz. 306 wholly supported by public contributions, and 145 supported wholly or in part by endowment or subscription: 61 of these were in connection with the National Board, 16 in connection with the London Hibernian Society, 7 with the Kildare-Street Society, 2 with Emmanuel Smith's fund, and 1 with the Association for Discontenancing Vice.

The number of children on the books of 370 of these schools was 24,743, viz. 16,247 boys, 8030 girls, and 476 children of sex not stated. No lists were given from the remaining 53 schools, but the number of pupils on the rolls was estimated at 5561, giving an estimated total of 30,304. These computations give one school to every 1035 of the population (considering 478021), and make the children under instruction amount to 1 in 16 of the total. This is shown in the other dioceses of the province, except Killala, and below all the other dioceses of Ireland, except Emily, Cloyne, Ardself, and the archbishopric of Armagh.

In the Roman Catholic division of Ireland the diocese of Tuam has been lately diminished by the erection of the

new diocese of Galway, which took place on the dissolution of the Roman Catholic cardinalship of Galway in 1821.

The archbishop of Tuam had for his suffragans the bishops of Clonfert and Kilmacudagh, of Elphin, and of Killala and Achonry.

[W. & T. Archdall's Antiquities of Ireland, translated and improved by Harris; Archdall's Monasticon Hibernicum; Beaufort's Memoir of a Map of Ireland; Lewis's Topographical Dictionary of Ireland; Dublin Almanac, Parliamentary Papers.] TUA. (See Archdall.) TUBSTRIEA. [Madrephylllea.] TUBSTRIEA. [Madrephylllea.] TUBUS. [Perlia.] TUBUS. [Perlia.] TUBER, in systematic botany. [Tuberaceae.] TUBER, in structural botany. [Tuberae.] TUBERACEAE, a section of the suborder Castaneo-

formes, of the order of the Oaks, and of the natural order of Fungi. The genus of the tube is generally a cylinder, but this word may be made use of in mathematics. Where a tube is bent, there is no distinct geometrical name for its surface, but the following definition might do very well: a surface may be called a tube when it is formed by a circle which moves with its centre upon a given curve, and its plane always perpendicular to the tangent of that curve. This would include the straight tube, or common cylindrical, and every species of bent tube. TUBE, EUSTACHIAN. [EA.] TUBER, in systematic botany. [Tuberaceae.] TUBER, in structural botany. [Tuberae.] TUBERACEAE, a section of the suborder Castaneo-

formes, of the order of the Oaks, and of the natural order of Fungi. The genus Tuber is a closed uterus matured internally with veins, the sporangia are pedicillate and confined to the veins.

T. cibarium, the common truffle, is known by its shape being round and fat; it grows buried in the ground, and is especially beechnut, and is fed at the depth of 10 or 12 inches or more. It is a native of Europe and is also found in Japan and the East Indies. It grows abundantly in some parts of England. This is one of the few species of the natural order of Fungi that is used as an article of diet. For this purpose they appear to have been used by the Greeks and Romans: the latter especially considered them a delicacy. It may be noticed that the bodies of the common truffle is not the common truffle. There can however be no doubt that it had a similar form, origin, and use. The truffle when gathered for eating is about the size of a large walnut, and has a very peculiar smell. The flavour is not remarkable, though its petriole and spore are characteristic of the mushroom and more. Its reputation however as an article of diet does not depend so much on its flavour as its supposed aphrodisiac virtues. That this supposition is true may perhaps be questioned, but it is deserving of notice that they are not very digestible, and that they are supposed to possess this quality in common with cheese, chestnuts, and other indigestible substances. When eaten they are either cooked with various sauces, and served up with other dishes, or sliced and pared, and eaten with oil, salt, and pepper. As the truffle exists underground and cannot be easily cultivated, there would be some difficulty in procuring it were it not for its powerful scent. This attracts many animals to the spot where it grows, especially pigs, which are very fond of eating them; hence the truffle is sometimes called swine-bread, and pigs used to be employed for hunting truffles. Dogs however have the same perception of the odour of these fungi, and, being more easily trained to this purpose, are sometimes to be seen to scratch off the earth. 1 Nees von Eisenbe, says Mr. Berkeley, 'relates an instance of a poor crippled boy who could detect truffles with a certainty superior to that of the best dogs, especially pursing his nose. Attempts have frequently been made to cultivate them, but without much success. Mr. Berkeley relates that Bornholz had succeeded in reproducing them, and that the chief truffles of the United States are brought from France and Italy, where they are more abundant than in this country, and where hunting them is
attested by some persons as an occupation. In warm moist weather truffles may be found all the year round, but they are most abundant in August and September.

The genus *Rhizopogon* has a saccate uterus, bursting irregularly and marked internally with anastomozing veins and sessile sporangia. The *R. ulus* of Bulliard is the Tubularia of Linnaeus and is called white truffle, and by some writers, from its Greek appellation, root-beard. The plant is round, rather rugged, at first white and then reddish brown, and slightly fibrillose at its base. It is found on sandy ground in woods, but is a rare plant. It differs from the common truffle in not being carried entirely in the earth: a part of its globular uterus appears above the surface.

The species are characterised by their sporidia being glued together and forming an enunct disc. It includes the genera *Tubularia* and *Fusarium*. All the species are found dead and decaying sticks and branches, and trunks of trees, and on the decaying stems of various herbs. The *Tubularia vulgaris* is a very common fungus, and is found on dead branches, especially those of the currant tree; in the autumn of the year. It forms upon these branches little scarlet or rose-colored patches which are frequently very conspicuous. The *Fusarium roseum* forms smaller red patches than the last, and is found on the stems of decaying herbaceous plants, as those of the bean, tulip, Jerusalem artichoke, &c.

The Tubicolae have branchiae in the form of filaments, or of small arbiculations, attached to the head or on the anterior part of the body, and nearly all uninflated tubules. Of those which inhabit tubes, some form a calceate, homogeneous one, resulting probably from their transudation, like the shells of the mollusca, but they do not adhere to it by means of musculae: others construct a tube by agglutinating grains of sand, fragments of shells, or particles of sand by means of a membrane which they double like a muscula also; there are others again whose tube is entirely membranous or horny. (Regne Animal.)

To the first category belongs the genus *Serpula*.

The species of this genus are the *Tuyaux de Mer* of the French, and their twisting calceate tubes cover stones, shells, and other submarginal bodies. The section of these tubes is sometimes round and sometimes angular, according to the species.

Cuvier describes the animal as having a body composed of various segments; its body is often part engulfed into a disk, armed on each side with many bundles of stiff bristle-like appendages, and on each side of the mouth a phalume of branchiae in the form of a fan, ordinarily tinted with vivid colours. At the base of each phalume is a besy filament; and one of the two, that to the right or left inferiorly, is always prolonged and dilated at its extremity into a disk of different configuration, which serves as an opereum, and closes the aperture of the tube when the branchiae within it. Cuvier further observes that the most common species having this disk in the form of a nodule, some naturalists have mistaken it for a proboseus; but it is not pierced; and the other species have it more or less elongate and cylindrical.

The number of species of *Serpula* ( Lamarck) admitted into the latest edition of *Animaux sans Vertebres*, is sixty recent and fossil; and M. Milne Edwards adds many more at the end of the genus; but he observes that very little is known of the specific differences presented by these animals, and that many of the living and all of the fossil species are characterised in a very doubtful manner. The fossils are said to be found in the tertiary, green-sand, chalk (environs of Münster and Mainz), limestone, and oolite beds, &c. Mr. Lea describes a species, *Serpula ornata*, from the tertiary of Alabama (Claborne beds).

Dr. Fitch records fourteen named species and two uncertain species from the strata below the chalk, ranging from the upper green-sand to the Kimmeridge clay.

Mr. Murchison notices *Serpulae* and *Sporobolus* in the Silurian rocks, *Sporopile* longissimus in the upper Jurassic rocks, and *Sporobolus tenus* in the Lower Ludlow rock, near the Wenlock limestone. (See Mr. MacLeay's paper, post, p. 330.)

Mr. Murchison also records the presence of *Serpula anoploidea* (Gold.) in the Devonian rocks of Russia. (See his forthcoming work on the 'Geology of Russia in Europe and the Urals.')

Example, *Serpula contempticulata*. The tubes of this *Serpula* are round, twisted, and about three lines in diameter. Its *opereum* is funnel-shaped, and its branchiae are often of a beautiful red, or variegate with yellow and violet. It quickly covers vases, bottles, or other objects thrown into the sea.

Localities.—The Mediterranean and European seas.

In other species (genus *Galeolaria*, Lam.): the opereum is flat and beset with points.

Cuvier notices another species from the Antilles (Serpula gigantea, Pall.), which lives among the madrepores, and whose tube is often surrounded by their masses. Its *branchiae* are rolled into a spiral form when they re-enter; and its opereum is armed with two small branched horns, like the antlers of a stag. This species is the *Tubercella* bicorona, Abildg., Berl. Schr. ii, iii. 4; *Acetaba*, or *Animal*; *Florer*, Home, 'Lect. on Comp. Anat.', ii. pl. 1. Upon this spiral rolling up of the branchiae Savigny established his subdivision of *Cynopside Serpulae*, from which M. de Blainville afterwards established the family.

The genus *Sporobolus*, Lam., consists of those *Serpulae* whose branchial filaments are much less numerous, only three or four on each side; their tube is rolled up into a tolerably regular spiral, and are ordinarily very small.

Salada.

The species of this genus have the same body and the same fan-shaped branchiae as the *Serpula*: but their two spiral filaments adhering to the branchiae each terminate in a point, and do not form an opereum: they are even sometimes absent. The tube of the *Salada* appears, most frequently, to be composed of grains of sand, of clay, or very fine mud, and is rarely calceate. (The known specie

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cies are rather large, and Cuvier notices their branchial plumes as being of admirable delicacy and brilliancy.

Cuvier, (Cuv. dieude, Riso). This beautiful and large species, with a calcareous tube like that of the 

Serpula, has the branchiae of a rich orange.

Terebella. The Terebella, like the greater part of the Solbella, inhabits a fragment tube; but it is composed of grains of sand and fragments of shells: their body, moreover, has much fewer rings, and their head is differently ornamented. Numeroua of their tentacles, susceptible of much extension, surround their mouth, and on their neck are arbo-reseant, not fan-shaped branchiae.

Example. Terebella conchil go. Amphithrite.

Cuvier remarks that the species of this genus are easily known by straw-like processes ranged in a petrified form, or in that of a crown, in one or more rows, where they probably serve for defence, or perhaps as means of creeping or collecting the materials for their tube. Around the mouth are very numerous tentacles, and on the commencement of the back on each side are branchiae in the form of a comb.

Cuvier's genus Amphithite comprehends the Pectinaria of Lamarck, the Amphi中间tes of Cuvier, and the Oken, the Cistone of Leach, the Solbella of Lamarck, the Hermina of Savigny, and the genus Pherum of De Blainville.

Siphonora (Oito). The species of this genus, which Cuvier suspects should be referred to this order, have on each articulation above a bundle of fine bristles; below, a single bristle; and in the anterior extremity, two packets of strong and golden-coloured bristles. Under these bristles is the mouth, preceded by a sucker, surrounded by many soft filaments, which Cuvier thinks may be branchiae, and accompanied by two fleshy tentacles. The pointed mediullary chord may be seen through the skin of the belly. The Siphonora live buried in the sand.

Examples. Siphonomena echinata, Oken; Siph. uncata, Edw.; Littoral De Fret, Ann. pl. ix. f. 1.

Cuvier closes his Tubiculae with DENTALUM.

The following situations have been noticed as frequent by these annelides:

Description. (including Venturina and Galerodacia, Lam.) may be said to be, generally, littoral, attached to rocks, stones, shells, crustaceans, corals, and other marine bodies.

Spirorbis is found on sea-whel, shells, &c., and nearly in the same situations. Spirorbis occurs on the coasts, on shells, &c., and generally in shallow water.

Terebella haunta near the same localities.

Here we will call attention to Mr. W. S. MacLeay's Paper. 'Note on the Annellida,' in Mr. Murchison's 'Silurian System,' part ii.

Mr. MacLeay commences by observing that the Annellida differ from the true Annelida in being hemiprodite, and in general red-blooded; and with regard to this part of their organization, he remarks that M. Milne Edwards is said in the public journals to have discovered that some Annelida are not provided with red blood; but the distinguished Cuvier, he adds, stated the same fact so long ago as the year 1828, for in his 'Systeme des Annelida' he places Copeus among his Hirudineo; nay, even Cuvier, who first distinctly pointed out the group under the name of con a sang rouge, has said that their blood is only generally red.

Mr. MacLeay describes them further as soft vermiform animals of an articulated structure, and which form the immediate connection between such Vertebres as Amphibians and Mammia, and such Annelida as Porochepals and other white-blooded Vermes which have the sexes distinct. Although hemiprodites, many of them, he says, require a reciprocal coitus.

The following division of the Annelida is propounded by Mr. MacLeay.

Nereidina. Animals having a distinct head, provided with either one or both antennae.

Serpulina. Animals sedentary, and having no head, provided with eyes and antennae.

The Nereidina are, as Mr. MacLeay considers, to be the most perfect, their structure of all Annelida, as they possess numerous organs and have a distinct head, which is generally provided with eyes and an antennae. Some of them, says Mr. MacLeay in continuation, 'after the manner of Ser-pulina, inhabit tubes, which tubes are membranous, formed by a transudation from their body; but, in general, the Nereidina are naked, and they are always agile animals, moving about in search of their prey. Aristotle calls them Serpulina, or Serpulina; but I am apt to say spiny, and it is true that they are wonderfully like Centipedes. The fossil impressions in the Llampeter rocks are too indistinct to enable us to determine accurately the genera and species of Nature which there occur; more particularly, as the generic characters in this group depend on such minute distinctions as are afforded by a study of the mouth, antennae, and eyes.'

Genus Nereites. Closedly approaching Savigny's genus Lepidurus. Its external appearance, or the segments of the body are here perhaps more slender and its proportions longer than usual. (MacLeay.)

Of this genus Mr. MacLeay notices two species: 1. Nereites MacLeay, Murch. fig. in pl. 2, fig. 1, of the Silurian System; and he says of the latter, that the worm had evidently, before colling, with difficulty trailed itself along in the mud in a way which any one accustomed to collect these Annelida at once recognised.

Genus Myrantes. Body linear, very narrow, and formed of very numerous segments with indistinct feet and ab- cirri. (MacLeay.)

Example. Myrantes MacLeay, Murch. (Silur. Syst. pl. 27, fig. 3.)

Mr. MacLeay remarks that the softness of the texture of the foregoing three species of Annelida and the perfect of the impression in fig. 1, makes it very remarkable; and if articulated feet existed in the Tithones, various species of them, even although membranous, should not become down to us more perfect than those figured by Ga-

fuss; and he refers to Ann. Scien. Nat., vol. xiv. p. 2, fig. 8, and delta protula, and on paper is those crustaceans, for which see the article Tarchonemidae.

Serpulina, MacLeay.

These, says Mr. MacLeay, are sedentary animals, with eyes and tentacles. They live in tubes, which are either natural transudation of their body and either mucous, or calcareous, or their tubes are semicirculations; but composed of an aggregation of particles of sand or other small substances. The calcareous nature of the tube in some Serpulina is, Mr. MacLeay observes, very advan-

tageous for their preservation, and has thus enabled us to see that such animals occurred frequently in the Upper Silurian Rocks.

Genus Serpulina.

Example. Serpulina longissima, Murch. (Silur. Syst. pl. 5, fig. 1.)

Nemertina, MacLeay.

The Nemertina, says Mr. MacLeay, are white-blooded worms, like some of the Hemitricidae or Leeches. In this group however the character of articulation becomes much more indistinct. Rudolfi has placed Gordius among Nemertina (Syst. Vet., 372); and if Gordius goes into the group of Notteri, it is most probable that Rhabdites may also. Nearis Borbasii is a long black sea-worm, which is said a sea earthworm, Mollusca. The articulation of its body become visible when it is contracted. If the long vermiform impression in the Cambrian rocks of Llampeter belong to organic substances, it can only be referred to some animal between Gordius and Nemertes, although probably

'any sea-burrowing closely resembling in form the terrestrial Scyphidomene.'
TUBICOLIDA. The Tubicola of Lamarck form the first division of his Conchiferous Crussipodes; and he connects his Conchifera with Aspergillum, and terminates them with Lingula, the last genus, according to him, of the Brachiopoda.

Lamarck observes that the Tubicola are undoubtedly conchifers, but of such great singularity, that some among them have been referred to other classes by modern naturalists; and he adds that it is singular to find a bivalve shell inclosed in a testaceous tube, and still more singular to see it incrusted in or built into the wall of that tube, and concurring to complete such wall.

The singularity of the Tubicola, as well as that of the Pholades, has, be further remarks, caused a misconception of the real essentials of the shells which belong to the family, namely, two similar, equal, regular valves, articulated by a hinge. As in the shells of the Tubicola, there are some which have accessory pieces apart from their valves; so, as one sees in the Pholades, some naturalists have taken them for multivalve shells, a notion which has given rise to very odd associations.

But, continues Lamarck, the doubts relative to the classification of the Tubicola and to those similarities which they exhibit to the Pholades are evidently dissipated by the transitional characters which connect Aspergillum with Clavigella, these last to the Fistulinae, and afterwards to the Teredines, which themselves approach the Pholades.

Finally, Lamarck points out that the animals of this family are borers, burrowing in stone, wood, and even in thick shells; but some, nevertheless, live in the sand.

The following six genera are arranged by Lamarck under this family—Aspergillum, Clavigella, Fistulina, Septaria, Teredinina, and Teredo.

We here subjoin figures of the more remarkable forms of Aspergillum.

M. Deshayes, in the last edition of the 'Animalia sine Vertebro,' remarks that the establishment of this family by Lamarck is a proof of the profound secrecy of that zoologist, and that he knew, at a time when they were rejected, justly to divine the points of relationship which undoubtedly connect the different genera of this family. At the same time M. Deshayes observes that it has long appeared to him possible to ameliorate the family by simplifying it. The genera Aspergillum, Clavigella, and Fistulinae alone, he thinks, ought to form it; whilst the three others, Septaria, Teredinina, and Teredo, bear the greatest analogy to Pholad in general characters: the shells have analogous forms; they have an appendage at the umbones, as is seen in the Pholas; and they have no true ligament. These three last genera, then, pass into the family of the Pholas.

The animal of Aspergillum vaginiferum has been found by M. Koppel, and it appears to bear much analogy to that of Pholad.

Locality.—The Red Sea.

Aspergillum vaginiferum.

a, the valve incrusted in the tube.

Locality.—The Red Sea.

Aspergillum Nova Zealandsie.

a, valves incrusted in tube; b, front view of disk.

Locality.—New Zealand.
Fossil Aspergillum.

M. Deshayes, in his Tables, gives the number of recent Aspergilla as four, the same that appears in the last edition of the 'Animaux sans Vertébres,' and one fossil (tertiary) from Bordonax. Aspergillum Longhornum, Haining, is entirely fossil species in the last edition of the 'Animaux sans Vertèbres.'

Since the article Clavagella was written, M. Cailliaud has published, in the 'Magazine de Zoologie' (1842), a work of great interest, and highly interesting to students on the red algae. The result of observations on individuals collected in the course of 1840, in various parts of the Mediterranean and Adriatic seas, at Nice, Venice, Naples, Palermo, and Monaco.

M. Cailliaud gives the following characters:

- Animal perforating. Shell bivalve, attached to a free tube in the fossil species, and included in the calcareous or some marine production in the living state; the anterior part of the tube open, in the form of a ruffled chalice, the posterior part excavated, oval, containing a free valve, and the other affixed to its wall; ligament external.

M. Cailliaud, after quoting the remarks of Broderip (vol. viii., p. 243), says, 'I shall add to the judicious reflections of Broderip some observations which may be deemed conclusive.' The agglomeration Balanus sulcatus, which conceals the Clavagella, in the gulf of Pozzolli, are several times in the position, and it sometimes happens that the Clavagella, in introducing itself into these calcareous masses, meets with the pozzolana, which is of much softer nature than the calcareous of the Balam, and consequently more easy of disintegration by the continual contact of the sea-water, and the mussel can, then, make a passage from the Balani and avoid this volcanic tube, which from its nature we may believe could not be dissolved by the substance acidulated liquid of the mussel which dissolves the calcareous lime.

When the animal of the Clavagella excavates its dwelling, its free valve is entirely open and strongly applied upon the wall of its excavation; in this case the burrow which unites the wall of the excavation of the two valves of the valve denues a passage to the acidulated liquor, which cannot extend between the free valve and the wall of the excavation, where it might attack the shell. In spite of these precautions one would be led to attribute to a principle of deterioration the white deposit (encauze) of lime which covers the strum on the free valve, but I rather believe that this deposit of lime belongs to the residue produced by the solution of the calcareous substance which passes between the excavation and the border of the valve, and that its pasty consistence must, in accordance with the border of the epidermis, prevent the filtration of the acid. As the mussels can avoid the contact of the acid, which unites it, it is not more difficult to avoid its attack upon the valve.

I am induced to believe that this dissolving secretion is only emitted in small quantity; that it is maintained in contact with the stone by the great muscle, and that the dissolved calcareous molecules forti by its absorb its strength, as soon as there is no longer any apposition of the great muscle against the stone, the sea-water would absorb its effects. It is then very easy for the animal to suspend at once its work by admitting the water around it.

M. Cailliaud observes that in the small number of living Clavagella known may be observed, as in fossil shells of the same genus, small tubes often co-adapted (accolo) to each other, and placed in various parts of the cell. Dr. Bang believed that these served to give passage to so many thecalium of byssus with which the animal is attached to the bottom of its dwelling. But M. Cailliaud remarks that this supposition cannot be allowed, for they would be entirely useless to the mussels which is sufficiently attacked by its fixed valve. An attentive examination of these little tubes in living Clavagella has proved to me that their function is not to afford a passage to the water, as has also been supposed, because in many of the excavations there are neither tubes nor any other communications; that the animal had no byssus; but that it is able to fill the void which the mussels finds on its passage in introducing itself into the stratum voids belonging sometimes to other perforating animals. Thus it is, observes M. Cailliaud, that with these tubular masses the animal fills and closes all the spaces which communicate with its dwelling so as to itself from foreign bodies; and accordingly we perceive that these tubular reunions are always due to chance: one sometimes sees them at the bottom of the dwelling of the mollusk, sometimes in the walls; wherever in fact there is need of sealing off, but never with any fixed character.

This leads M. Cailliaud to consider that in the fossil Clavagella the case is different: these, entirely closed in a sheet, analogous to the others, of which they have much in common, have lived, not like the recent species, in the stone or in the madrepore, but, like its recent Aspergillum, perpendicularly plunged for about three-fourths of their length into the sea-water. M. Cailliaud then, inquires, with which the club of the Clavagella is often surrounded, without any determined character, but thrown out at hazard like the roots of a plant, have served as points of support necessary for maintaining the perpendicular tube in the sand and at a convenient height for enabling the aperture above the level of the soil to receive the water? These digitations, he further observes, are less numerous and extended according to the nature of the stratum in which these animals lived; and we accordingly find fossil species hardly provided with any of these tubes, and sometimes they are on one side, sometimes on the other, according, he supposes, as the necessity of support increased. The club of the Balam, for the most part closed by the mollusk, at their contact with the club-shaped portion of the tube, so that they could not be available to the internal organization. M. Cailliaud then remarks, that if this observation is probable and interpretable, that it is problematic, and that the fossil Clavagella affords us valuable data relative to these digitations, of which the number, extent, and disposition were subordinate to the circumstances of the soil which these animals occupied, cannot be considered as specific characters; and that this Clavagella echinata, corona, and cristata ought to be examined anew in order to their receiving new names or being united.

The same acute observer states, that at the extremity of the club is often found, as in Aspergillum, a small open fissure, parallel to the main axis of the tube, but, the mollusk, and, indeed, it becomes necessary, since in very low tides the upper extremity of the tube is not bathed by the sea-water. Aspergillum, he remarks, would seem to be in the same predicament, and the crown, formed of tubes, which it bears at its extremity may contribute as a stay to maintain it in a vertical position and at the desired height.

The tube of the fossil Clavagella is, says the same zoologist, more slender and generally more elongated than that of the living species, and this difference may be explained by the change of level of the soil or moving stratum where the fossil species lived and which were obliged to prolong their tube to the level of the sea, that is to say, to extend that part of the tube into the sea-water. In these great species, he remarks, their siphons must have sometimes extended from 20 to 23 centimeters.

M. Cailliaud goes on to state that one of the most curious facts that he has to relate is the manner in which these small pipes are formed. The epicrind of the great muscle of the mantle is rough, covered with small pustules, whence fleshy filaments, like tentacles, occasionally come forth: these are so many instruments with which the secretory matter is poured out, and with which the mollusk forms these little tubes which are shown in the figure of Clavagella balanorum. M. Cailliaud had not been able to see them positively, as the Saccchi of Naples twice surprised these animals in the act of introducing these fleshy filaments into the commenced tubes, which they secreted in a short time; many finished ones were already closed, and the work was completed, these filaments retired into the epicrind of the great muscle, to reappear again when necessity required their aid.

Our limits will not permit us to follow M. Cailliaud in this valuable paper, the whole of which is worthy of the attention of geologists, paleontologists, and zoologists. M. Cailliaud has given the greatest attention to the growth and consequent apparent variations of the species, the result of which is the record of the following species:

2. Clavagella balanorum, Scaccii.
3. **Clavagella elongata**, Brod.
4. **Clavagella metilenta**, Brod.

We subjoin some of M. Cailliaud's figures, which give more information as to the shell than any yet published.

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**TUB**

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(Images of Clavagella elongata and Clavagella metilenta are shown.)

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3. Right valve in a very young state. 4. The same more advanced, seen to the stone which has been cut, to show the cuneiform part, and the right valve in situ. Its young tube has six feet and develops its first limbation or ruffle. 4. The same still further advanced, also in the stone. Its young tube has two ruffles. 5. The same greatly increased and seen to the stone; a part of the molusk is seen under the right valve and in its evagination, also the great muscle of the mantle and the aperture where its small rudimentary foot comes forth; the longer extremity of the tube has been cut away to show the siphons terminated in papillae; the tube presents five ruffles and the commencement of two others which the molusk had not finished. 6. Another specimen, which has entered the stone horizontally and afterwards had prologued its tube in a perpendicular direction. 7. Another specimen.

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**Clavagella laitonina.**

In an agglomeration of balanis: the little valves above noticed are here seen in the upper figure.

**Fistulana.**

Sheath tubular, most frequently testaceous, more convex and closed posteriorly, attenuated towards its anterior extremity, open at its summit, containing a free and bivalve shell; the valves equal, and gaping when they are closed.

Animal... having at its anterior part two cyathiferous calanules. (Lam.)

M. Rang characterises the animal as being similar to that of Tuxano, but shorter.

M. Deshayes remarks, in the last edition of the 'Animaux sans Vertèbres,' that Lamarck is evidently mistaken in supposing that the calanules, which he believed to exist in the **Fistulana**, were destined to carry the organs of respiration: this error, M. Deshayes observes, is rendered certain by two methods; 1st, The true **Fistulana**, although closed on one side, have never any calanules; 2nd, These calanules belong exclusively to the **Teredines**, and they have their branchiae disposed as in all the **Conchifera**, and not dependent on these calanules. These parts, he adds, are not of the use which Lamarck supposed; they are destined to close the entrance of the tube like a sort of operculum.

The number of species recorded by M. Deshayes in his tables is five living and seven fossil (tertiary); and of these **Fistulana gigantea** and **hians** are noted as living and fossil (tertiary). In the last edition of the 'Animaux sans Vertèbres,' four recent species only are given, nor does **Fistulana gigantea** nor **Fist. hians** appear among them: two fossil species only are noticed, **Fistulana ampullaria** and **Fist. pyrum**.

Small as this number is, it ought to be greatly reduced, according to M. Deshayes, who says, that although Lamarck has rendered the genus **Fistulana** more natural, he has nevertheless left more than one error which it is necessary to rectify. M. Deshayes had observed that the genus **Gastrochaena** of Spengler was the same as that named **Fistulana** by Lamarck, but with this difference,
that Spengler's genus was more natural. Lamarck, says M. Deshayes, had preserved a genus Gastrochaena in the family of Pteleodoiarae; but it cannot be retained for this reason: there exist certain Fistulana (Fistulana clava) which make for themselves a tube complete and always free, like that of the Aspergilla; other species burrow into the substance of submersed bodies, and their tube serves as a lining for the cavity which they inhabit (Fistulana amputaria); finally, there is a third sort which always burrow into the substance of madreporas, large shells, or soft calcareous rocks; the tube of these last invests the cavity which they occupy, but as their shell can only be obtained by breaking those bodies, inattentive observers have fancied that they were deprived of a tube, and for this incompletely known species Lamarck preserved the genus Fistulana. M. Deshayes, who states that he has observed with much care the species of the two genera, and detected the identity of their generic characters, whether their mode of life was in a free or included tube, believes that one of the two genera ought to be suppressed.

M. Deshayes then adds strictures as to some of the species admitted by Lamarck into the genus Fistulana. Fistulana corniformis. M. Deshayes states that the calcareous tubes which bear this name in Lamarck's collection belong without exception to the genus Teredo. Fistulana gregata. If the structure of the shell accords with the tube, this species again, in the opinion of M. Deshayes, must belong to Teredo. Fistulana lagena. M. Deshayes had not seen the internal shell of this species: it may, he thinks, also belong to the genus Teredo; but this is doubtful.

Fistulana ampullaria. A true Fistulana, but remarkable in this, that according to circumstances it forms a free tube sunk in the sand, or perforates calcareous bodies, and its tube serves as a sheath or lining for the cavity which it inhabits: this species, then, under the circumstances first named, belongs to Fistulana; under the second, to Gastrochaena. Fistulana pyrum. This M. Deshayes does not know completely; but judging from the form of its tube, he thinks that it very probably belongs to Fistulana; it may indeed, he adds, be possible that this is the same species (accidentally free) as that named Pholos hisus by Brocchi; in that case it would be another example of the inutility of the genus Gastrochaena.

Fistulana clava, the only other species recorded in the last edition of Lamarck, is left without comment.

The Fistulana inhabiting a free tube have been found in sands or hard mud, with the small end of the tube exposed. TUBIFERA, the title of the fourth order of Polyzoa in the classification of Lamarck, including the Alecosta of Lamarck.

TUBINGEN, the second capital of the kingdom of Wurtemberg, at 48° lat. and 14° E. long.; it is situated on the left or north bank of the Neckar, over which there is a stone bridge, at its confluence with the Ammer, in one of the most beautiful and fertile parts of the highland of Wurtemberg. The left sides of the valley of the Neckar are partly bordered with forests; rising above them, towards the east and south, the majestic forms of the surrounding Alps, which, with the lovely valleys, and the green eminences covered with vineyards, make a most pleasing object at every turn of the time; the hills rising by themselves, which is irregularly built in the old style. Hence the Mosel is a small river, the most regular passages are the two suburbs, one of which has been built within these few years by the right bank of the Neckar, and the other on the left. There are three Protestant and one Roman Catholic churches. The inhabitants, in number between 5000 and 8000, are partly employed in the manufacture of woollen cloths, but Tübingen is chiefly industrial, being the seat of a university which was founded in 1477. By Count Eberhard, who became afterwards the first duke of Wurtemberg; it flourished during the first 40 years till the Reformations: Reuchlin and Melancthon were among its professors. After the Reformation, and the death of all those of divinity, were highly esteemed by all the Protestants of Germany. It experienced in the sequel many vicissitudes of fortune. It was greatly improved in 1503. It was then the head quarters of the ProtestantTHEFERE, and some territory being acquired by Wurtemberg, the population of which preceded the Roman Catholic religion, the university founded for them at Eulenburg was suppressed, and the students admitted at Tübingen, which is now the only university in the kingdom. The university has six faculties, namely, medicine, jurisprudence, philosophy, Protestant and Roman Catholic divinity, and political economy. There are thirty professors in ordnary, who form the Senate, and six extraordinary. According to the new statute of 18th January, 1829, there is, instead of a rector, a chancellor, appointed by the king, who is at his head of the whole university and the Senate in particular.

The number of students is generally between 600 and 700 (Horschelmann says that in 1822 there were 800 students). The university has ample funds: with a library of 69,000 volumes (according to the 'Conversations Lexicon,' 140,000), a good collection of natural history, a cabinet of natural objects, a collection of mathematical, astronomical, and philosophical instruments, an observatory and botanical garden. There are a Protestant and a Roman Catholic seminary, a chancery, and an anatomical theatre.

The library and many of the collections of the university are in a spacious edifice, besides the university, are the George's church; the town-hall, built in 1483; the two seminaries; the museum, built in 1823; the court of justice of the circle of the Black Forest; the city hospital, a scene of sprees, feeding the Clinical, enjoyed in 1580, which is an inordinate of the king in hospital, to which medical officers are admitted for practical improvement. The town various printing-offices, dying-houses, breweries, and manufactories of woollen cloth. Much wine is made in the neighborhood, but it is not held in great estimation. There are many saws, fulling, and other mills on the Neckar and the Ammer. Trade is pretty brisk, the high road from the Black Forest into Switzerland passes through the town.

(Brockhaus, Conversations Lexicon; Stein's Geography, by Horschelmann; Memminger, Beschreibung von Württemberg; A. Flesher, Das Königreich Württemberg.)

TUBIPOR.EA, or TUBIPORID.E, a group of Asterozoa, forming the first family of the Zoophyta of Blainville, the other families being Ctenilia, Pennatulacea, and Aleystra. The Tubiporidae are thus defined:—

Animals provided with internal ovaries, and eight pinnated
tentacles, and contained in elongated cylindrical cells; cells calcareous or coriaceous, with a round terminal opening, fixed by the base, and not united into a real common apyramid. (This last part of the characteristic is not clear.)

§ 1. Envelope flabby.

Genus *Cuscudalia*, Blainville.

Tentacles regularly elioted, contained in oval cells, stalked alternately near the extremity of the articulations of the tentacles, ramified, tortuous stem.

This is equivalent to the British genus *Walkeria* of Fleming, or *Scutellaria cuneata* of Linn. Its place in this family is thus doubtful. (Horn. Treats, vol. iv., tab. 15, f. 1.)

Genus *Tubula*, Lamarck.

Cells tubular, cretaceous-membranaceous, marked with rather longitudinal channels, and united into a ramose fixed apyramid.


Genus *Cuscudalia*, Lamarck.

Animals claviform. Cells infundibuliform, ascendent, open at the extremity, and continued interiorly into an hexagonal stem. (Included by Lamarck and Lamouroux in the Scutellaria.)


Genus *Chuvilina*, Quoy and Gaimard.

Animals in more or less tubular, elongated, subdedicated, fixed, and agglomerated irregularly on the surface of organic bodies.

Example, *Chuvilina viridis*, from Australia. *Actinolouge,* pl. 82, f. 5.

§ 2. Envelope calcareous.

Genus *Tubijpora*.

Animals cylindrical. Cells tubular, thin, membranaceous, enveloped in calcareous vertical tubes, which have and terminal openings, and are connected by transverse plates into an irregular fixed apyramid.

Example, *Tubijpora nautica*, Linn. *Actinolouge,* pl. 82, f. 5.

TUBULIPORITES. The fossil species supposed to belong to *Tubijaria* are thus named by many writers on organic animals.

TUBULIBRANCHIATA. The *Tubulibranchia* form the second order of *Gastropods*, and he says that they exist to be detached from the *Pterobranchia*, to which, however, they very nearly approximate, because the shell, which is in the form of a more or less irregular cone, the commencement of which is spiral, fixes itself upon various bodies; therefore, adds Olivier, they have no organs of copulation, and fertilize themselves.

Olivier's *Tubulibranchia* consist of the genera *Vermex*, *Gaulitinella*, androughly.

*Vermex* (Adanson.)

The *Vermex* have a tubular shell, the whorls of which, in the early stage of the animal, form a kind of spine, but which are prolonged into a tube more or less twisted, like those of the tubes of *Serpula*. (Tecnolouge.)

The shell is ordinarily fixed in an interlaced group of the same species, or partly enclosed in Lithophytes. As the shell does not creep, there is no foot properly so called; but that which in the ordinary gastropods forms the tail bent downwards and carried forward in front of the head, where its extremity expands into a mass furnished with a delicate operculum which closes the entrance to the tube; and sometimes various appendages, and its operculum is flat in some species. The head of the mollusk is oblique, and carries two moderate tentacles, which have the eyes at the sides of their external base. The mouth is a vertical oval, and beneath it is seen on each side a filament which forms the appearance of a tentacle, but which in reality belongs to the foot. Their branchial tube only form one row, along the left side of the branchial vault. The right side is occupied by the rectum and the spermatheca chord, which transmits the eggs. There is no penis, and the animal produces itself. Olivier remarks that the species are rather numerous, but not very distinct.

Lamouroux placed the form under the genus *Serpula*.

Oliver observes that Lamarck's *Vermex*, which that naturalist leaves near the *Serpula*, does not differ from the *Vermex*.

Quoy and Gaimard are of opinion that these animals ought naturally to form an order apart, in conse-
Annelsids closely approximating to the Serpulae, belong to the class Mollusca, and should be placed near to the Vermes. From the conformation of their tubiform shell, Savigny, he observes, had already expressed doubts as to the correctness of the generally received opinion on this point; and M. de Blainville went further, for he recognized the right of those animals to belong to the class of mollusks, a judgment which ulterior discoveries entirely confirmed. M. Audouin, having enjoyed an opportunity of observing one of these animals, has proved that their organization closely approximates that of the Vermes. The body is of an elongated form and spirally turned, so that it cannot be extended in a straight line; anteriorly is seen the operculum, which is very thick, formed of the aggregation (complement) of horny lamellae, and fixed on a muscular foot, which presents superiorly a sort of appendage very much compressed backwards, from which rises a distinct head, furnished with two small tentacles slightly expanded at the summit, each provided at their base with a projecting eye. Immediately next to the head is seen the mantle, which is slit superiorly throughout its length to the base of the spiral part (tortillon), which is distinct and terminates the body. The right lobe of the mantle is reduced to a very narrow fringe, which is bordered within by a small furrow extended from the head to the origin of the tortillon; the left lobe is much larger throughout its extent. The branchiae exist on one side only, and consist of simple filaments fixed to the internal surface of the left lobe of the mantle throughout its length. Finally, says M. Milne Edwards, the tortillon is somewhat short, and includes the liver and organs of generation, which terminate at a small notch on the left lobe of the mantle. The shell when recent is covered externally with a sort of epidermis, and its walls are fixed to foreign bodies with much less firmness than the shells of the greater part of the Serpulae.

The number of species recorded in the tables of M. Deshayes are four living and one fossil (tertiary); and of these, Siliquaria anguina (Serpula anguina, Linn. noted as recent and fossil (tertiary). In the last edition of Lamarck's 'Animaux sans Verabres' are six recent species, including Siliquaria australis, which MM. Quoy and Gaimard found at Port Western in New Holland; and four fossil (including Siliquaria anguina) from the neighbourhood of Angers, from Grignon, and from the calcareous greens of Nihou. Mr. Lea records Siliquaria Calcarobenaus from the tertiary of Alabama.

Example, Siliquaria muriaca. Locality, Indian Seas.

Cuvier remarks that Siliquaria resembles Vermetus in the head, in the position of the operculum, and in the tubular, irregular shell, which has, however, throughout its length a slit which follows all its windings, and which corresponds with a similar slit in the mantle which covers the branchial cavity. Along the whole length of this slit adheres a branchial comb, composed of a great quantity of foliations, distinct and, as it were, tubular. Linnaeus placed them with the Serpulae, and Cuvier observes that in these latter times some have believed that they belong to the class of Annelids. Thus Lamarck supposed Siliquaria as well as Vermitula to be approximated to the Serpulae.

Cuvier states that Audouin has observed and described the animal, and that to him he owes what he has said on the subject.

M. Milne Edwards, who refers to the labours of M. de Blainville and M. Audouin on this subject, remarks that the Siliquariae first distinguished by Guettard under the name of Tenagode, and considered till of late as being...
TUC

TUBULIPORIDAE, or TUBULIPORIDEA, the second family of Polyparia solidis, in Blainville's arrangement of the Actinocorona. The genus is characterized by the circular or oval foot near by no means exact; but are thus stated by Blainville:

*Animula* contained in cells of a tubular figure, with a round mouth, which are acumulated irregularly, so as to form an attached unsolid polyparium. (The animals are only common to the latter.)

*Genus Microselena, Lamouroux.*

The cells acumulated in devirous fasciculi, so as to constitute a calcareous solid polyparium, generally hemispherical and radiato-etriate below.

Example, Microselena porosa, Lam. 'Gen. Polypy.' pl. 7, f. 24-26. (Fossil at Caen.)*

*Genus Obelia, Lamouroux.*

Cells conical, approximate, adherent at their origin, separated, and situated at their extremity, so as to form a small round attached plate-like polyparium.

Example, Obelia tubulifera, Lam., 'Gen. Polypy.,' pl. 80, f. 7 and 8. (From the Mediterranean.)

*Genus Tubulipora, Lamark.*

Cells slender, elongated, hydroid, with eight tentacula. Cells deep, rather conical, agglommerated into a parasitical ensuraing calcareous-membranaceous polyparium.

Example, Tubulipora plicatilis, Lamark. Ellis, 'Corallinae,' tab. 27, fig. 3, f. E. (Seas of Europe.)*

*Genus Rubula, Defrance.*

Cells subjacent, prominent, irregularly united at the base into a calcareous echinulated (probably attached) polyparium.

Example, Rubula soldani, Defr. ('Dict. des Sci. Nat.,' tom. 46, p. 596.)* (Fossil from Hauteville.)

TUCANUS (the Tucan). A southern constellation of Beyer, situated between Phoenix and the south pole, and near to the bright star in Eridanus. The principal stars are as follow:—

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<th>No. in Catalogue of</th>
<th>Right Asc.</th>
<th>Declination</th>
<th>Magnitude</th>
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TUCKER, ABRAHAM, a distinguished metaphysician, was descended from a Somersetshire family, and was born on the 2nd of September, 1705. His father was an eminent merchant in London, who amassed a large fortune, and died in his son's infancy, leaving him to the guardianship of a maternal uncle, Sir Isaac Tillard. 'Of the memory of this relation,' says Sir Henry Mildmay, whose biographical sketch prefixed to his edition of the 'Light of Nature Pursued,' is the only account that we have of this author. 'Mr. Tucker to the latest hour of his life never failed to speak with extreme affection and gratitude, frequently observing that he was indebted for every principle of his character, and the virtues which he possessed to the indefatigable pains and bright example of his uncle.'

Tucker was sent to a school at Bishop's Stortford, and in 1721 entered as a gentleman commoner at Merton College, Oxford. During his stay at Oxford he devoted himself chiefly to mathematical and mathematical studies, but found time also to make himself master of the French and Italian languages, and to cultivate a natural taste for music into very considerable skill. About the year 1724 he removed to Cambridge, where for some time, Sir Henry Mildmay informs us, 'he applied very closely to the law, in which he acquired such a degree of knowledge as enabled him to conduct with advantage the management of his own affairs, and frequently to render very essential services to his neighbours; but his fortune not requiring the aid of a profession, to the pursuit of which neither his constitution nor his inclination was adapted, he was never called to the bar.'

While he continued at the University, he appeared in tours through different parts of England or Scotland, and once made a summer excursion into France and Flanders.

In 1727 Mr. Tucker purchased Betchworth Castle, near Dorking, with an extensive estate attached. He immediately applied himself to the study of agriculture, and, with his usual industry, he committed to paper a great variety of remarks which he either had made himself, collected from his friends and tenants, or selected from the different authors, both antient and modern, who have treated upon rural economy.' In 1730 he married Dorothy, daughter of Edward Barker, Esq. of East Betchworth, cur- sory baron of the county of Surrey, and receiver of the manor of Betchworth. He had two daughters by this lady, who died in 1724. The elder daughter, Judith, survived her father, and died unmarried in 1736. Dorothy Maria, the younger, married, in 1766, Sir Henry Paulet St. John, Bart., and was the mother of Sir H. P. St. John Mildmay, who assumed the name of Mildmay on a marriage with an heiress of that name, and who edited the 'Light of Nature Pursued,' and wrote the sketch of his grandfather's life, from which we have quoted.

Tucker felt the loss of his wife very severely, and occupied himself for some time in twice transcribing all the letters he had ever received from her. He then applied himself to educate his daughters, and himself taught them French and Italian. In 1745 he published some materials which a friend had sent to him for the purpose, and published them in a pamphlet, with the name of The Country Gentleman's Advice to his Son on the subject of Party Clubs. Sir Henry Mildmay says of this pamphlet, which is very scarce, and of which he had with difficulty procured a copy, that it was not a party production, but a general exhortation, addressed chiefly to young men, against strong party feelings. 'We learn of the same authority that Tucker kept quite aloof from politics, and having been often solicited to be a candidate for the representation of Surrey, invariably refused. He was once only prevailed upon to attend a county meeting at Epsom, where party ran very high, and though he took no active part in the proceedings there, he was introduced into a ludicrous ballad, where he is described, with several other gentlemen of respectability and talent, as confounded by the superior powers and eloquence of the Whigs of that day, Sir Joseph Mawbey and Sir Humphrey Coutts. This circumstance afforded to Mr. Tucker abundant matter for humorous adaptations, and whenever politics were the subject of conversation, he seldom failed to advert to his ill success of his only essay in public life; and was so much amused with the figure he made in verse, that he set the ballad to music.'

It was about the year 1756, according to Sir Henry Mildmay, that Tucker began his great work 'The Light of Nature Pursued;' at least no papers relating to it were found of an earlier date. But the materials for that work must have been long in course of collection, and probably contain the results of the observation and reflection of a whole life. 'My thoughts,' says Tucker of himself, 'have taken a turn from my earliest youth towards searching into the foundations and measures of right and wrong; my love for retirement has furnished me with continual leisure, and the exercise of my reason has been my daily employment.' When he had determined upon composing his work, we are told by Sir Henry Mildmay that Tucker made several sketches of the plan of the work (which he afterwards printed in the shape of a dialogue), before he finally decided on the method he should pursue; and after he had ultimately arranged and digested his materials, he twice transcribed the whole copy in his own hand. 'And he endeavoured to improve himself in composition by a study of the principal Greek and Latin authors, and by translating the most admired passages of Cicero, Demosthenes, and others. The first specimen of his work was published in 1765 under the title 'The Light of Nature Pursued;' this was a selection from the four octavo volumes of the 'Light of Nature Pursued,' which he gave to the world in 1769. In the mean time, a criticism in the 'Monthly Review' on the 'Fugitive Poems' of William Shenstone, to which he had contributed, led to a controversy, in which he defended himself, and the editor of the 'Monthly Review' attacked him. This led to a parting of the ways with the editor, and to a correspondence published in the 'Gentleman's Magazine,' and 'The London Magazine.' He published the 'Light of Nature Pursued' under the title 'The Man in Quest of Himself;' by Cuthbert Comment. He published the 'Light of Nature Pursued' under the title 'The Man in Quest of Himself;' by Cuthbert Comment. He published the 'Light of Nature Pursued' under the title 'The Man in Quest of Himself;' by Cuthbert Comment.
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the fictitious name of Edward Search. The remaining volumes of the work, the composition of which, together with magisterial duties and the superintendence of his estate, occupied the remainder of his life, were edited after his death by his daughter.

Sir Henry Mildmay gives the following interesting account of Mr. Tucker's habits. He always rose early in the morning to study his literary pursuits. During the winter months he commonly burnt a lamp in his chamber for the purpose of lighting his own fire. After breakfast he returned again to his studies for two or three hours, and passed much of the morning in walking, or in some rural exercise. As he was remarkably abstemious, he lost but little time at the table, but usually spent the early part of the evening in summer walking over his estate, collecting information on all agricultural subjects from his tenants, and sometimes committing to his result of their personal experience to paper. In winter he completed the regular measure of his exercise by traversing his own apartment; and, after accomplishing the distance he had allotted to himself, he employed the remainder of the afternoon in reading to his daughters. In 1711 blindness overtook him, a fever having completed what ineffectual application had prepared the way for. His favourite object however, remained in his own possession, the mechanical ingenuity enabling him to direct the construction of a machine, which guided his hand and helped him to write so legibly that his productions were easily transcribed by an amanuensis. He also received invaluable aid from his elder daughter, whom he may not unjustly compare to Milton's daughter. She transcribed the whole of his voluminous work for the press; and so entirely did she devote her time, like Milton's daughter, to those pursuits which would make her most useful to her father, that she applied herself to the study of the Greek language, in which she made such proficiency as to be enabled to preserve to her father, during the remainder of his life, an intercourse with his favourite authors, of which his misfortune must otherwise have deprived him. Tucker died in 1774. Tucker's work is one which for various reasons, its length as well as the nature of the subject, is read by few; but many will know the praise bestowed on it by Paley in the preface to his Moral and Political Philosophy:—"There is however one work to which I owe so much that it would be ungrateful not to confess the obligation: I mean the writings of the late Abraham Tucker, Esq., part of which were published by himself, and the remainder since his death, under the title of The Light of Nature Pursued, by Edward Search, Esq., I have found in this writer more original and ingenious observation, upon the several subjects that he has taken in hand than in any other, and I can say than in all others put together. His talent also for illustration is unrivalled. But his thoughts are diffused through a long, various, and irregular work. I shall accordingly dispose of them by the method of collecting them into method, to collect into heads and articles, or to exhibit in more compact and tangible masses, what, in that otherwise excellent performance, is spread over too much surface."

The Light of Nature Pursued is a didactic work, and not a systematic treatise, on mind and morals, and is of a practical rather than a theoretical character. The principles of mental and moral science are but cursorily treated, and with the view of being applied to the business and practical exigencies of man's life. Tucker adopts Harely's theory of association, with its objectionable material elements, but instead of association he always uses the term translation, a term which has nothing to recommend it in preference to that which it discards. The striking qualities of Tucker's work are ingenuity and fertility of illustration, a rich quiet vein of humour, which has procured for him the title of the metaphysical Montaigne, and a lofty moral aim, which renders the work as useful to the student as its humour and variety of illustration render it generally entertaining.

There was a future author with Sir James Mackintosh, who has evidently bestowed great pains upon his sketch of him. He had many of the qualities which might be expected in an affluent country gentleman, living in a privacy undisturbed by political sed, and with a leisure of time which called for some public service. But England had not entirely renounced her old taste for metaphysical speculation. He was naturally endowed, and indeed with more than ordinary acuteness and sensibility, nor with a high degree of range and reach of mind, capable of far reaching original speculation and effect, with a fancy perhaps unmatched in producing various and happy illustration. The most servile of his moral qualities appear to have been preserved intact in a religious spirit; the whole influence of his situation and character is visible in his writings. Indulging his own tastes and fancies, like the English squire of his time, he became, like many of them, a sort of nobleman of mental independence; hence the boldness with which he often employs illustrations from homely subjects. He wrote, he pleased himself more than the public. He had too little regard for readers, either to sacrifice his sincerity to their taste, or to commit his own to their faults. If the fear of fatiguing them... He was by early education a believer in Christianity, if not by natural character religious. His calm good sense and accommodating temper led him rather to explain established dogmas in a manner agreeable to his philosophy than to assail them. Hence he was represented as a time-server by freethinkers, and as a heretic by the orthodox... Had he rejected his metaphysical dogmas in the margin of his books, he would have been esteemed an excellent moralist and an admirable critic of ancient and modern literature. His favourite ethical observations, for which he had so peculiar a vocation, from the disputes of the thinkers of his country and his day... might have thrown many of his chapters into their proper form of essays, which might have been compared, though never published... The title of The Progress of Ethical Philosophy, Whewell's edition, p. 269.

The best edition of the Light of Nature Pursued is that of Sir Henry Mildmay, in 7 vols. 8vo. There is a report of this edition in 2 vols. 8vo. for the last century. The whole of the work has been published by Mr. Hazlitt, which is now out of print, but which is highly commended by competent judges. The tract in reply to the Monthly Review of 1777 is entitled A Defence of the Individual, or the Soul; and the whole is printed in Parr's Metaphysical Travels, published by Lamley, 1827.

TUCKER, JOSIAH, D.D., a learned divine and distinguished writer of the last century, was born at Laughorne in Carmarthenshire, in 1711. Some time afterwards his father went to reside on a small estate near Aberystwith in Cardiganshire, which had become his property and which he cultivated himself, and from which he derived his income as a farmer. Although his means were very small, he contrived to send his son to Ruthin School in Denbighshire, where he pursued his studies with such success as to be enabled to obtain an exhibition at St. John's College, Oxendale. Some days after this, he performed the journey between Wales and Oxford, and it is said that young Tucker was obliged to go backwards and forwards on foot, with a stick over his shoulder and a bundle in his hand, in order to be sometimes also mounted upon his own horse, but the young man did not wish to sacrifice the convenience of his father to his own pride; and in future journeys he resumed his stick and his bundle. Shortly after leaving the university he entered into holy orders, and served as curate of St. Stephen's Church, Bristol. He next became curate of St. Stephen's Church, Bristol, and was appointed a minor canon in the cathedral of that city. Here he had the good fortune to engage the friendship and esteem of Dr. Butler, the bishop of his diocese, who appointed him, as his domestic chaplain, and afterwards obtained for him a prebendal stall in the cathedral of Bristol. To the active friendship of his excellent patron he was also indebted for the rectorcy of St. Stephen's, to which he succeeded in 1749. To complete at once his history of his ecclesiastical preferences, we will add that in 1786 he became dean of Gloucester, and about the same time took his degree of D.D. To his residence in the great commercial city of Bristol may, in great measure, be ascribed the prevailing character of his political writings, the best of which are those which relate to the interests of trade and commerce. Pursuing some of the most important such of his subjects as may intervene in point of time, we shall be the better able to give a connected view of his principal writings upon trade. In 1748 he published his first commercial work, entitled A Brief Essay on the Advantages and Disadvantages which respectively attend France and
Great Britain with regard to Trade, with some Proposals for removing the Principal Disadvantages of Great Britain, in a new method." In this essay he condemned the French system of taxation, especially the taille, the duties upon agriculture and those laid upon provisions entering their great cities. He objected also to their mode of farming the revenue, to their maritizes or guilds, and to their monopolies and exclusive charters. Nor did the taxes of this nature which the fourth has consisted in the services of life are in fact so many taxes upon trade and industry; and such must be accounted the duties upon soap, coal, candles, salt, and leather. Likewise the duties upon wine, and the strict and arbitrary method of foreign raw materials, to be carried into effect for more than half a century after the death of Gloucester had most plainly point out its advantages. His arguments and illustrations upon this point are hardly susceptible of improvement after forty years' experience of the practical effects of this system. We have already adverted to the work of Adam Smith.

In 1774 he first published a tract which he had written sixteen years before, entitled "A Solution of the Important Question, whether a Poor Country, where Raw Materials and Provisions are Cheap and Wages Low, can Supply the Trade of a Rich Manufacturing Country, where Raw Materials and Provisions are Dear and the Price of Labour High." The subject is very ably treated, and (as is usually the case with the dean) in a plain and practical manner. This tract is well worthy of attention, as the question is still one of great interest, and a frequent subject of discussion in reference to free trade and our competition with foreign manufacturers.

Duncan went to War for the sake of Trade, considered in a new Light,' is another valuable tract, first published in 1763, and republished with the last. It is an enlightened exposition of the evils of war in regard to trade, and is thought to have been the means of promoting the other. Mr. Turgot thought so well of this tract, that he translated it into the French language, and wrote a very complimentary letter to the author. Some years later he published a work upon a similar plan, viz. "Out Boys, or An Enquiry what Benefits can arise either to the English or the Americans, the French, Scandinars, or Dutch, from the greatest Victories or Successes in the Present War;" being a Series of Letters addressed to Mr. M. de Mirabaud, in answer to the Natie of an Englishman, on the subject of the war, and to encourage jealousy and exclusiveness in national commerce.

But the most remarkable of all the commercial tracts of Dean Tucker was published in 1786, being "Reflections on the Present Matters in Dispute between Great Britain and Ireland." The object of this tract was to point out the advantages that might be derived from the union of Ireland, and suggested to the English merchants a scheme for evading restrictions and monopolies, by the use of the free Irish ports for their commercial adventures. The ends proposed to be accomplished by these means were: to purchase the manufactures of other countries beyond the Cape of Good Hope; in other words, an escape from the commercial monopoly of the East India Company: 2dly, 'A free trade to Egypt and the Levant,' at that time restricted by the charter of the Turkey Com-
by an act of the 7th James I. (c. 2), chiefly directed against
the Papists, and which required all persons applying for
naturalization to have taken the sacrament of the Lord's
Supper, and to have been a member of the Church of
England, and had been resident in that part of the
province of parliament, and throughout the country, but being
supported
No sooner had it become the law than the clamours with
which it had been accompanied were renewed, and while the
word at its height, Dr. Tucker boldly undertook the de-
ference of the measure in two 'Letters to a Friend concerning
Naturalizations.' The act was nowhere more unpopular
than at Bristol, and the populace were so enraged at his
opposition to their prejudices, that they threw him in effigy in
full canons; and he is said to have witnessed the ceremony
from his own garden. The violence of public feeling upon the
subject at that time may be judged of from the fact that on the
labor day, in the same year, the Duke of Newcastle was forced
to move for the repeal of the act, and that the offensive
measure was actually repealed.

At the very commencement of the disturbances in the
American colonies, the dean took a view of British interests
at variance with all parties, and published several tracts
from time to time as the contest proceeded. He showed
no sympathy with the Americans, nor did he acknowledge
the legality of their complaints. On the contrary, he
exag-
erated the constitutional right of the mother country to tax
her colonies, and accused the Americans of ingratitude in
resisting the mild and liberal sway of England. Thus far
he sayed to the country, but while they were
 coercion and punishment, and while the opposition were
seeking to conciliate and make concessions, Dr. Tucker
proposed to abandon the colonies altogether. He did not
doubt the power of England to conquer the Americans,
he asked, in 'A Letter from a Merchant in London, to his
Nephew in America.' How are we to be benefited by our
victories? And what fruits are to result from making you
a conquered people? Not an increase of trade; that is im-
possible, for these keepers never get the modicum
by beating his customer; and what is true of a shopkeeper
is true of a shopkeeping nation.' To these opinions he
always adhered, and took every occasion to enforce them.
Writing so late as 1792, he stated that he had held the
opinion for upwards of five and twenty years that colonies
were detrimental to a country, and that he had been growing
every day more and more convinced. These views were
consistent with his uniform advocacy of perfect freedom
of trade and navigation; and were strengthened by his horror
of the needless wars which had too often been caused by
distant colonial possessions.

And the controversy led him to speak with
much acrimony of the American people, their leaders and
advocates, and some of his statements brought him into col-
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A. Tucker' he said in his celebrated speech on
his ' Addresses', and his earnest endeavours in this vineyard will, I suppose,
raise him to a bishopric.' In consequence of this reference to
himself, the dean addressed his next pamphlet, in the
form of a letter, to Mr. Burke, and dissected the speeches
of that statesman upon the American question, and again
enforced his own opinions.

His views of the American question led him frequently to
oppose the doctrines laid down by Mr. Locke, and relied
upon by the Americans—that the consent of the governed,
given either by themselves or by their representatives
chosen by them, is the only foundation of civil govern-
ment—and the justification of taxes. In many of his
pamphlets he combated these principles, and at length
devoted an elaborate work to their refutation. In 1781
his 'Treatise concerning Civil Government' appeared. It
consists of three parts. In the first he examines the doc-
tines of Mr. Locke, and of his followers, Dr. Price, Dr.
Priestley, and Mr. Molyneux, as to the principles of civil
and political liberty. In the second he offers a theory
of his own as the true basis of civil government, and
suggests alterations in his British constitution. In the last
he describes the former Gothic or feudal constitution of
England, chiefly in order to show the gradual increase of popu-
lar power and the limitation of the influence of the crown.
This work was much applauded, and learning, but is of a somo-
\textit{cal} desultory character. His judgments here were
devoted to any extension of popular representation, and he
even proposed to raise the qualification of electors and
the members of the House of Commons. He had praised
the greater portion of this work some years before, but his
views were then more in accordance with the ideas of
the bishop especially, Dr. Warburton, between whom to
choose there seems to have been much want of concert,
was alleged to have said that his trade was his religion,
and his religion a trade. The dean took many oppor-
tunities of casting ridicule upon the practice of the
priests, by which his labours were regarded.

On one occasion he thus expressed himself:—The baby
affords to consider me with contempt: to which I am
said to have replied:—I had the honour to read
in the last volume of the 'Quarterly Review' that you
had nothing. He has said that religion is my trade
and trade is my religion. Commerce and its corollaries
have, it is true, been favourite objects of my attention
and where is the crime? And as for religion, I have
constantly attended to the duties of my parish, nor have I
reduced my cathedral. The world knows something of me
as a writer on religious subjects; and I will add (which
world does not know), that I have written three his-
tory books—"The History of England," and "The
History of the World." My heart is at ease on that score; and my conscience,
thank God! does not accuse me.' In the preface to
'Reflections on the Expediency of a Law for the Naturalization of
the Americans' he further declared, 'I have often
gone some censures for engaging in inquiries secular,
beside his profession; and he begs leave to offer as
reasons for his interfering in those matters, and at the
same time to vindicate whose interest clashes with that of
the public, may excite them to vilify and insult him.' Three
years later, he writes, 'Another bill brought against me is
an extremely ignorant in my peculiar profession as a
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vivine; and that having done too much of my time to the
study of commerce, I have shamefully neglected to
cultivate those sciences which more immediately belong
to my clerical profession. To these charges I stand

he and my 'Apology for the Church of England.'

He will write to Mr. Letters to Mr. Kippins, as
before the public, let the impartial judge as they please.

It is not surprising that the political works of this able
writer should have attracted more public notice and
more than his other writings. Indeed, he is already a
name in the religious and political circles of the

stated in 'The True Interpreter,' 'Religious Intolerance no Part of
the General Plan either of the Moslem or Christian Dispensation.'

At about the same time he published "Seven Sermons
on some of the most important Points of Natural and Re-
lected Religion." He proposed also to revise the Book of
Common Prayer, to retrench its redundancies and
reductions, to reduce its length; but he does not appear
to have proceeded with this design.

As a public writer Dr. Tucker proved himself a
man of uncommon sagacity, judgment, and foresight,
with a mind little tainted by prejudice, and very far
from vain. He was probably more than once
enjoyed a higher reputation, if his religious writings had not
been eclipsed by the greater celebrity and interest of his political works. His style is clear, simple, and forcible; and his mode of treating a question rather popular than scientific. His principles and maxims, indeed, are always expressed with the greatest clearness, and the elucidation of his subject is methodical; but the freedom of his style and the familiarity of his illustrations impress his writings with a character essentially popular.

There exist in Russia several Tulas, but one of the freestone river near the town of Tula, is little more than a brook in its short course in the government before it enters that of Riasan. There is however no want of water, there being above 200 small rivers. 'The inhabitants,' says Hassel, 'are Russians, with a few German colonists.' The men are chiefly occupied in making tallow, born to obey, quiet, docile, and industrious as long as they are under due restraint, but obstinate, indolent, and quarrelsome where they have their will. On the whole they are poor, and have frequent occasion to resort to the assistance of their lord; their clothing and food inexorably wretched; they rarely have meat, more rarely fish, and many never buy salt.

The bishop of Tula and Bjelew is at the head of the clergy; he has 857 parishes under him. The government is divided into twelve circles. Except in the capital there are no manufactories; woollen and linen are made only for their own use by the families of the country people.

The most considerable town next to Tula, is Bjelew, situated on the Oka, in the western part of the government. It is a large old town, with a rampart and moat: it has fifteen churches; one monks' convent, with fifteen nuns; a number of inns; a number of public buildings. The population probably exceeds considerably 7000, that number having been assigned to it twenty years ago. There are several tanneries, breweries, tallow-melting houses, and other manufactures of lace, coarse, knives, and particularly, those, which are highly esteemed all over Russia. The inhabitants carry on a considerable trade.

Tula, the capital of the above government, situated in 51° 15' N. lat. and 37° 29' E. long., at the confluence of the Tula and Tchernaya rivers, is a large, busy, and manufacturing town. It has 31,000 inhabitants, 28 churches, two monasteries, with a seminary and a gymnasium, 17 poorhouses, a theatre, a founding hospital, and a house of correction: there is likewise an institution for the education of the children of the nobles families. The manufacture of arms is the most extensive and important in the Russian empire. It was founded by Peter the Great in 1712, and belongs to the crown. It employs above 7000 workmen, of whom 600 are smiths; has two iron-foundries, and provides the whole army with arms, producing annually 70,000 muskets and 25,000 side-arms, which of excellent quality and beautiful workmanship; cutlery of various kinds is also manufactured, a soap manufactuary, a soap manufactory, and some breweries. Odjow, on the Opa, has seven churches and 3300 inhabitants, who derive subsistence from agriculture, mechanical trades, and a considerable commerce in hemp and corn with Kaluga. Jeremow, on the Metscha, has six churches built of wood and one of stone. Most of the houses are thatched with straw. The inhabitants, 3000 in number, chiefly subsist by agriculture. The above are the only chief towns of circles that require any special notice.

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TULIP-TREE, the English name of the Lilium-flavus tulipifera, a tree belonging to the natural order Magnoliaceae; where it is native, it is also known by the names White wood, Canoe wood, Saddle-tree, Tulip-bearing Lily-tree, Virginia Poplar, and Tulip-tree. The name Lilium-flavus is formed from leonion (lily), and dentrun (dipylon), a tree; the flowers re-
TULIPE [TULipa]

TULIPA, a genus of plants belonging to the natural order Liliaceae. This name is a corruption of the Persian word thelasbim, or tolan, which is the name the plants of its genus is cultivated in Persia, and the word also bears a suffixed form, and was probably applied to the tulip on account of the resemblance between the form of the flower and that of article of dress. The genus is known by a perianth being composed of six sepals. The stigma is three, and the style is curved, smooth, and it has neither nemor nor style. All the species are herbaceous, developing from a bulb; the flowers are mostly solitary, seated on a lengthened scape, at the base of which, leaves, not numerous, are developed. About thirty species have been observed by the same

Tulipa, the Wild Tulip, has the stem 1-flowered, somewhat drooping; the leaves of the perianth ovoid-marginate, hairy at the extremity, the stamens hairy at the base; the style is curved. Among the only species is a native of Great Britain. In England it occurs in the counties of Norfolk, Suffolk, Hertfordshire, and Middlesex, in a clay soil. It has also been found in Scotland. It is found in the southern parts of Germany, in Switzerland, Asia, and France. In France it is known as Yellow flowered tulip, flowering in the firsthalf of May. It increases itself by throwing out a long stout flower from its root, at the extremity of which a bulb is developed, and thus a new individual is produced at a considerable distance from the parent plant.

T. Oculus Solis, the Agen Tulip, has a 1-flowered, brous stem; oblongo-lanceolate leaves; the stem smooth; the exterior leaves of the perianth acuminate, the interior obtuse. This species is also known as Linnæus, and it was first distinguished by Sibthorp. It was found at Agen in France, and also grows wild in Italy, Germany, and other parts of Europe. The flowers are large and bell-shaped, of a fine scarlet-red colour, each petal is edged with a crimson-lined spot at the base. It blossoms in April and May.

T. subovata, the Early Dwarf or Van Thol tulip, has the stem single-flowered, downy; the flower erect, the leaves lanceolate; the perianth almost globose, ovoido-lanceolate. This plant is supposed to be a native of the south of Europe. It blooms in March and April, and is cultivated in Holland under the name of Duct Van Thol. The flowers are of a scarlet colour, edged with yellow, and give out a sweet scent, for which this plant is more cultivated than on account of the colour or form of its flower. The plants are small, and if cultivated in a room, or other water, may be made to blossom as early as January. It is also found in Spain.

T. Celosiana, Small Yellow Tulip, has a solitary, more erect, flower; the leaves of the stem lanceolate; leaves of perianth greenish, lanceolate; the stamens slightly hairy above the base. This plant blooms in March or April, and is a native of the south of Europe, and of the banks of the Wolga. It was known to Clusius, Bauhin, Marsol, and Tournefort, but Linnæus confounded it with the wild tulip. It is not however more than half the size of the Tulip; it has also been described as T. gynagyna. It was cultivated in France, and was restored amongst the number of species of the tulip by Redouté, who has figured it in his splendid work on the Liliaceae.

T. acuminata. The Indifferent Tulip, has a smooth 1-flowered stem; the leaves of the stem lanceolate; leaves of perianth acuminate. Redouté restored this species as the last, and figured it in his work. It was at one time supposed to be a Persian plant, but it has been found wild near Toulon in France, and also in East Turkestan.

T. bifors, the Two-flowered Yellow Tulip, has a stem bearing two or three flowers with two spreading lanceolate leaves. This plant is a native of the salt deserts about the Wolga, and is found in company with T. celosiana. It is not more than half the size of that plant; and blooms earlier, and has less duration. The flowers are fragrant.

T. Cerníssima. Common Garden Tulip, has the stem 1-flowered and smooth, as well as the petals and stamens; the leaves lanceolate, glaucous and smooth; the lobes of the stigma deciduous and deeply divided. Of all the species of tulip this one is the best known, and has perhaps had more attention devoted upon it than any other plant possessing only one flower. This species of tulip grows wild in the Levant, and appears to have been cultivated by the Turks in their gardens from an early period. Buchenau, who was the first to cultivate this plant in Europe, found it on the island of Adrianopec and Constantinople; and Shaw found it in Syria between Jaffa and Ramah, and at Chardin.
which were cultivated in Constantinople were brought from Caivala and Caffa; the former being early-flowering sorts, and the latter late-flowering. Busbequius brought bulbs with him from Constantinople, for which he says he paid 150 ducats per pound, and grew them in his garden at length as far as 1551. Corda, in his great book on the tulip, which he did in 1559, in his edition of the works of Valerius Cordus, from some tulips he had seen blooming in a garden at Augsburg. It seems to have been introduced into England about 1727, for Gerarde, in his Herball, published in 1597, has the following account of the tulip:

"My loving friend, Master James Garrett, a curious sort of man, had many of them and they have recovered the country in London, but he undertook to find out, if it were possible, the infinite sorts by diligent sowing of their seeds, and by planting those of his own propagation and by others received from his friends beyond the seas for the space of twenty years, not being yet able to attain to the end of his task. For though in that new year brings forth new plants of sundry colours not before seen; all which to describe particularly would roll Sisyphe's stone, or number the sands."

The tulip was first introduced into France in 1611. It does not appear at what time it was first carried to Holland, but the Dutch were early in the habit of sending to Constantinople for tulip-seeds. It was in this country that the tulipomania took place. In the early part of the seventeenth century the passion for the possession of these plants became so strong, that dealing in them became one of the most important money speculations, and the bulbs of tulips were sold and resold at enormous prices, in the same manner as they were on the Stock Exchange of England. It became in fact a gambling transaction, in which persons ventured their capital, in the hope that particular kinds of tulips would realise a higher price. This practice was not carried on throughout Europe, but was confined to the Netherlands, and rose to its greatest height in the years 1634, 1635, 1636, 1637. Beckmann, in his History of Inventions, gives an account of this remarkable transaction, as it was called. One variety of tulip, called the Viceroy, was exchanged for articles valued at 2500 florins.

"These tulips," says Beckmann, "were sold according to the weight of the roots. Four hundred perls (a sort weighing nearly a grain) of Admiral Lefkken cost 4400 florins; 446 ditto of Admiral van der Eiyk, 1020 florins; 100 perls Schilder, cost 1015 florins; 200 ditto Semper Augustus, 9500 florins; 410 ditto Viceroy, 3000 florins." The species Semper Augustus has been often sold for 2000 florins; and it once happened that there were only two roots of it to be had, the one at Amsterdam, the other at Haarlem. For a root of this species one agreed to give 4000 florins, together with a new carriage, two grey horses and a red horse, a coachman and a wager agreed to cover twelve acres of land for a root. Those who had not ready money promised their moveable and immovable goods, house and lands, cattle, and clothes. Munting mentions a man who was so much in love with tulips "that if I were not tied up for four months, it was followed not only by mercantile people, but also by the noble men, citizens of every description, mechanics, seamen, farmers, tur-diggers, chimney-sweeps, footmen, maid-servants, and old clothes-women. At first every one won and no one lost. Some of the poorest people gained in a few months houses, coaches and horses, and figured away like the first characters in the land. In every town some tavern was selected where the highest prices were asked for the bulbs, and confirmed their bargains with the most sumptuous entertainments. They formed laws for themselves, and had notaries and clerks. But the object of these speculations was not a desire to possess the plants themselves, although the first purchasers were prompted by that feeling. During the time of the tulipomania, a speculative offer often offered and paid large sums for a root which he never received, and many of these speculations are found in the history of the Dutch who have not one. Before the tulip season was over more roots were sold and purchased, bought and promised to be delivered, than in all probability were to be found in the gardens of Holland; and when Semper Augustus was not to be had, which happened twice, no species perhaps was often purchased and sold. In the space of three years, as Munting tells in, more than 10,000,000 florins were expended in this trade, besides nothing more than gaming on a large scale, and although all seemed to gain at first, the time soon came when the tulip purchasers failed to meet the demands made upon them, and as many became ruined as had previously made their fortunes. The Dutch government found it necessary to interfere, and on the 10th December 1637, decreed that every vender should offer his tulips to the purchaser, and in case he refused to receive them, the vender should either keep them or sell them to another vender. The purchaser was also ordered to give the tulip by florists as essential to the character of a fine tulip.

The stem should be strong, elastic, and erect, and about 30 inches above the surface of the bed. The flowers should be of a size and form suitable to the kind of art, and composed of a number of petals, the flowers of these should proceed a little horizontally at first, and then turn upward, forming almost a perfect cup, with a round bottom, rather widest at the top. The three exterior petals should be rather larger than the three interior ones, and broader at their base; all the petals should have perfectly entire edges, free from notch or serrature; the top of each should be broad and well-rounded; the ground colour of the flower, at the bottom of the cup, should be clear white or yellow, and the outer or rich-coloured petals, never more than half of the main or principal ornament of a fine tulip, should be regular, bold, and distinct on the margin, and in fine broken points elegantly feathered or pencilled. The centre of each leaf or petal should contain one or more bold blotches or stripes, intermixed with small portions of the original or breeder colour, abruptly broken into many irregular obtuse points. (Cyc. of Gard.)

The varieties of cultivated tulips have been divided by florists in many ways for the sake of convenience. Parkinson, who wrote in 1629, enumerates 140 varieties, which were divided into prococes, early bloomers; sectores, late bloomers; and tuber medio, doubtful or middle bloomers. The first division was subdivided into tulips variegatus, and tulips unvariegatus. The latter divisions were chiefly composed of varieties of T. Canariensia. Amongst modern florists in Great Britain, the varieties of the latter tulip, of which upwards of 600 are enumerated in modern catalogues, are divided into four families—Bizarres, Byblemens, Roses, and Se fs.

Bizarre tulips have a yellow ground marked with purple or scarlet of different shades. Byblemens tulips have a white ground, lined, marked, striped, or variegated with violet or purple only of various shades. Rose tulips are marked or variegated with rose, scarlet, crimson, or cherry colour on a white ground. Selfs, or plain-coloured tulips, are those which are wholly of one colour or many marks. The three first of these families are again divided into feathered and flamed, according as the intermingled colours are in narrow stripes or pencillings, or in a broad central stripe. There remain, amongst the last family of tulips, the Selfs, that are called breeders are selected. In a state of nature the tulip is mostly a self, that is, it has but one colour; but under certain circumstances all the other colours will be developed, as a bee to the number of varieties of these flowers which may be obtained. Se f are always raised from seeds, but the circumstances which are most favourable to the breeding of the Selfs, as the
development of other colours is called, are not well understood.

A florist will have to wait sometimes twenty years without having the pleasure of seeing his self break; a flower of the colour of which the tulip is susceptible, requires the greatest care in its cultivation, and perhaps it is only amongst the amateurs of Holland and Belgium that this flower can be seen in all its glory. Tulips are mostly planted in beds, which should have the hard earthy bed filled for the bed for the bed should be dug out for about 20 inches deep, and the bed filled in with a mixture of about two parts of a fresh, rich, loamy soil, rather of a sandy character, and one part of well rotted cow-dung, and the bed in decayed by the cultivation of the same from the end of October to about the tenth of November. They should be planted about seven inches apart and about four inches deep, or less according to their size, in the middle of March will any of the blossoms in April or May. The bed of flowers is often protected by an awning, which should not be used till the flowers are opened, and should be so constructed that the light and air may be freely admitted during the intervals between the coolness of the night and the brightness of the sun at noonday. Tulips should never be artificially watered. When the petals fall off, the seed- vessel should be removed, as its remaining on weakens the bulb. When the flower has disappeared, and the leaves become brown, the bulls should be taken up and placed in a dry situation. In the following August or September the seed skins and fibres and the easily separable or were removed off the bulb should be washed and the deposited in drawers. In propagating the tulip from seeds they should be sown in deep boxes, filled with good garden-mould mixed with sand. The young plants will not require any water, as they may be expected to blossom by the fourth or fifth year, or at least the seventh.

(Polystichum; Polygonaria.)

TULIPARIA. [Sectularia; Polygonaria.]

TULIPOMANIA. [Tulipa.]

The gentleman of moderate fortune, who lived in the beginning of the last century, and zealously devoted a great part of his life to the improvement of agriculture. He possessed a small estate near Hungerford, on the borders of Oxfordshire and Berkshire, and has generally been considered as the father of the drill and horse-hoeing husbandry. Having observed the good effects of the cultivation of many plants in regular rows, and of frequently stirring the intervals between them, as has been done already mentioned by gardens, he introduced this system into the field, and invented many ingenious implements for diminishing the labour of hand-drilling and hoeing. The success which attended his first experiment on a deep loam, confirmed his expectations, and led him to a theory, which was the cause of his own ultimate ruin, and threw discredit on the whole system, which in other respects was founded on sound principles. Observing that, by means of assiduous cultivation and stirring of the soil around the roots of growing plants, he produced a greater luxuriance of growth than by the common methods, without any addition of manure for several years, he concluded really that the earths very finely divided, and the moisture, constituting the finest of the food of plants, and that, consequently, stirring and pulverizing the soil was a complete substitute for manuring. Having fully established this erroneous principle in his own mind, he exerted all his ingenuity to effect the most complete pulverization of the soil. In the first place, all the seeds were to be sown in rows at such a distance that a plough or other stirring-instrument drawn by a horse might conveniently be used in the intervals. From this circumstance the system was called the horse-hoeing husbandry. The immense advantage which would arise from the cultivation of waste lands in distant parts of the kingdom, if the increased labour of men and horses were a perfect substitute for manure, which wasprocured, made many clever men look upon Tull's system as a most wonderful discovery; and the first trials appeared to be so successful, that the new husbandry, as it was called, was strongly recommended for general adoption. The great reluctance with which any new system is adopted by the mass of practical farmers prevented the new husbandry from becoming universal; and only some men of a theoretical turn fully adopted the notions of Tull. All those in experiments in this theory, neglecting to recruit their lands by a judicious addition of manure, found to their cost that, however good crops they might have for a time, by continually stirring and pulverizing the soil, it became totally exhausted at last, and practically proved to be without interest. In the end of the system of manuring, and was the cause of serious ultimate loss. Tull himself, who adhered to his principles to the last, like most original inventors, and expended years in propagating the cultivation of a variety of new and ingenious implements, became so embarrassed that he lost all his property, and it is said, died in prison, where he had been put by some mistake in an old and unmeritorious, and called the "Society of the Library of Useful Knowledge," published by the Society for the Diffusion of Useful Knowledge."

The unhappy fate of the author of the system, and the loss sustained by its principal abettors, threw such a discredit upon it, that for a long time not even the most useful part of it was retained. Had Tull introduced the row culture, as it is practised in Lombardy, from which he borrowed some of his principal operations, and joined judicious manuring to it he would have been a man who had the merit of originating, in England, at least, the greatly improved system of drill-husbandry which has since been generally adopted wherever it can be conveniently applied. At all events, the system of Tull would have long since been confined to artificial grasses, which, being intended for pasture, cannot grow too closely together. The cleansing of the soil from weeds, and the exposure of a great part of the surface to the influence of the atmosphere, would have entirely superseded fallowing, and in this case a proper application of manure would have kept up the fertility.

Tull published a treatise on his new mode of cultivation in 1731 in which he principally expounded and calcuated made, founded on his early experiments of the immense profit which would accrue in the course of years by adopting his practice. Change of crops would be of longer interest; rotations useless; the most profitable crops could be raised year after year without diminishing, and the soil be kept in a state of perpetual fertility. Such were the visions of a man of considerable abilities, led by error of his own sanguine imagination. Had the soil Tull's farm been of a noteworthly nature, he would soon have discovered his error by a few experiments, but working on a good deep loam, and continually keeping it stirred and pulverized, it required a much longer time to discover the error, but he attempted it was completely exhausted, and the owner was ruined.

The fate of Tull and his system may be a warning to those who are fond of building ingenious theories on a few imperfect experiments, and a caution to wait till the facts are fully published before they draw practical conclusions from them.

Jethro Tull first published, in 1731, detached essays on his new mode of cultivation, which were afterwards, in 1733-4, collected into one volume, with copious notes by himself. In 1822 the late Mr. Cobbett edited a new edition of Tull's works, with an introduction by himself, which, by the same perspicuous and that perspicuous writer, is full of useful remarks. Cobbett fully shows how Tull's practical part of Tull's system, and strongly recommended it in his "Cottage Economy." He showed there, by reference to actual experiments in a garden, how greatly the stirring of the soil around the roots of growing plants assisted its growth, and the advantage of allowing a certain space to every plant to admit of this stirring. Tull had cultivated roots with great success according to his system; and as every the common matter in the soil was exhausted, the success fully proved the correctness of his principles. The greatest obstacle which Tull had to contend with was the obstinacy of his labourers, who thought him quite mad when he ordered them to sow only two rows ten inches apart on each land four feet diameter, by forty-four inches between each double row of the working of the plough. He was forced to put his hand to the plough himself, and in this as well as in his other trials he was greatly assisted by the encouragement and actual help.
of Lord Ducie of Moreton, whose descendant, the earl of Ducie, is now one of the most zealous and active patrons of all improvements in agriculture, having established a model farm at Whitfield, Gloucestershire, and invented several useful implements of tillage. Whatever may be the preceding instructions of the erroneous theory, he has many excuses in the received opinions of his time. Van Helmont's experiment of the willow prepared the minds of scientific men for the theory that the vital principle consists of the purpose of the generation; and Tall seems to have supposed some _pabulum_ in the ultimate particles of earth, which with water furnishes all that the soil requires to produce active vegetation; and when we consider that by the most recent experiments the decay of a manure composed of four gases—oxygen, hydrogen, carbonic acid, and azote or nitrogen—with a very small proportion of earth, form the whole elements of vegetable and animal substances, it is not so great an error to suppose that water, earth, and which contain all these elements, may be sufficient for vegetable or animal increase. This was the whole error of Tall.

**TULLAMORE, or TULLAMOORE, a town in the barony of Ballycowan, in King's County, in the province of Leinster, Ireland, 165 miles by south of Dublin, in 53° 15' N. lat. and 7° 28' W. long.**

No historical interest attaches to this place, which, before 1798, when it was nearly destroyed by fire, was an insignificant place and inhabited by the earl of Charleville, after the confiscation, in a superior manner, and being in the centre of a fertile district, it rose in importance; and the circumstance that the Grand Canal for some time had its terminus here, before it was carried on to the Shannon, promoted the growth of prosperity of the place. Tullamore contained, in 1831, 1652 houses, inhabited by 1314 families, 45 houses uninhabited, and 14 houses building; the population was 6342.

There is a neat market-house, a handsome county court-house, and a county gaol on the radiating principle; a small barracks for the military, and a police-station. There is a bridge over the little river Clodagh, which passes through the town and into a coal-carry, into which there are several stores on the Grand Canal, which passes the town on the north side, and opens a communication with Dublin on the east, and with Limerick and other places on the Shannon on the west. The town is in the parish of Kilbirke (the whole population of which, in 1831, was 9673); the parish church, in which divine service is performed on Sunday and Wednesday morning, is at some distance from the town; but divine service is performed on Sunday evening and on Monday evenings. There are a Roman Catholic chapel in Tullamore, and there are in the parish meeting-houses for Quakers and Wesleyan and Primitive Methodists. The town of Charleville has a capacious mansion, and an extensive and beautiful demesne, which is very high and level.

The market is held on Tuesday and Saturday: it is the greatest market in the county for grain; the average yearly sale for the ten years from 1826 to 1835 was estimated at 45,000 barrels of wheat, of 20 stones to the barrel; 35,000 barrels of oats, of 14 stones to the barrel; 20,000 barrels of barley, of 16 stones to the barrel. There are five yearly fairs. Brick-making, distilling, and brewing are carried on.

The assizes for the county are held here, having been transferred from Philipstown by an act of 2 & 3 Wm. IV., c. 60. Quarter-sessions for the division are also held here. Tullamore is the residence of the sub-inspector of the county constabulary. The county infirmary is in the town.

The benefice of Kilbride is a rectory, the gross yearly income of which is 1450l. 8s. 4d., the net yearly income 1175l. 4s. 11d., with a glebe-house. The parish is in the diocese of Meath, and in the ecclesiastical province of Armagh.

There were in Kilbride parish, according to the Second Report of the Commissioners of Public Instruction (Parl. Papers for 1833, vol. xxxiv.), twenty-day schools of all kinds, with 1406 children (737 boys and 669 girls) on the books, and with an average daily attendance of from 900 to 950. Of these schools, two, with an average attendance of 160 children each, are in a new building. The whole detail of the war cannot be regarded as historical, and has all the appearance of a poetical tradition. It is said to have arisen from predatory incursions which the Albanians made into the territory of the Romans. The most memorable event of his reign is the war with Alba, which is celebrated in ancient story on account of the single combat between the Horatii and Curialti, and which was followed by the destruction of Alba, and the edifices and public buildings of the Albanians. The whole detail of the war cannot be regarded as historical, and has all the appearance of a poetical tradition. It is said to have arisen from predatory incursions which the Albanians made into the territory of the Romans. There existed a friendly relation between the two towns before is implied in the statement that the Horatii and Curialti were

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related; and even now war might have been avoided, if it had not been for the cunning and the warlike character of Tullus, who forced the Albans to abandon Rome, and the trench which their king (dictator) Cetrius is said to have formed was the beginning of the Fossa Cluhia. He died during this invasion, and was succeeded by the dictator Mettus Tufetius. The hostilities, however, were renewed again after another long time, when at last the Alban dictator proposed that the war should be decided by a single combat. The fight of the Horatii and Curiti was accordingly brought to the war to a close, and the northward fell the supremacy of Rome, and promised to furnish its contingent to the Roman armies. The formula of the Fetal law, and the trial of one of the Horatii for having slain his sister, contain some genuine and important documents of the olden time of Rome. (How the war of the Albans was ceased by the treaty of Fidenae, which was supported by Veii, Mettus Tufetius, according to the treaty between the two states, had the Roman army with his troops, but with the design of abandoning his city, and going over to the enemy at the critical moment. Tullus Hostilus discovered the treachery, and after the Fidenates and Veientines were vanquished, he punished the treacherous dictator, by having him torn in pieces by two chariots to which he was fastened, and at the same time ordered out his army to destroy the town of Alba, which, with the exception of its temples, was accordingly razed to the ground. The inhabitants of Alba were transferred to Rome, where the Curiti had been transferred to Tumrek. Several of the noble Alban families were incorporated with the Roman patricians, and the number of Roman equites was likewise doubled, while the great mass of the Albans, who had been executed or forced to renounce their religion, were permitted to form the Roman plebs. (Rome.) When Tullus Hostilus had thus strengthened his kingdom, a war arose between the Romans and the Sabines, in which the Sabines were defeated near the Sillisseta. But after these events, the gods afflicted Rome with an pestilence, which was preceded by several awful prodigies. The king however continued his warlike pursuits, until at last he was seized with the disease. In order to propitiate the gods, he consulted the Collati or Numa, which contained rules about the manner in which the wrath of the gods was to be appeased. He found the formula with which Numa had performed his solemn sacrifices to Jupiter Elicius. Tullus Hostilus attempted to do the same, and to call down the god, but he committed a mistake in his use of the sacred formula, and the god in his anger destroyed the king and his whole house by lightning.

The story of Tullus Hostilus as related by Livy (i. 22-23), which bears much more traces of a genuine tradition than the detailed and interpolated account in Dionysius (iii. i., &c.), respecting explanations of the story, see supra, Hist. of Rome, 1. 216, &c.; Maldon, Hist. of Rome, p. 137, &c.

TUMBRIL, or TUMBRIL, a machine formerly used for the punishment of scolding women, consisting of a stool or chair attached to the end of a long pole, mounted in such a manner that the chair, with the offender placed in it, might be swung over a pond, and immersed as often as might be necessary. Several notices of the use of this apparatus, which was also called a trebuchet, a cucking-stool, or a ducking-stool, are given in Brand's 'Dictionary of Antiquities,' art. 'Cucking-stool.' It appears to have been used as early as the era of the Saxon government in England, and to have been a common punishment in some places at that time as the time of Guy, who mentions it in his 'Pastoral.' The term was formerly used as a punishment for brewers and bakers who transgressed the laws relating to them. Fabian (quoted in Strutt's 'Horda Angel-Cymman,' vol. ii., p. 9) says that, in the 12th year of Edward II., one baker, for 'taking an oaten bread to the market,' was cast into a cucking-stool. Other cases are recorded and many cases used to carry tools, &c. in a train of artillery.

TUMEN, TUMEN, or JEPANTSCHA, the chief town of a district of the same name in the government of Tobolak in Asiatic Russia, is remarkable as being the first town founded by the Russians in Siberia. It was built in 1586, on the site of a Tartar town, of which some traces still remain. It is situated in 67° 10' N. lat. and 63° 35' E. long., on the margin of the 60th parallel of latitude. The river Tumen is much higher than the left bank, at its confluence with the Tumenk. The town is of considerable extent, chiefly consisting of wooden houses, above which some stone buildings rise, as well as the steeples of several churches, which are generally built of stone. The environs consist of corn-fields and meadows. The number of inhabitants is above 6000, of whom 600 are Tartars. The banks of the Tuma are interesting on account of the tree of the district, which is found not only at Tumen, but farther up the river, and which are in such a good state of preservation, that cobs and other articles are made from them. Erman says that on the banks of the Swaragach, a small river, not only teeth, but also bones of elephants are found, and those of buffaloes.

(Canabich, Lehrbuch; Stein, Lexicon; Stein, Handbuch, &c. by Hirschelmann, A. von Humboldt, G. Ehrenberg, &c. Rose, Reise nach dem Ural und dem Altai; Erman, Reise durch Nord Asien, &c.)

TUMOUR. It is not possible to define exactly the diseases which are commonly classed under the name of Tumour; and any definition which the character of the term Tumour (tumulus, which in the meaning of tumouring Olaus is included) is unnatural: for there are several diseases which agree in the most important respects with some of those called tumours, but are not attended by any obvious enlargement of the parts. The habit is the same, but the causes and the same disease exists in some cases with, and in others without, swelling. The greater part of the diseases which have been classed as tumours are examples of a large number of very varied growths; diseased structures, which are not mere enlargements of previously existing parts, but new organisms or living substances which have grown within the tissues of the body by powers of development peculiar to themselves. It is only the case of those which depend on the supply of blood or other nutritive fluid. In this class are included all those diseases described as solid or sarcomatous tumours, and those which are closely related to some kinds of tumours, but are not accompanied by swelling; such as tubercle, certain forms of diffuse malignant growths, and some others.

The diseases called Encysted Tumours are entirely different from all others of the class in their pathological characters, and will be considered in a separate article. [WEN.] The chief cancerous growths have been already treated of under their appropriate heading (Cancer, Malignous); and tuberculous growths under the name of Tubercle. Their distinction is consequently omitted. (Pathris.) The present article will be chiefly devoted to the history of those morbid growths which are commonly described as innocent tumours.

All such morbid growths may be divided into malignant and innocent. The practical distinction between the two classes, from which they derive their names, is that innocent growth or tumour is not likely to recur after being removed by operation, but a malignant growth is likely to recur in the same or in some other part. There are names may be safely retained to mark the two chief divisions of morbid growths; for although the test of the result of a surgical operation cannot be applied to those which from their locality do not admit of an extirpation, yet the names indicate important characteristics in the progress of the two kinds of growth, wherever seated. Indepedently of the practical distinction, the most essential characteristics of malignant growths are: 1. That they may recur or spread by the body, although some parts are more liable than others, and each kind of growth seems to find its most appropriate seat in a certain organ, as cancer in the breast, tubercle in the lungs, melanoma in the skin, &c. 2. Some of the parts adjacent to the growth are involved in it, and to propagate themselves from one part to another, probably by means from the primary disease into the blood, with which they circulate till they meet with an organ in a fit state to supply them with the means of increasing. 3. That the middle process of softening (which appears to be consequent on the death of their constituent particles); towards ulceration; that this ulceration is a kind which is at present incurable; and that in its progress it involves
almost without distinction of tissue all the adjacent natural structures of the body, the particles of which, by their contact or combination with a malignant growth, seem first to assume a nature similar to their nature, and then to perish with them. 4. That in general the minute structures of which they are composed are disposed in the same manner, and in the same order, as those parts, and that their development does not proceed to the formation of any structure similar to the fully developed tissues.

The distinctive characters of innocent growths are chiefly negative. Certain of them may present one, but they rarely present more than one, and never all, of the characters just described. Thus: 1. The number of tissues in which innocent growths occur is comparatively few: in many, it is generally found that the growths are not seen; and when, as sometimes happens, many innocent tumours exist in the same body, they are (at least as a general rule) found in the same tissue, or in or near the same organ. Thus, many fatty tumours may grow at the same time, but they all lie in the tissue of the natural fat; many fibrous tumours may occur together, but all are in or near the uterine. On the contrary, when many innocent growths co-exist, they are commonly found in many different tissues. Indeed, it is one of the distinguishing characters of the innocent growths, they are not further altered than in consequence of the pressure and the inflammation which the growth excites; neither is there any evidence that such growths can, or that they are capable of becoming, different kinds of growths. Innocent growths have no natural tendency to ulcerate or slough; those changes happen to them only in the same manner and under the same circumstances as to the natural tissue of which they are composed. In other words, they have no more tendency than the natural tissue: and the same conditions have to involve the adjacent parts in their destruction. 4. The tissue of an innocent growth is in general similar to that of some natural and fully-developed tissue of the body.

The class of innocent growths includes most of those to which the name of Sarcoma is now generally given. Their appearances are so various, that the most practised microscopist is often at a loss to meet with examples which they cannot certainly refer to any described variety; yet there are some well-characterised forms, within the descriptions of which may be included a great majority of those which occur in the human body—and those we shall describe under the names of the Fatty Tumour, or Growth; the Cellular; the Fibrous, or Tendinous; the Cartilaginous; the Osseous; the Fibro-cartilaginous.

The Fatty or Adipose Tumour, to which the name of Tumour, or Growth, unless it be the case of two or more tumours occurring in the human body, and, happily, the most innocent, and the most usually capable of remedy by extrusion. Its general seat is in the subcutaneous cavity of the body, the fibrillary fibers are much increased by the growth, and then have a more compact structure and more intimate connection with the surrounding parts. It usually occurs singly, but sometimes twenty or more of various small sizes are seen in the same person. Its elementary tissue is exactly like that of the fat in which it lies, but from which it is separated by a layer of compact cellular tissue, and is generally distinguished by the smallness and distinctness of the lobes composing it. Its blood-vessels are few and of small size, and usually enter it at its base, where it is more closely than elsewhere connected with the adjacent tissues. It is insensible, and commonly grows very slowly, without producing pain, or any other inconvenience than is due to its weight or its pressure on adjacent parts. When left to itself, the adipose tumour may grow to an enormous size. Mr. Copeeland removed one weighing 22 lbs.; Sir Astley Cooper, one of 37 lbs., 10 oz.; and M. Daguin of Morlaix, one weighing 46 lbs. 4 oz. 12 drachms. The size of the wound necessarily made in the removal of tumours of such magnitude renders the operation somewhat dangerous; but, except for this circumstance, the extirpation of fatty tumours may usually be performed with ease or both hands. When the parts are not removed, they are apt, through the dissection and thinning of the skin over them, to give rise to ulceration and other more painful affections.

The Cellular Tumour, which derives its name from the similarity of its tissue to that of the common cellular tissue of the body, is a very rare disease. It is composed of a compact substance, infiltrated by a scrous or gelatineous fluid, and may attain a great size. Mr. Lawrence, in his "Lectures on Surgery," has described an example yet known of it; perhaps also the disease which Mr. Abernethy, in his "Classification of Tumours," named Common or Vascular Sarcoma, was of this kind. But, although this form of tumour: the great enlargements of the skin or of the flesh by some to be of the same nature, are widely different from it.

The Fibrous or Tendinous Tumour, the fleshy tubercle of Dr. Baillie, is a very frequent and well-known growth. Its ordinary, perhaps its only, seat is in the walls or in the neighbourhood of the uterus. Its natural form is almost exactly globular, but when it hangs in a dependent position, it generally becomes somewhat flattened, and this gives the same microscopic character as that of the natural fibrous and tenacious tissues, and is equally little vascular. Its section presents a very compact and firm semi-transparent basis, invested by numerous shining, tough, fibrous fasciculi, arranged sometimes in rays proceeding from its centre, but more frequently in irregularly arched and undulating lines. It grows slowly, and at first without pain: but when it has attained a size it usually excites painful sensations, either when it is moved, or when the pressure to which it is subjected results in the tumour increasing to a size as to form masses nearly a foot in diameter, and in this case they usually end fatally by their pressure on important organs, or by hemorrhage when they project externally; or, advanced stages of their growth, or at any time when they can increase in size and stretch the tissues surrounding it, its basis of attachment becomes narrower and forms a mere pedicle; and cases are recorded in which at the last this pedicle has by some accident been broken through, and the tumour has fallen loose into the abdominal cavity. By a similar process of growth it increases—often very much—in the superficial surface of the uterus, it gradually projects into the cavity; and in this case, when its basis of attachment has become narrow, it forms the most frequent kind of polypi of the uterine opening. In this case the tumour may be removed by cutting through the narrow neck by which it is attached to the uterus with either the knife or the ligature; and cases sometimes happen in which the neck of the polypus becoming very narrow, is broken through by the uterus forcibly contracting, and the whole mass is safely expelled. When however the growth of a fibrous tumour commences in or near the middle substance of the wall of the uterus, neither of these events can happen; and it is in these cases that the tumours attain their greatest dimensions.

The Cartilaginous Tumour is that which has been named chondroid or cartilaginous sarcoma: it is the enchondroma of Müller, and one of the numerous forms of growth which have been hitherto described under the name osteo-sarcoma. Its usual and perhaps its only place of growth is within or upon the bones, and it occurs in connection with the bones of the fingers and the last phalanges of the toes, appearing more frequently than in any other part. It grows slowly and usually without any pain, and may continue to increase for thirty or more years. It is most commonly isolated, but sometimes two or more tumours of the same kind occur on the same bone or both hands. The most usual form of the cartilaginous tumour is globular, with an irregular nodulated surface, and a section shows that it is composed of numerous round masses of a greyish-white semi-transparent substance, closely resembling the cartilage skeletons of cartilaginous fishes, and presenting all the microscopic characters of ordinary cartilage.
component masses, which are especially obvious when the tumour is large, vary in size from two lines to half an inch in diameter, and in different specimens vary much in consistence; they are held together by portions of tough fibrous tissue in which blood-vessels run, but are themselves little, if at all, vascular, before the process of ossification has commenced in them.

When a cartilaginous tumour begins to grow within a bone, the disease commences by its eruption through the surrounding osseous tissue, and may expand the shaft, so that the bone at last forms an osseous shell around it. Müller regards this as the most usual mode of growth, but it is certainly very rare. In few cases in which the cartilaginous growth commences within a bone, it appears most frequently to make its way through an aperture produced by ulceration in the wall, and then to increase externally to the shaft. But its more common original seat is on the exterior of a bone, either within or external to the periosteum; and it does not become intimately connected with the bone till its base of attachment has become osseous, and has ossified with the similar tissue of the bone on which it rests. The ossification of a cartilaginous tumour (a change which Müller has entirely overlooked) is a process exactly similar to that of the ossification of the natural bone. It may commence in any part of the tumour, and simultaneously in several unconnected points; but it usually begins and makes most rapid progress at the part where the tumour is connected with the bone. As this part ossifies it unites with the wall of the bone, which at the same time loses its compactness and, as it were, becomes cartilaginous tissue, like that into which the tumour is changed; and at the last, the osseous tissue of the tumour and that of the bone on which it is seated become exactly continuous, so that the tumour seems to have been from its origin, and to have grown from, and not into, the interior of the bone. In general the circumference of the tumour remains cartilaginous for some time after the ossification of its base; but at last also examples of what may be usually covered by a thin layer of compact osseous tissue, which encloses the tumour, into which all the internal part of the tumour has been converted, and becomes continuous with the outer layers of the adjacent healthy part of the bone on which it is seated. After its complete ossification the tumour may still continue to grow; but if it do, it is only as a natural bone grows, by the enlargement of its interior and the formation of concentric layers of compact bone around it; it never presents any external layer of cartilage after its surface has once been completely closed in by bone, nor does its external layer often become much thicker.

The cartilaginous tumour may grow to an enormous size. An instance is related by the College of Surgeons, which had almost completely ossified, measures 12 inches in diameter, and is situated on the upper part of the tibia. But even in the most advanced states they may be removed by the amputation of the part on which they are situated, without fear of return, and this is a circumstance which is always with advantage to be considered: for besides the inconvenience produced by their weight and pressure on adjacent parts, large cartilaginous or osseous tumours are apt to produce ulceration and sloughing by their attrition of the skin which covers them.

The greater number of those called Osseous Tumours, or osseous exostoses, are only ossified cartilaginous tumours,—examples may be called the second stage of the disease last described. It is doubtless impossible whether the tumour possessing the true osseous microscopic structure is formed except through a preceding cartilaginous state. Many other kinds of tumours connected with bones are incorrectly called osseous or osteo-sarcomatous. Such are those associated with medullary or soft cancerous diseases, of which some are only the osseous skeletons upon which the malignant disease was fixed; others are the remains of the osseous tissue disfigured and changed by the growth of the malignant disease in the interstices of its osseous growth. And again, other hard tumours connected with bones result from what should be called the calcification rather than the osseous sort of growth; for in these there is no earthy matter is deposited in the bone, and they never acquire the structure of true bone. Most or all of these calcified tumours are of a malignant nature.

Mr. Hunter had amputated the patient's leg. cartilaginous masses, similar to that which had formed within and around the femur, were developed within the lungs and upon the ribs.

The history of the Fibro-cartilaginous Tumour is as yet more imperfect than that of any of the preceding, except the cellular. It is most frequently, or always, connected with the bones, and is most commonly met with upon the tibia and femur, from the parts external to the periosteum. It has usually a round or oval form, and its surface is less deeply indurated than that of the cartilaginous tumour. It may attain a great size, and common lead to sloughing of the outer surface of the tumour over it. Its cause is unknown. It is composed of a very firm, compact, pale, whitish or yellowish, aluminous tisssue, in which small spicula of bone are often scattered, but which does not become truly or entirely osseous. It may grow in any bone, but more usually it occurs about the exterior: in the former case it generally expands the shaft or body of the bone into a shell around it; in the latter the surface of the bone is broken up, and seems to coalesce with the tissue of the bone.

In different examples the fibro-cartilaginous tumour presents various degrees of consistence, and not a few apparent diversities of internal structure. In some examples its substance is homogeneous, in others obscurely fibrous; in others, it is composed from the name, which is intended to express its general aspect rather than its minute structure, for the firm tissue of which it is chiefly composed has not the microscopic or chemical character of true cartilage. The fibrous structure rather predominates over that which resembles cartilage; and in others numerous cells, containing a glairy or a serous fluid, are scattered through the inferior of the fibrous mass. The existence of such diversities, it is not unlikely that more than one kind of tumour is included in this name; but the gradations, from the examples in which the tissue is most nearly homogeneous to those in which it is most fibrous, or contains most cells, are so numerous and gradual, that it is difficult to decide whether they are all of one kind, modified by accidental circumstances, or examined in different stages of their development.

The treatment of the tumours whose natural history has been described may be summed up in a few words. There is no remedy for them but their removal: not one of the medicines proposed for exciting their absorption is worthy of a trial. Of the means of removing them (when removal is possible), none is so safe, so expeditious, or productive of so little pain or inconvenience, as the knife; and when ever it can be employed, the sooner it is used the better. For, in general, delay can only increase the severity of the operation. For the operation itself, the only general rule is, that the whole of the tumour, and especially any portion which is left will most probably become the nucleus of a similar growth. The particular proceedings must be varied according to the size, locality, and other circumstances of the tumour.

TUMULUS (or Busaum), a Latin word, signifying a 'little hill.' Tumuli, or artificial mounds of earth, of various sizes and forms, are found in many parts of the globe, and are commonly supposed to be tombs, or sepulchral memorials of persons of distinction, or of warriors slain in battle.

That some of these artificial mounds were originally raised for, or at least appropriated to, other objects than sepulchral is evident from the fact that there has no satisfactory evidence. We limit our present remarks to the consideration of Tumuli as Sepulchral Monuments.

In the book of Joshua mention is made of heaps of stones raised over dead persons, which in course of time would assume the appearance of tumuli of the present day. This practice seems however to have been done in the case of enemies only, and was doubtless intended as a mark of abhorrence. The earliest account of tumuli as sepulchral monuments is that of Herodotus, who speaks of the tumuli of the Lacedaemonians. His descriptions of the funerary of Patroclus and of Hector, in the 'Iliad,' differ in very trifling particulars; but in each the same mode of inhumation is commemorated. The cremation of the dead was practised in Greece at the time of the present day, and at the dawn the embers were ceremoniously placed near the centre of the space occupied by the pyre, which was surrounded by an artificial substructure, or a founda-
tion, and the loose earth was heaped above it. The word used by Homer to denote the throwing up of such loose earth (νεοῦσα) is also applied to the picture; and its propriety will be readily acknowledged by persons who have seen the outline of many of those primitive sepulchres, which has evidently resulted from the loose earth being allowed to slope at the angle at which it would form when thrown up.

This peculiarity has not been clearly expressed in the version of Pope:

'That done, they hid the sepulchre, and set the deep foundations round the pyre; Hythloday the midian they steeped the slain; the rising earth, memorial of the dead.'—Book viii. 253.

In later ages we find accounts of immense sepulchral tumuli. Such was that of Alyattes, the father of Croesus, which is described by Herodotus and Plutarch. (Herod., ii. 71.) A sepulchral mound which still exists near the site of Acanthus was raised by the army of Xerxes, in memory of a noble Persian who had superintended the construction of the caulis which was cut across the island of Athos. (Athos.)

Tacitus, from whom we derive the first satisfactory account of the Germans, observes that their funeral was distinguished by no empty pomp. 'The bodies of illustrious men were buried in sepulchres of a particular kind of wood; but the funeral pile was neither strewn with costly garments nor enriched with fragrant spires. The arms of the deceased were committed to the flames, and sometimes even his horse. A mound was then raised, which, as a better sepulchre than those elaborate structures which, while they indicate the weakness of human vanity, are at best but a burthen to the dead.' (Germania, xxvii.)

Whether the body was preserved entire or committed to the flames, the custom of depositing the remains of dead bodies under a mound of earth has been observed in nearly every part of the world; by the antient Scythians on the banks of the Borysthenes (Herod., iv. 71), and by the aborigines of North America on the banks of the Ohio.

Of the sepulchres of the Scythian nations many are found in the Kuban. Rennell (Geography of Herodotus) describes them as perfect tumuli, sometimes of great height, often a hundred feet in diameter, and in some cases the earth is excavated to a considerable depth; in others it merely covers the body. The deposits, with the remains of the dead, are weapons and implements of war, domestic utensils, and idols.

Some of the tumuli scattered over various parts of Germany have been examined. They are distributed by the antiquaries of that country into four classes: 1. Tumuli without bodies, or urns. 2. Tumuli with bodies, but without urns. 3. Tumuli with bodies and urns. 4. Tumuli with both bodies and urns. Of the last class several were opened in the neighbourhood of Sinzheim, and skeletons were found in them, with rings of brass and iron on the hands, and glass beads, with or without a chain or other ornament surrounding the neck. (Meidinger, Die Deutschen Volksstimme geographisch und gesellschaftlich besucht, p. 208, &c.)

The first careful investigations into the tumuli of this country were made by Dr. Stukeley in the neighbourhood of Stonehenge above a century ago. (Stukeley's Account of Stonehenge, fol. 1740.) The attention of the public was a second time drawn to the subject by Douglas, in his 'Nennia Britannica,' published in 1793; his researches were confined to the southern coast of England, and chiefly in the county of Kent.

In the agricultural and densely-peopled districts, barrows have nearly disappeared; but in the counties of Wilt and Dorset, and the adjoining parts of Hampshire, they are scattered over the open downs, and crown the more elevated ranges of hills which are yet untouched by the plough. Fortunately, a gentleman who had perseverance to prosecute the investigation opened by Stukeley and Douglas, and with ample means to carry them into effect, was found in the late Sir Richard Colt Hoare, whose attention was first directed to the subject, and who was materially assisted in his researches by his personal acquaintance with Cunnington, a tradesman and self-taught antiquary of Wiltshire. In no part of Europe have tumuli been so completely explored as in Wiltshire, and their contents have been described with that minute accuracy, which has been explained in the life of Sir Richard Colt Hoare, in his work on Wiltshire, 2 vols. 1810, 1821.

Considering tumuli according to their shape, we cannot adopt a better classification in general than that of the work referred to, which is indeed partly grounded on local names and distinctions.

We must not, he observes, consider every barrow as a mere tumulus, or mound, loosely and fortuitously thrown up; but must rather view them as works of evident design, and executed with the greatest symmetry and precision. The long barrow (see No. 1, annexed illustration), from its singular form and large size, claims the first notice. These barrows differ considerably in form as well as magnitude. Some resemble the half of an egg cut down the middle; some are almost triangular; some form a ridge of equal breadth throughout; and in the latter number are wider at one end than the other, and that end is usually turned towards the east. They are commonly placed on elevated situations, and stand singly. They differ materially from circular barrows in the arrangement of their weapons, or trinkets, are never found in them. With few exceptions, bodies appear to have been laid on the floor of the barrow, at the broadest end, in an irregular manner; and near one or two rings, the Maurus, are placed in the native chalk, and covered with a pile of stones or flints.

The bowl barrow (No. 2) is the shape most usually found. It abounds on the Mendip Hills, in Somersetshire, and is sometimes accompanied with a single tumulus. Dorsetshire also contains many barrows of this class.

The bell barrow (No. 3), from the symmetry of its shape, is probably an improvement on the bowl barrow. It occurs in the vicinity of Stonehenge.

Of the Druid barrow, as it was miscalled by Stukeley, Sir Richard C. Hoare distinguished three varieties. (Nos. 4, 10, and 11.) There seems some reason to assign this class as designed for the interment of females. The outward vallum, with the ditch within, is moulded with great care. In the area are sometimes one, two, or three small mounds, which in most cases have been found to contain small articles, such as cups, and lance-heads, also amber, jet, and flints.

Two other varieties of the Druid barrow have been cautiously observed. One is a low mound, enclosed within a vallum, and occupying almost the whole area. (No. 5.) In the other the area is perfectly flat, and rises in a curved line from the vallum. (No. 6.)

The twin barrow (No. 7) consists of two conical mounds within a fossa.

The broad barrow (No. 9) resembles the bowl barrow, but is wider and flatter at top.

Two other forms are mentioned, the pond barrow (No. 6) and the cone barrow (No. 8). The first is certainly not sepulchral, and perhaps the antiquity of this kind may be questioned. Of the cone barrow only a single example has been noticed—near Everleigh, on Salisbury Plain.

Another kind appears to have escaped the notice of Sir Richard C. Hoare. These barrows are so slightly elevated that they can scarcely be discovered, except in the morning and evening, when the shadows are broad and marked. Their contents show them to belong to an early period. No. 12, a tumulus called Milbarrow, near Avebury, Wiltshire, set round with stones, is represented and described by Stukeley, in his work on Avebury, fol. 1743.

A remarkable barrow, which has acquired much notoriety from the popular writings of Sir Walter Scott, being particularly noticed in his novel of 'Waverley,' and described by the name of Wayland Smith, is found on a lofty ridge near White Horse Hill, in the county of Berks, England. It is one of those long barrows which we meet
with occasionally, having a kist-vaen of stones within it to protect the place of interment.\(^*\) \((\textit{Antient Wiltsire}, \text{vol. ii.}, \text{p. 47.})\)

In the county of Dorset, about five miles west of Blandford, on the open downs, is a tumulus called Deverel Barrow, which was explored in 1825 by Mr. W. A. Miles, and found to contain twenty-one unbaked urns, fragments of which are preserved in the museum of the Institution at Blandford. Mr. Miles states that a much larger tumulus was discovered in the same field, and was also much larger; and that these tumuli, which were also covered with earth, were enclosed by cists, or chest. Mr. Miles enumerates thirty different interments as being traceable in this tumulus. He published an account of its contents, with engravings, in an octavo volume, in 1826.

Barlow Hills, in the county of Essex, on the south border of Cambridgeshire, is a name given to four tumuli, arranged in a row, and varying in size, as indicated in the diagram belo\(\text{w} \) (No. 17). The largest of these, measuring 142 feet in diameter by 44 feet in height, was explored in 1835 by Mr. J. G. Rokewode and other gentlemen, who excavated a passage or gallery upon the surface of the natural earth, from the extreme base to near the centre of the barrow. This line or gallery is marked (No. 18) a, extending 56 feet, where the workmen were ordered to extend the open space on each side; and at the distance of 13 feet they came to a square enclosure, or chest (c), which was found to contain various antique relics of genuine Roman or of Brito-Roman manufacture. These were glass urns or bottles, a bronze lamp and cup, a patera, a praeferculum (a long or tall vase, with a particular handle), a folding chair, bronze strigils, an enamelled vase, &c. The last and the bronze praeferculum are elegant and extraordinary vessels, and the only examples of the kind ever found in any of the tumuli of Great Britain. A particular account of these objects is given in the \"Archaeologia,\" vol. xxvii.

At a place called the New Grange, near Drogheda, Ireland, there was a remarkable tumulus, which was explored in 1770 by Governor Powwill, who wrote an account of the barrow and of other objects in the vicinity, for the Society of Antiquaries of London, and published the same in vol. ii. of the \"Archaeologia.\" He states that the mound consists mostly of large pebble stones, which must have been conveyed about 12 or 14 miles; and by calculation the weight must have been about 110,000 pounds. The height is 70 feet, and the diameter about 400 feet. Surrounding its base is a series of rude stones, placed in a circumferential circle, on their ends, as indicated (No. 14). A gallery formed of upright stones, &c., with others placed on their tops, extended from the entrance almost to the centre of the tumulus, but there was an area surrounded by other stones, and covered by a dome or cupula, \(a\). Branching from this area were three square recesses, \(b\), \(b\), \(b\). The accompanying diagrams show a plan and section of the gallery.

Silbury Hill, near Marlborough, Wiltsire, is one of the largest barrows in the world. \(\text{[Averbury.]}\) See the cut in a preceding column, No. 13.

Sir Richard C. Hoare considers the deposition of the body in the fire as a testimony to the genuine relicks of the fire, to have been practically at the same time. There are however various anomalies of both. In the first and most ancient interments the body is enclosed in a cist, with the legs and thighs drawn up, and the head generally turned towards the north. The second is of much later date. The body is deposited at full length; but the head is placed in no particular position, and arms and various instruments of iron accompany the skeleton. In the same manner two modes of depositing the remains, after they were burned, have been practised. In the more ancient, the fragments of the burnt bones were collected and laid on the floor of the barrow, or in a cist excavated in the native soil. In the second, which is clearly the later, the bones were placed in a funeral urn, which was then inserted in a cist, usually with the mouth downward. In these cases portions of the cloth which enveloped the urn have occasionally been discovered, as well as small brass pins, by which the cist was fastened together, and were very frequently placed either at their head or feet. They are always ornamented with patterns, and would contain about a quart. The third are smaller still, and more fantastic in shape. They are too diminutive to have been receptacles for ashes. They were probably intended for perfumes, and have accordingly been named incense-cups.

To the remarks of Sir Richard C. Hoare we may add, that the remains found in the Wiltsire barrows indicate a difference in the practice of the barrows before and after the introduction of metals, when arms and implements consisted of spear-heads of flint, and arrow-heads of flint or bone; the second, when articles were of bronze: the third, when articles were of iron. These objects may accompany the deposit of the sepulchral urn; or there are two varieties, indicating different periods of mechanical art. In the first the urn is fashioned by hand, without ornaments, or with those of the rudest kind, and dried by the heat of the sun. In the second, it was evidently wrought on the lathe, ornamented by the application of some instrument with zigzags and other patterns, and finished and baked with different degrees of skill and attention. For by the first of these may belong to the earliest known inhabitants of Britain; and the others may perhaps be assigned to the latest Belgic colonists. It is also likely that in the West of England the different modes of interment in barrows had ceased before the establishment of the Romans; at least no coins nor other Roman objects, which might have been introduced into England during the Roman occupation, have ever been found in the course of researches which have scarcely left a single barrow in south Wiltsire unexplored. \(\text{[Averbury; Pri-}

RAMIDES; CAHIN; CHOLLULA.}\)

TUN. \(\text{[Ton.]}\)

TUNBRIDGE \(\text{[Kent.]}\)

TUNBRIDGE WELLS. \(\text{[Kent.]}\)

TUNE, in Music, a short air, or melody, with both or either of which it is synonymous. A vocal \(\text{\textit{tune}}\) is a song, a ballad, in England; \(\text{an \textit{ariette}}\) in France; \(\text{a \textit{canto} in Germany; a \textit{canzona} in Italy; a \textit{seguitilia in Spain; a \textit{canzuncio in Austria,\}}}\) &c., according to the country in which it had its origin or is naturalized. \(\text{[Abercromby; Maslov.]}\)

TUNGSTEEN, a metal first obtained in a perfect state by M. M. d'Elhuyart, in 1781. Its name is derived from the Swedish words \(\textit{tungsten}, \text{\textit{heavy stone}, on account of its}\) hardness.

The properties of tungsten are—\(\text{\textit{tungsten}}\) has that it has a greyish-white colour, and considerable lustre. It is brittle, and nearly as hard as steel; its specific gravity is 17-4, and with the exception of platin, gold, and iridium, is therefore the heaviest known metallic. It resists heat and air, and its temper at fusion, greater even than that necessary to melt manganes. It is not altered by exposure to air. When heated to redness in the open air it takes fire, compounds with oxygen and is converted into tungstate, and nitric acid produces the same effect upon it. Tungsten may also be obtained by passing hydrogen gas over the heated oxide of tungsten, or by immersing zinc in a solution of it.

We shall now mention the principal minerals which contain tungsten, and in these it exists either as oxide of tungsten or as tungstic acid.

\(\text{\textit{Tungstic Acid}; \textit{Weltic Acid}.—Occurs pulverulently or in} \)
small friable masses, but with some appearance of crystallization. Fracture conchoïdal. Inodorous, tasteless. Colour varies from orange or chrome-yellow to yellowish-grey. Low sublimate. Translucent. Specific gravity 6.0.

It is insoluble in acids, but soluble in acetic potash and also in solution of ammonia when heated, and is precipitated from them by acids in the state of a white powder. Before the blowpipe it gives a blue glass with microcosmic salts. It has been found on the surface of wolfram and sometimes on that of tungstate of lime, at Huttington in Connecticut, and Zinwald in Bohemia.

It is stated to consist of—

Oxytungsten: 20-23
Tungsten: 70-77


By the blowpipe difficulty fusible into a transparent glass. Slowly acted on by nitric acid, which leaves a residue of tungstic acid.

This mineral occurs in Bohemia and Sweden, and in the English counties of Cornwall and Cumberland, and also in America.

Analysis by Berzelius:—

Tungstate acid 40-417
Lime 19-400

It sometimes contains small portions of silica, and of the oxides of iron and manganese.


Before the blowpipe wolfram decomposes, and at a very high temperature melts into a globule covered with crystals of a metallic lustre. With sulphur of potash it forms a transparent bead of a deep red colour.

Its constituents, according to the authorities named, are—

Tungstic acid: 74-668
100

100

Protoxide of iron: 73-511

73-92

100

Protoxide of manganese: 5-640
8-74

11-20

Silica: 2-100
5-744
18-75

100

100

100-55

This mineral very frequently accompanies tin-ore in the English county of Cornwall, in Bohemia, and in Skirry. It is also found in various other countries, as America, Siberia, Scotland, &c.

**Tungstate of Lead.** [Lead—Ores of.]

We shall now describe some of the compounds which tungstic forms with other metallic bodies.

Oxygen and Tungsten. We have described below a natural compound of these substances under the name of tungstic acid; but a mere oxide, not possessing acid properties, may be obtained by fusing finely powdered wolfram, or tungstic acid, in a lead, with the fumes of potash, and dissolving in hot water the tungstate of potash formed, adding hydrochloric of ammonia to the solution, evaporating the mixture to dryness and heating it to redness. The residue is a black amorphous mass, which, after being well dried, is dissolved in a little solution of potash, is oxide or bioxide of tungsten.

Its properties are, that it is black; it is insoluble in water, acids, and potash, and does not change on heating. But when formed in a different mode from that now described, it may be combined with oxygen, and converted into redness, and then it is converted into tungstic acid, by absorbing oxygen during combustion. This oxide may also be formed by passing hydrogen gas over heated tungstic acid; its colour, when thus obtained, is brown. It contains—

Two equivalents of oxygen 16
One equivalent of tungsten 100

Equivalent 118

**Tungstic Acid.**—We have already stated that this may be obtained by decomposing the native tungstate of lime, by heating the oxide in the air, or, which is the best method, by heating tungstic of ammonia to redness so as to expel the ammonia. The properties of this substance are, that it is pulverulent, of a yellow colour, insoluble in water, but readily dissolved by the caustic alkalis, forming with them salts called tungstates. When recently precipitated from the solution by acids it forms compounds with them which are soluble in water.

It is composed of—

Three equivalents of oxygen 21
One equivalent of tungsten 106

Equivalent 127

When this acid is heated to about 600° and a current of hydrogen is passed over it, a blue substance is obtained, and it is also procured by immersing zinc in a mixture of hydrochloric and tungstic acids. This Berzelius considers as a tungstate of tungsten, probably composed of—

Two and a half equivalents of oxygen 20
One equivalent of tungsten 100

Equivalent 100

**Chlorine and Tungsten** form two compounds: when the metal is heated in the gas, combustion occurs and the bichloride is formed. It has sometimes the form of delicate red needles, but more commonly that of a deep red fused mass resembling iron in fracture. When heated it emits a red vapour, and is by water converted into hydrochloric acid and oxide of tungsten.

It is composed of—

Two equivalents of chlorine 72
One equivalent of tungsten 100

Equivalent 172

Although there appears to exist another chloride of this metal, chemists are scarcely agreed either as to properties or composition.

**Sulphur and Tungsten** form a sulphuret, or perhaps two compounds; they are however but imperfectly known.

The tungstates of ammonia, potash, and soda, are all soluble and crystallizable compounds; while those of lime, barytes, and arsenia are insoluble.

**TUNGUSES.** [Sinkria, vol. xxi. p. 460.]

**Tunicata.** A group of animals which, although very low in the creation, has, as Mr. W. S. Macleay observes, in consequence of the investigations of Cuvier, and particularly those of Savigny, attracted a considerable portion of attention.

Mr. MacLeay remarks that, although it is a proposition now almost undisputed that zoology cannot be satisfactorily studied without comparative anatomy being taken for its basis, it may not be amiss to cite as examples of the truth of this assertion the singular discoveries of Savigny on the compound Tunicata. The wonderful facts with which that distinguished naturalist has recorded could never have been discovered by him, had he confined his attention to external appearances. 'Disdaining to rest contented with the manufacture of names, he employed himself in the investigation and generalization of physiological facts; and his discovery of compound Tunicata,' he conceives, 'shows Mr. MacLeay, 'to be such as may deservedly be placed at the side of that of the meta-physics of Batrachian aptites, or any other important physiological fact whatever."

Mr. MacLeay, after enforcing the necessity of dissection, as stated in the article BOLINIA, proceeds to quote Cuvier, who says, 'The external form of the Ascidia being subject to many accidents, their accurate distinction requires no great differences, their colour not remaining after death, and differing probably during life according to age and locality, it is surely difficult to distinguish them without having recourse to their interior' and so we are, observes Mr. Mac Leay, was Aristotle of this truth, that he has given us an anatomical account of such species of Ascidia as he was acquainted with, so detailed and so accurate as to puzzle his commentators, and to lead some of them to believe that his investigation was in fault rather than their own knowledge of natural history.

The Tunica had always been interesting to Mr. Mac Leay as an osculant group connecting the polype Arela and ascophalous Acoel, and he regarded this situation, assigned to them in the Horae Entomologicae, cannot now for a moment be doubted. Their relation to the testaceous mollusea has likewise been pointed out, he observes,
by Aristotle, Baster, Linneaus, Pallas, Cuvier, and Savigny. Their relation to the Polypes has likewise been shown by Savigny, when he demonstrated that the *Alcyonium flore* of Linneaus (*Alcyonium pulmonarium* of Solander and Eichhorn) is the *Ectenaea* of *Ascidiae* combined in a common envelope. Indeed, continues Mr. MacLeay, it is rather curious to remark that the affinity of these animals to Mullusca, although so frequently observed, is less striking to modern naturalists, than that of Mullusca themselves to the Polypes, and which was only discovered the other day. Mr. MacLeay however qualifies this observation by referring to the *Dict. des Sciences Nat.* art. 'Mollusques,' p. 563, where M. de Blainville complicates them with the *Myx.*

Mr. MacLeay then refers to Savigny's distinguishing character of the *Tunicata*, namely, their having a soft test or covering, consisting of an organized envelope, provided with two orifices, the one branchial, the other anal; and he remarks that if this character be assured, as there is every reason to believe it to be, the imperfectly known genus *Mammaria* will, if truly described by Müller, not belong to this group, although it has been placed there by Lamarck. There is great obscurity however, he observes, hanging over this genus as well as *Bipamallaria*, which, upon the authority of some manuscript notes of Péron, is said to have rigid tentacles. By one of the orifices above mentioned the envelope receives the sea-water and introduces it into the branchial cavity; but Mr. MacLeay refers to Aristotle for a general account of the structure of that group of *Tunicata* which comprises Aristotle's *Tethya*, or the *Tunicae of Savigny*.

Aristotle, then (*Hist. Anim.*), observes, under the head of Testaceous Animals (τὰ βραχτεᾳνα), that 'there are some, such as those called *Tethya*, which are so entirely surrounded by their test or envelope as to have no part of their frames visible except at some of their parts.' So far, as Mr. MacLeay remarks, this accurately drawn character may apply to the whole of the *Tunicata*. But Aristotle afterwards proceeds to a more definite description of the *Tethya* — but of all these animals, abounding with Characters (these animals are called *Tethya*) which have the most remarkable nature; for with them alone is the body entirely concealed in the test. This test or envelope (τὰ βραχτεαὶ) is between the texture of leather and shell, and may be consequent cut like a piece of tough hide. The animal adheres to the rocks by its test, and has two passages or orifices (στοματα), distant from each other, and so small as not to be easily visible. By means of these it imbibles and discharges the water. On opening one of these animals, in the first place, a membrane, composed as it were of nerves (σωμάν ἐνακόλυτον), and communicating with a fleshy intestine (τὸ σωματοσκελεῖον); so that the intestine of the *Tethya* appears connected with the membrane by a single artery. Though, in the flesh is alike in all testaceous animals, this intestine resembles in form that of none of them. It is suspended at two places, viz., to the above-mentioned membrane, and to the sides of the test, (lately described, 'to the skin from the side'); and wherever it adheres to either of these it is narrowest. At each point of suspension this intestine tends towards those orifices which lead to the outside of the test, and by which it receives and discharges the food and water; so that if one of these apertures be closed the animal's mouth, the other must be its anus. One of these orificial processes (the branchial orifice) is thicker than the other. Within the cavity also of one or other of these there is a certain small cohering substance which divides it.'

Mr. MacLeay, who thus translates a passage presenting almost insuperable difficulties to any but a zoological scholar, observes, that 'the membrane, composed as it were of nerves,' is a good description of the beautifully reticulated membrane which forms the branchie of the *Tethya*. Aristotle, he adds, appears however by some mistake to have considered the branchial pouch as surrounding the intestine; but he supposes that the small cohering or continuous substance which Aristotle alludes to immediately after the mention of that part which Mr. MacLeay considers to be the branchial orifices, is the valvule of the anal orifice.

Mr. MacLeay then proceeds to show the connection of the *Acritae* with the *Mullusca* by means of the *Tunicata*, as stated in the article *Borelania*; and he says that this osculant group may be divided as follows:—
whom the public are indebted for this lucid and philosophical analysis, agree with their consequent group the *Adnialina* in the remarkable variation that exists in their system of classification. Let us consider the character that can possibly be adopted for the ground-work of a Zoological system, the mode of generation ought to rise in importance only in inverse proportion to its degree of variation. In a group of animals, for instance, where it varies much according to evidence of less importance, as affording natural characters, than among those groups where it remains less subject to variation. When the naturalist happens to consider that he ought to classify it according to the evidence of less importance, as affording natural characters, than among those groups where it remains less subject to variation.

When the naturalist considers that he ought to classify it according to the evidence of less importance, as affording natural characters, than among those groups where it remains less subject to variation.

For example, *Dendrophyllia* but his name happens to have been employed in other branches of the science.' *(Linn. Trans., vol. xiv.)*

The earnestly desire to impress the principle inculcated in the last paragraph upon the mind of the zoological student.

Mr. Broderip and Mr. G. B. Sowerby have described a curious form belonging to this natural group.

Group, *Tunicata.* Family, *Chelyosaoma.*

Generic Character. —Body sessile, fixed, involved in a coriaceous test or envelope dividedly laminated above. Orifices conical, each closed with six trigonal valvules.

Description. —Elongate-ovate, affixed at the base, flat above, octopartite, the laminae striated; orifices prominent.

Locality. —The Arctic seas, adhering to stones.

This animal comes nearest to the *Ptilya* above noticed, but there are no traces of tentacula surrounding the branchial orifice. It differs from the *Thalida* inasmuch as the mantle seems to adhere to the coriaceous test, instead of a simple valve, each orifice of *Chelyosaoma* is furnished with a complicated one. From the *Ascididae* it differs inasmuch as both orifices are surrounded by six valves, instead of being quadrifid.

There were four specimens, one of which was sacrificed to the inquirers, the authors being fully aware of the value of internal investigation, more especially in animals of this class; decomposition however was so far advanced that the ovaries and other viscera were nearly reduced to a shapeless pulp, and they could only trace the following parts of the interior structure. But, before the result of this observation is laid before the reader, it may be well to state that the decomposition which prevented anything like accurate analysis of the ovaries and other viscera was, apparently, occasioned by the spirit in which the specimens had been preserved not having sufficiently penetrated to the internal parts. This is mentioned in order to draw the attention of collectors to the necessity of puncturing the external integuments, muscular coats, &c. of such animals as are plunged entire into spirit, in order that they may reach and preserve the viscera.

The mantle appeared adherent only to the orifices, each of which consists of six triangular valvules. Each valvule is furnished with a set of muscular fibres, adhering at one end to the inner surface of the tunica, and at the other extremity to a small process on the valvule. These muscles appear to be the agents for opening and shutting the valvules. Besides this set of muscular fibres and within them there is another set, which passes latitudinally from one papilla to another, forming a sphincter; the base of which presents numerous muscular fibres, passing from the edge of the coriaceous plates which form the upper surface. These appear to be intended to give the animal the power of dilatation and contraction of the coriaceous gland. They are other strong subcutaneous muscular fibres, adhering by coriaceous processes from the lower part of the cup. The upper surface, which is flat, consists of eight coriaceous, somewhat horny, angular plates. One of these is placed against the three on the opposite side of two specimens which were examined, this was an hexagonal shape, the sides coming in contact with the orificial valvules, being lustrous. The plates are so disposed that the branchial orifice is surrounded by three plates, and the anal orifice by four, besides which is an intermediate plate, and abuts upon both. The three plates near the branchial orifice are much larger than the four which are near the anal orifice. Each of the plates is marked with three or four elevated striae, parallel to the sides of the plate, and near to them, leaving an area in the centre, and bearing a striking resemblance to a land-tortoise's shell. The orifices are very small, and are surrounded by six triangular valvules, each transversely striated, and, when shut, rising from the surrounding surface in the form of a cone. The lower or cup-like part is formed of a coriaceous substance, with slight traces of separation into plates, but without internal muscular fibre. In one specimen only were there irregular somethings in the place of the external base of the cup, but not so strongly marked as the upper plates. These lower plates were not to be observed in a lower specimen which was removed for the purpose of examination from the stone to which it was fixed. *(Zool. Journ., vol. v.)*

![Chelyosaoma MacLeayana.](attachment:image)

The compound (and most probably all the) Ascidians, in their first state of development, after leaving the egg, assume the form of Tadpoles, and are locomotive by means of a vibratile tail, which they cast off when they quit the larval state and assume the sessile condition. This metamorphosis was observed by Sir John Graham Dalvyl, both in a solitary and compound Ascidian, namely in *Ascidia papilla* (solitary) and in *Apidium verrucosum* (compound). *(See Edinburgh New Philosophical Journal, January, 1839, vol. 26, p. 152.)* But in 1828 MM. Audouin and Milne Edwards had proved that the compound Ascidians are at their birth endowed with sufficiently extensive locomotive faculties, and that, in the progress of age, they underwent a true metamorphosis *(Ann. des Sciences Nat., 1828, tome xv., p. 10;)* and M. Sars, as well as Sir John Graham Dalvyl, subsequently verified the fact, which had been doubted by certain naturalists. The observations of M. Sars were made upon the Botryllis of the Norwegian coasts. *(Beskrivelser og tagljueker eller note omvæltn. eller nye i havet ved den Bergenske byg i seinere dyr af polypernes, acelphernes, radintheres, annelidernes og molluskerne classer, 4to., Bergen, 1833.)* The metamorphosis of these animals is admirably described and figured in the beautifully illustrated paper by M. Milne Edwards, entitled 'Observations sur les Ascidies compostes des Cotes de la Manche,' read before the French Academy of Sciences on the 11th November, 1839, wherein the structure and internal physiography of these highly interesting animals is explained in a masterly manner. The researches of Savigny, of whom M. Milne Edwards speaks in those terms of eulogy which every zoologist must feel to be due to that acute, accurate, and patiently investigating naturalist, were principally employed upon animals preserved in spirit, which will account for the fact of some of their delicate organs having escaped his notice; for, as M. Milne Edwards truly observes, it is only by studying these small animals in the living state that one can hope to fill up the lacunae which Savigny left in their history. This has been most satisfac-

P. C. No. 1595.
their organisation and habits. We regret that our limits will not permit us to lay this excellent paper in detail before our readers. It is full of the most interesting information, and we recommend those among them who are observers to take this paper and their microscope with them to the coast, reminding them at the same time that when they have sufficiently amused themselves with examining the metamorphosis and organisation of these Ascidians, they will find plenty of opportunities for adding to our stock of knowledge relative to the comparative anatomy and habits of a multitude of marine productions which demand an investigation and illustration like that bestowed by M. Milne Edwards on the Compound Ascidians.

**Fossil Tunicata?**

We would draw the attention of geologists to a more narrow investigation of the organic remains preserved in the various strata, and particularly in the older formations, with a view to the detection of fossil animals belonging to this group. There is reason for believing that they were more plentiful than is generally supposed, and that the test or envelope of many of them must have been capable of preservation. The forms themselves, presenting a low grade of organisation, arc just such examples of animal life as might be looked for in those beds which were once at the bottom of the antient seas, whilst they are found among the marine productions of the present day.

Here then we shall notice *Ischadites Königii*, from the lower Ludlow rock, described and figured in Mr. Murchison’s ‘Silurian System.’

Mr. Murchison remarks that these curious fossils are arranged together, that he always compared them with packed or barked sticks; and he says that Mr. König, to whom he referred them, thus speaks of them:—‘I am of opinion that they may be considered to belong to the family of Ascidiae. Like the *Leucophthalmus* of the ’Temes Sectiles’ (cent., i., 1), they seem to form a group of globular, conoseous, and, it may be added, pedicled bodies; for in one of them the eixctrax for the insertion of the pedicle distinctly appears. As however no traces of branchial and internal apertures are apparent on the surface exposed to view, it would be rash to constitute this fossil a genus, or to assign it a place in any of the known genera of the naked *Modiolae*, to which *Leucophthalmus* unquestionably belongs.’

**TUNING,** the art of adjusting the several sounds of a musical instrument so as to make its scale approach to correctness; also the art of putting two instruments, each of which has the parts of its scale in proper relative adjustment, into agreement with each other.

Some musical instruments have a permanent relative scale, all the parts of which, if changed at all, change together. Thus a horn or a flute may change its pitch from the heat of a room, but all the parts change together, and the whole effect of temperature is corrected at once by lengthening the pipe of which the instrument consists. Other instruments require to have the parts of their scales compared with each other from time to time, owing to their several parts being unconnected and subject to unequal wear, or to separate accident: such as the organ and piano-forte. Others again are so liable to these depragments as to require tuning on every occasion of use, as the violin class, the harp, the drums, &c. It is not our intention to enter into the modes of tuning instruments in detail, but, as promised in the article SCALE, to give some
account of the difficulties which are met with in the actual construction of any scale, and the ordinary modes of meeting them. A well-written article just referred to we have pointed out the mathematical commencement of this subject, and have made it evident, from first principles, that a perfect scale is impossible; that is to say, one in which all the intervals, or half-tones, are the same, require that the octave shall consist of only twelve semitones, and though some organs have been constructed with more, it is not worth while to embrace the subject by treating of any other than that of the twelve semitones. We shall use the same notation as before, namely, expressing the following note of the treble scale,

\[ \text{C'} \]

by \( c' \), we shall denote the successive cs in ascent by \( c', c'', c''' \), &c., and those in descent by \( c_b', c_b'', c_b''' \) &c.: thus \( c_2 \) is three octaves below \( c' \), and \( c' \) is four octaves above it.

The first point is to fix upon some one note, by the pitch of which all others may be determined. The only way for tuning any instrument which will always not alter. It is true that the pitch of a note depends only upon the number of vibrations in a second, and can, by the description of this number, always be recovered by acoustical experiments. But we might as well expect a carpenter to ascertain his own rule for himself by the pendulum [Standard], as an ordinary musician to appeal to the theory of musical vibrations. A standard pitch is usually obtained, or professed to be obtained, by the tuning-forks, an instrument consisting of two steel prongs growing out of a steel handle. When these prongs are sharply struck they vibrate, and if the instrument be held to the ear, or placed upon the flap of a table, or on a sound-board, a low and very pure sound is heard, if the prongs be perfectly equal. These tuning-forks are usually made to sound either \( c' \) or \( a \), and they would answer their purpose exceedingly well if there really were in existence any standard from which they were made. But this there is not; and the consequence is, that not only do the tuning-forks of different makers frequently vary a little from each other, but the new forks are sensibly higher than the old ones, seems to be the case in most, if not in all, the tuning-forks in different places varies [Acouvertures, p. 97], and also how very much what is now called concert-pitch is higher than it was a century ago [Pure]. This rise, it appears, is still going on, and, unless measures are taken to stop it, will become a source of confusion in the composition of the new masters are played and sung two or three notes higher than they were really written.

There was, we are told, a few years ago, a standard, so called, constructed under the direction of those who manage the Philharmonic concerts; but we are not aware that any account was given of the method of selection, or that any experiments were instituted with a view to its perpetuation. We are also told that this mysterious standard is kept secret, because it is the property of a particular man, and that the rest of the craft had difficulty in obtaining it. Since we began to write, we have seen another promulgation of a standard tuning-fork, for the especial use of singing classes. The prospectus of the seller states that careful experiments have determined that the Philharmonic c (the c' of our notation) vibrates less than 512 times in a second; how much less is not stated. These new tuning-forks are perfect; others who have used it in the following way, each suppose twelve perfect fifths to be tuned upwards from c', and give the results the names of the notes which they would represent in the scale of twelve semitones, and in the monochord of sharps, if the scale were perfect, then have

\[ \text{c}, c', d', d'' , a', a'', b', b'', b'' \]

Now since \( c'' \) is the same note as c', it appears that twelve perfect fifths should be the same as seven octaves. And if we pass to the octave below, as soon as we get out of the

2 2 2
octave beginning with c, we should have c, g, d, a, e, &c., the last being c'. It will be found however that this is not true, but that the note obtained from twelve ascents by one of the fifths is an octave higher than c'. Again, if the perfect thirds be tuned from c, we should have c, c♯, c', but it will be found that c' obtained in this way is too flat. The octave derived from the fifth of the ten white keys in the treble c, is obtained from the third that derived from the thirds vibrates 125 times where it should vibrate 128. The slight alterations which are made in order that any one of the twelve notes of the octave may be in tune at any key; if you use a key-note, any key-shout at any shout of the ear, constitute the temperament of a scale; the altered consonances are said to be tempered. Some writers call the interval from the false octave obtained by the fifths to the true one, by the name of the root; and using the word in this sense, this difference is justly; containing no sort, one from the fifths, and one from each of the sets of thirds beginning with c, c♯, d, &c.; and three more might have been got from the minor thirds. But by the term neo/other writers mean the flat fifth which exists in the worst key, when the temperament is allowed to favour some keys at the expense of others. Simple as this little variation in the meaning of a term may be, it is worth while to warn even the tune-worms amongst the pianoforte-makers of his time with utter ignorance of the scale, in stipulating with the tuners whom they employed that there should be no wolf. In all probability they only meant that no key should be worse than another, or that the temperament should be equal. This term oneself is said to be derived from the jarring of a badly-tuned consonance, supposed to resemble the distant howling of the animal; we rather suspect it was so called because it was hunted from one part of the scale to another like a wild beast, in hopes of getting rid of it.

Two systems of temperament suggest themselves: the first, equal, in which the necessary defects of the scale are distributed equally throughout it; the second, unequal, in which some mode is adopted of distributing the imperfection so as to make some keys feel it less than others. The most common practice of our day is to endeavour at equal temperament. The two systems have their advocates, and the arguments for one and the other are as follows. In favor of equal temperament it is urged that all the keys are made equally good, and that in no one does the imperfection amount to a striking defect: also that in the orchestra there is little chance of any uniform temperament among the various instruments, if it be not this one. Against equal temperament it is urged that it takes away all distinctive character from the different keys, and leaves no ground for the key perfect and the key flat. Both these arguments have force, both for and against; for ourselves, we consider those against equal temperament much the stronger. We have often felt that a pianoforte newly tuned has, with much correctness, a certain inutility, which wears off as the effect of the tuning proceeds; and insomuch that the best phase of the instrument, to our ears, is exhibited during the period which precedes its becoming offensively out of tune. At this time the progress towards the state of being out of tune (for which there is no single word, maltonation would do very well) can only be called a change of the temperament; and the several keys begin to exhibit varieties of character which, until maltonation arrives, render the instrument more and more agreeable. But it must be remarked with respect to equal temperament, that it cannot be obtained in the ordinary way of tuning. The only way of obtaining a given temperament, equal or unequal, with certainty, is to take a monochord, and having calculated, the proper lengths of the different strings, to form the successive notes on the monochord, and to tune the several notes of the instrument in union with them. No tuner can get an equal temperament by trial; so that the question lies between the having all sorts of approximations to equal temperament, according to the propensities of different ears, or as many sorts of approximations to some other systems. Had the English nation been as much addicted to mechanical, a simple monochord, or system of monochords, would have been invented, on which any given system of temperament could have been readily laid down by rule, and thence transferred to the instrument.

The mode of proceeding by approximation to equal temperament is simply to tune the fifths a little too flat, and the following order of proceeding is the most usual and has often been given. The first letter represents the note already tuned, the second the one which is to be tuned from the first. The third, the note referred to in the above process, the trial that should be made upon notes already in tune, in order to test the success of the operation as far as it has gone. The first step is to put c in tune by the tuning-rod c, c′; c′; c′; c; c; G; G; G; G; D; A; A; A; A; E; G; E; E; D; E; G; E; G; E; D; E; G; E; G; E; D; E; G; E; G; E. We have written all the semitones as sharps, whether tuned from above or from below. Of course, since the fifths are neither too small nor too large, and their intervals, the upper note must be flattened when tuned from below, and the lower note sharpened when tuned from above. In the preceding the octave c′ is completely tuned, and also the adjacent interval c♯. The rest of the instrument is then to be tuned by octaves. The thirds should all come out a little sharper than perfect, as the several trials are made: when this does not happen, some of the preceding fifths are not equal. The parts which are first tuned by the fifths, and from which all the others are tuned by octaves, are called bearings.

We shall now show how, by means of the theory of the scale, to examine a system of temperament: the rest of the calculation is only for the convenience of the trial, and the only further process is, creating imaginary subdivisions, by means of which to express the various intervals required. None is so convenient, in our opinion, as the expression by means of mean semitones and their fractions.

We prefer to show a complete examination of one system, in such a manner that any one may apply it to another, instead of briefly noting the peculiarities of different systems. We shall take as an example Dr. Young's first system, which is as follows: Tune downwards, from the key-note, six perfect fifths, ascending into the octave interval c♯ when necessary; then tune upwards, from the key-note, six equally imperfect fifths, throwing the whole error of the first six into a semitone, and leaving them. In the equal temperament the wolf is made to bear twelve euls: here only six—larger ones of course. Now a perfect Fifth, being two major tones, a minor tone, and a diatonic semitone, is thus composed:

<table>
<thead>
<tr>
<th>Major tones</th>
<th>4</th>
<th>5</th>
<th>5</th>
<th>5</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor tone</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Diatonic semitone</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Perfect fifth 7/10550

The imperfect fifth of this temperament is to be flattened by the sixth part of -20000, or 120000, or 1.10550. The imperfect fifth required. We are then to proceed as follows:—

<table>
<thead>
<tr>
<th>Sixth fifths downwards</th>
<th>Sixth fifths upwards</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 00000</td>
<td>0 00000</td>
</tr>
<tr>
<td>F 7/10550</td>
<td>G 6/9045</td>
</tr>
<tr>
<td>F′ 7/10550</td>
<td>F 6/9045</td>
</tr>
<tr>
<td>A 7/10550</td>
<td>A′ 6/9045</td>
</tr>
<tr>
<td>A 7/10550</td>
<td>A 6/9045</td>
</tr>
<tr>
<td>D 7/10550</td>
<td>D′ 6/9045</td>
</tr>
<tr>
<td>D 7/10550</td>
<td>D 6/9045</td>
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<td>G 7/10550</td>
<td>G′ 6/9045</td>
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<td>G 7/10550</td>
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<td>C 7/10550</td>
<td>C′ 6/9045</td>
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<tr>
<td>C 7/10550</td>
<td>C 6/9045</td>
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<tr>
<td>F 6/9045</td>
<td>F′ 5/8720</td>
</tr>
<tr>
<td>F 6/9045</td>
<td>F 5/8720</td>
</tr>
</tbody>
</table>

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There is no doubt, at least in this world, how much surplusage in carrying the results to five decimals, or the hundredth- part of a mean semitone; but all calculators are aware of the impossibility of using more places than will ultimately be wanted. Collecting the above results, we have, for the interval of every note from C, as far as C, as follows:—

-000000 E 3-92180 G2 7-92180
Ca 9-89053 F 5-88270 A 9-89053
D 2-94135 G 6-98245 B 10-92027

We shall now examine the effect upon the several keys. We have remarked [Scale, p. 504] that the effect of making an interval four times the mean of the semitones of a more pliable character; while we may suppose that too large an interval has a somewhat contrary effect.

As the most important chord of every key is that of the key itself, its third, and fifth, these are the keys of effect of each key from observing the effect of the temperament upon the common chord of the key-note, judging of the character of the key by the amount and direction of the temperament of the third and fifth. Now a major third is made of a major and minor tone, and is therefore 3-86314 mean semitones; while a minor third, or a major tone, and a diatonic semitone, is 3-15641 mean semitones. Hence the principal chord of a key, according as it is major or minor, has this effect upon the key-note;—

Major 3-86314, 7-01555
Minor 3-15641, 7-01555

To examine any particular key, take the numbers from the preceding table opposite to the notes of the principal keys, and add the mean of the 12th (make the octave when necessary); subtract the number of the key-note from the other two, and the remainders will give the tempered intervals. Compare the tempered intervals with the preceding correct intervals, and the amount and direction of the temperament will be seen. For instance:—

Key of A major.

A 8-94135
C# 12-90225 E 15-92180

Tempered intervals: 3-96300 6-98245
Perfect intervals: 3-86314
Temperaments: +0-00764 -0-00189

and means sharper than perfect, — flatter than perfect.

We might describe this chord (keeping three decimals, which is more than sufficient) as having a temperament expressed by the following symbol (+0-008, —0-009); and if we examine all the keys in the same manner, we shall have the following account of this system of temperament. (A person who is used to the subject, and to calculation, might proceed more shortly by considering the law of the system, but the beginner had best take each key by itself. We have preserved the use of sharps only, for the sake of symmetry.)

The rules for the verification of every such process are six in number, and as they express relations which may be made more easily memorized, we will, for systems of symmetry, give them at length. In all these rules it is supposed that the flats and minor thirds are tempered flat, the major thirds sharp, and that the signs are neglected.

1. The sharpness or flatness of the inharmonics, or of the intervals of the keys, is maintained in any interval from the key-note to any chord, by the one rule, to make them as far as possible for major thirds, and as far as possible for minor thirds in four. There are then four distinct parcels of major thirds, and three of minor ones, so that it is impossible to pass out of one into another by thirds alone. It would be possible to temper all the major thirds equally, and yet to retain an unlimited number of modes of tempering the fifths, depending upon the manner in which one system of thirds is joined to the others; and the nature of the thirds thereby tempered.

We have, from the scale, shown how to construct the temperaments: we now take the inverse question, namely, from the temperaments to construct the scale. Let the sharps and flats denoted by the small letters be so placed as to render the temperaments the same as those in the scale, and the temperament will be that of the minor, or the key of A major.

2. The sum of the temperaments of all the thirds in the major key is the same as one of the numbers at or above three major thirds taken four times, or 1-61236 mean semitones; the sum of the temperaments of the thirds in any three keys whose tones are successive thirds being the excess above mentioned, or 1-61236 mean semitones; the excess above mentioned, or 0-62563 of a mean semitone, the sum of the temperaments of the thirds in any four minor third temperaments, or three minor thirds temperaments, the excess above mentioned, or 0-62563 of a mean semitone.

3. The sum of the temperaments of all the thirds in the twelfth minor keys is three times the excess of four minor thirds over an octave, or 1-97684 mean semitones; the sum of the temperaments of the thirds in any four minor third temperaments, or three minor thirds temperaments, the excess above mentioned, or 0-97684 of a mean semitone.

4. The temperament of the third in any major key, increased by the temperaments of the fifths in that key and the three succeeding dominant keys, makes a comma, or 0-01506 of a mean semitone, which is the excess above the fifth above it; so that the successive dominant keys of c major, for instance, are those of g, d, a. Thus, in the above system, the temperament of the third in a minor is 1-127; and those of the fifths in a, c, e, g, a are 0, 0-172, 0-1939: put these together, and we have +0-215, a comma, as asserted.

5. The temperament of the minor third in any key, together with the temperaments of the fifths in this key and the succeeding dominant keys, makes a comma, or 0-21506 of a mean semitone. The subdominant of a note is the fourth above it; so that the successive subdominant keys of c, for instance, are those of e, a, d. Thus, in the above system, the temperament of the third in a minor, for instance, is +0-215, and the temperaments of the fifths in d, e, a, d are severally 0; these put together of course give +0-215, a comma, as asserted.

The temperament of the difference of the fifths in the same key is the difference the temperaments of the fifths of the third and the minor third in the dominant key.

The algebraist may easily see how these rules are deduced, and also that they are all which can be obtained. The major and minor by 23 equatons, the fourth and fifth rules contain the second, third, and sixth. Now, the pitch note being given, there are eleven equations to be determined, and there are 3 × 12 or 36 equations between the values of these notes and the temperaments of the major thirds, minor thirds, and fifths.

But 36 equations between the twelve values of the notes should give 25 equations between the values of the temperaments; and these 25 equations are contained in our first, fourth, and fifth rules.

In every system of temperament which deserves the name, the flats must be flattened, and also the minor thirds; while the major thirds must be sharpened. In any other case, the algebraist might use the preceding rules by considering as negative the temperament of a sharpened fifth or minor third, or of a flattened third. In this sense these rules are always true, from the instant when the strings of the instrument are put on, and throughout its existence as a sounding body.

It is now easy to determine the temperaments of the thirds, major and minor, from those of the flats. From a comma subtract the sum of the temperaments of the fifths in the third, or any one key, and you have three temperaments of the dominant keys, and the remainder will be the temperament of the major third in that key. Again, from a comma subtract the sum of the temperaments of the fifths in the three subdominant keys, and you have the temperament of the minor third in that key. Hence we may, without any trouble, lay down at pleasure the temperaments of the fifths, and deduce those of the thirds, but we cannot, from the temperaments of the thirds, deduce those of the fifths. It must be remembered that a succession of fifths, setting out from a given note, runs through every note of the scale before it reaches that note again; while the major thirds are brought up, so to speak, by the operation of a comma, in three successive, and the minor thirds in four. There are then four distinct parcels of major thirds, and three of minor ones, so that it is impossible to pass out of one into another by thirds alone. It would be possible to temper all the major thirds equally, and yet to retain an unlimited number of modes of tempering the fifths, depending upon the manner in which one system of thirds is joined to the others; and the nature of the thirds thereby tempered.

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viation, let simple commas denote addition, thus a, b may
mean a + b. Also let the notes themselves be descriptive
of their intervals from c, thus c means 0; c' means the
interval between G and c; we have, then, V meaning the
number of mean semitones in a perfect fifth,

\[ V = \frac{G}{c} \]

Proceeding in this way, we find the intervals of the
several semitones from the key note, expressed in mean
semitones, the following table:

<table>
<thead>
<tr>
<th>Key</th>
<th>Log.</th>
<th>4T</th>
<th>4F</th>
</tr>
</thead>
</table>
| C | 0.00 | ±1.42 | ±1.99
| G | 0.99 | ±1.42 | ±1.99
| E | 0.24 | ±0.15 | ±0.25
| B | 1.42 | ±1.42 | ±1.99

To carry this or any other system strictly into practice
without comparisons with the monochord, or the
beats, presently described, would be impossible; but
following might be suggested as an approximation.
In tuning by fifths, let the intervals c and c' be made
perfect all but perfect; let there be greater temperaments
in G, D, A, and E, A2; and most of all, decided,
in the remaining intervals.

The system of temperament is sometimes described
by giving the number of vibrations made by each of the
semitones, or numbers proportional to them. It is easy
to deduce the number of mean semitones in each interval
from such data, either by the common tables of logarithms
or by that given in Scale.

First, by the common table of logarithms. From
the logarithm of the number answering to the higher note,
subtract that answering to the lower; from the result take
three-hundredth part, and multiply the remainder by
the number of mean semitones in the interval, and
the number of vibrations with an excess of very little
more, or less, to deduce a mean semitone in an octave.
For example, to find the intervals, in mean semitones, of
a fifth and of a comma of the former of which the lower note makes two vibrations
while the higher makes three, and in the latter 81, the
higher makes 81:

For the Fifth

\[ \log 3 = \log \frac{2}{3} = 0.4771 \]
\[ \log 2 = \log \frac{3}{2} = 0.4013 \]

Then the vibration numbers are:

\[ \log \frac{2}{3} = 0.4771 \]
\[ \log \frac{3}{2} = 0.4013 \]

The vibration numbers, then, will be:

\[ \log \frac{2}{3} = 0.4771 \]
\[ \log \frac{3}{2} = 0.4013 \]

The result is:

\[ 2 \times 0.4771 = 0.9542 \]

Next, by the table in Scale (p. 500). If the number
in the table, simply subtract the logarithm of the number
from that of the higher, and the result is the number
required, within about the hundredth of a mean semitone.
But if the numbers be not in the table, divide both by an
number which will bring them into the table, or
approximately, and then subtract as before: interpoly-
tion may of course be employed, but if the skill of
the computer does not reach so far, he must content
with less accuracy, or, must use the common table
in the manner just explained. For example, a
vibration 4622 vibrations, while another makes 5059; required
the interval between them. Divide both by 30, which
give 154.1 and 107.9; if without interpolation, say 154.1

Now to form the scale in this system. Proceeding
by the table given above, of which we take a few steps as an
example, we have:

\[ c = 0.000000 \]
\[ V = 7.010550 \]
\[ \frac{c}{V} = 0.000000 \]
\[ \frac{c}{V} = 7.010550 \]
\[ a = 2^{0.4771} \]
\[ D = 2^{0.2415}, \text{etc.} \]

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an example, we have:

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\[ a = 2^{0.4771} \]
\[ D = 2^{0.2415}, \text{etc.} \]

* Throw out the twelve as fast as they arise.
while the upper note makes m, the fraction m/n being in its lowest terms, and let N and M be the actual numbers of vibrations in the lower and higher notes, per second: then

\[ nN = mN. \]

Let \( \mu \) be the fraction of a mean semitone, by which the higher note is raised, or lowered, above the natural, and the number of beats in a minute is found by taking the fraction \( \mu \) of the production \( nN \) or \( mN \), multiplying by 1109 and dividing by 320, or by 4, 8, and 10. The algebraical formula is,

\[ \frac{1109 \times mN}{320} \text{ or } \frac{1109 \times nN}{320} = 3 \times 4569. \]

For example, let the note c make 512 vibrations, it is required to find the number of beats per minute in the consonance \( c-c' \), when tempered as in the system of mean semitones. Here \( N = 512, m = 3, nN = 1536.\) The perfect fifth is \( 7/1955 \) mean semitones, whence the fraction \( \mu = 0^{1955} \), since the tempered fifth has seven semitones exactly. Multiply \( 0^{1955} \) by 1536, which gives \( 305288 \); multiply by 1109 and divide by 320, which gives 1047 (say 104) beats in a minute.

Tables for facilitating the calculation might easily be made, but it is hardly worth while to insert them here. These beats are usually, we believe, simply counted with a watch, but it would be both convenient and exact to have some means of checking them, as Dr. Smith recommended, a rhythm which could be the basis of a piece of music, just adjusted to move exactly with the beats; the pendulum might then be subsequently compared with the watch. Without such a contrivance it is very difficult to move advanced point of the 19th century properly and thinking enough in sufficient intensity; with it the last named instrument might easily be tuned on any system of temperament, and those who prize the art would have the advantage of hearing different systems, knowing at the same time what those systems are. At present the organ-builder is the only tuner who makes any approach to science: all the rest judge only by the ear, which may vary from time to time, or even with the state of the body, or the weather. We have many reasons to think that the ear alone is a variable judge in so nice a matter as temperament.

Personal desires of information on this subject may consult Jousse On Temperament, London, 1832; Hamilton, Introduction to the Art of Tuning (no date); Stanhope, Principles of Tuning, 1806; Marsh, Theory of Harmonics, 1849; Woolhouse, On Musica Intervalorum, 1836; Sir J. H. Herz, On Sound (Encyclopedia Metropolitana.); Young’s Figures, vol. 1, cap. 33; Smith On Metronomia, a first class monument of Dr. 1749; second class monument of Mr. 1750; third class monument of Dr. 1753. This map of Dr. South is most difficult and confused, but is still the most inclusive separate treatise on the subject; that of Mr. Woolhouse is sufficient, and much more intelligible.

It is on land and containing tamarisks, situated in the central part of the northern coast of Africa. It is bounded on the north and east by the Mediterranean Sea, on the west by the territory of Constantina, and on the south by the country of the Bizerte. Its greatest extent from north to south, where the boundary-line is very undefined, is about 300 miles, while its breadth from east to west varies from 65 to 140 miles. The average width may be about 100 miles, so that the area of Tunis will be 30,000,000 square miles, or about 3000 square miles more than that of Ireland. In this rough estimate the country south of 33° N. lat., which is part of the Sahara, and in which the authority of the Bey seems to be only nominal, is excluded.

Occupying the countries formerly known as Zegitana and Byzaeum, and projecting towards the centre of the Mediterranean to within 80 miles of Sicily, Tunis is the most important of all the countries of Northern Africa, not only as to the extent of its position but for the ports it possesses on a coast measuring in a sailing line about 400 miles. These advantages made its inhabitants a warlike and commercial people in the time of the Carthaginians, the fall of whom being the strength of the Barbary and Sarrasins against Southern Europe in the middle ages, and an unceasing annoyance to the Christian states after it fell into the hands of the Moslem pirates.

The northern portion of the country, or that which is situated north of 36° N. lat., exhibits in general a hilly character, and rises in some parts into mountains of considerable elevation, though there are also several plains of some extent. In the southern districts however, which comprehend more than three-fourths of the area, a level character prevails; and such ridges as occur are neither extensive nor elevated, with the exception of the Jebel Ussatil.

The frontier between the Algerian and Tunisian states of Tunisia has sometimes varied, but is now marked by the small rivulet of Wad-el-Esk, in 38° 32' E. long., whilst the boundary of Numidia and Africa Propria, the ancient names of these provinces was defined by a line running from D’Avance, which falls into the Bay of Tabarka 12 miles farther to the eastward. Indeed this seems to have been considered the boundary of the modern states when Dr. Shaw wrote his Travels, or Observations on Barbary and Africa (1797). The heights of the Rif, which once possessed by the Genoese, lies in the innermost part of this bay, five or six hundred yards from the mainland. The capes and headlands of this coast are variously laid down by geographers. The map of the Chevalier Lamon (Paris, 1829) seems to be most carefully compiled as a map; the best authority for the coast-line and soundings is the Admiralty Chart from the surveys of Captain W. H. Smyth (1821). According to those authorities, starting from Tabarka towards the north-east, and passing Cape Negro and Cape Serrat (Ras el-Munshikhar), we arrive at Cape Kroun, 58 miles from the frontier, in 37° 29' 10" N. lat. About 8 miles due east Cape Ras Abed el-Ka, the Cape of Planty, stands forth in 37° 19' 50" N. lat. The trifling difference between the latitudes of these two capes may account for sometimes the one and sometimes the other appearing as the most advanced point of the northern coast. The facade of the Sea-coast.—The northern coast, from the boundary-line of Tunis and Algiers to Ras Sidi Ali-el-Mekki, or Cape Farina, is rocky and high. The western part of it, as far as Ras el-Mun-shikhar, or Cape Serrat, is steep, and the mountains continue to rise near it a considerable elevation: it is also mostly wooded, but east of that promontory the coast is much lower, and in many parts considerable tracts of barren sand extend from the summits of the hills to the water’s edge. The most eastern portion of the said eastern extremity of Ras Sidi Bouchaicha, or Cape Zibeeb, contains only hills, most of which are covered with large plantations of olives, between which there are a few tracts of yellow sand.

The coast here takes a sudden direction to the southward into the Bay of Biserta, and we immediately fall upon the once fortified town of that name, called by the natives Benzart, the Hippo-Zarytus of the ancients, situated upon a narrow channel which connects the waters of two magnificent lakes with the sea. It was formerly the safest seat of Northern Africa, and was a great naval station of the Barbary corsairs; but the channel is now choked up by neglect, and the town, although governed by an agha, the governor and containing two thousand houses, is in the miserable remains of a place which flourished at no very remote period. Its white towers however produce a picturesque effect in the beautiful landscape and rich country which extends towards the south. On the east is the headland called Ras Zibeeb; and 14 miles beyond this Cape Farina (sometimes called Cape di Guardia, but by Shaw erroneously at Ras Zibeeb), the Promontorium Apollina of the ancients, forms the western limit of the Gulf of Tunis: its Moorish name is Ras Sidi Ali-el-Mekki.

The coast of the Bay of Tunis, from Ras Sidi Ali-el-Mekki to Ras Ghomart, is low and generally indented, long that projection on which the ruins of Carthage are found the coast is rocky, though in general slightly elevated above the sea. The shores of the innermost recess of the Bay of Tunis, between Ras Sidi Bousaid to Mannish, near Ras Zairan, are low, and in many parts marshy. From Ras Zafran to Ras Addar, or Cape Bon, and thence to Ras Mustapha, the coast is alternately rocky and high, and low and swampy.

A few miles within Ras Sidi Ali-el-Mekki the river Majerda, the ancient Barudia, falls into the sea through a lagoon, commonly called Port Farina, upon which stands the town of Ghar-el-Mheb, once populous, with its ports, mole, dockyard, and arsenal; where, no longer ago than the beginning of the 19th century, the largest vessel rode at anchor: but the decline of the Moorish power and the filling up of the port by the alluvium of the river have left it a deserted place, more wretched than Biserta. Crossing the Gulf of Tunis and passing the two small islands of...
Zembre, or, as the Moors call them, Zowamores, which lie at the entrance of the gulf, near to its eastern limit, we find ourselves at Cape Bon (Ras Addar), the Promontorium Mercurii of the ancients. This cape forms the eastern terminus of the Tunisine territory; for the coast here takes a sudden direction to the south, as far as Ras el-Zargias, the frontier of the kingdom of Tripoli.

Ras Mustapha to Ras-el-Mahmoor the coast is low and generally swampy, being formed by the alluvial deposit brought down from the adjacent hills by numerous torrents. A tract of low and rocky coast extends from Ras-el-Mahmoor to Hammamat, and it is fully covered with a low sandy coast, which forms the interior of the Bay of Hammamat, and terminates near Susa. There is a considerable lagoon connected with the sea near Hercola. From Susa to Ras Capodora (the ancient Caput Vada), and thence to the town of Skukku, the shores are in general rocky, but not high; in a few places they are low and sandy. Between Lambta and Tobulba is another etba, or lagoon, which is not connected with the sea. It is three miles long and half a mile wide. Salt is collected there to a large amount.

Hammamat, which gives its name to the gulf, is a town of about 4000 inhabitants, the cleanest and neatest in the regency. It is the capital of an agricultural district of the same name. Not far from it stands Heraclae, the Heraclides of the lower empire, and, according to Shaw, the Adnemetum of former ages. But Sir Grenville Temple, in his 'Excursions in the Mediterranean' (London, 1835), adduces strong grounds for believing that Susa was the ancient city of Thapsus, and that the modern town of Sfakkus is the historic region of Byzacium. With its battlements, castles, and mosques, Susa still presents from the sea a pleasing appearance, and is a place of considerable commerce, and one of the wealthy cities of the Tunisine state, being the chief mart for oil, linen, and soap: it has about 6000 inhabitants. The ruins of the ancient harbour are clearly traceable under water, and at the present day it has a mole, and good anchorage in 7, 9, and 10 fathoms of water, sufficient for vessels of 1000 tons sailing north-east. The castle appears to be kept in good order, and in 1393 the place resisted a regular siege by a combined Spanish and Maltese naval force, which was obliged to retire after a breach was made. Passing the modern town of Matir, or Monastir, which is walled in and fortified, but has no safe anchorage, and the village of Lampis, the Leptis Parva of antiquity (which, whatever may have been its wealth, according to Pliny, and its safety as a port, according to Lunn, is now an insignificant place), we arrive at Cape Demas, the southern limit of the Gulf of Hammamat. Here are the remnants of the once large and powerful town of Thapsus, whose solid mole is yet partly in existence, while the modern Mahabed, on the south, and Taras Hannibal is by the ancients, stands on a point of land about nine miles to the southward of Cape Demas. It was a place of great strength and importance in the sixteenth century, and was taken only after a long and frequent investment, and with fierce repulse against the Moors by Charles V., who, finding it to be the stronghold of the corsair Dragut, expended much money and much Christian blood to possess himself of it; but after having taken the place, he abandoned it, and destroyed its works, the remains of which show that they were of great solidity. The inner harbour, which was within the fortifications, is now quite dry, and it is in fact a poor place, available neither for trade nor for commerce. About 2^½ miles to the south, bounded by Cape Capata, the Caput Vada of Procopius, on the north, and the island of Gerba on the south, opens the Gulf of Cabes, or the Little Syris. Among the towns on its shores is Slax, or Sliak, the ancient Tapu, or Taphus, where there is a mole, and good anchorage, although the approach to it is intricate, by reason of the Karkka islands and innumerable low rocks which run for miles along this coast. It is a very good test for pilots, but now is a station for inland produce and European as well as Eastern merchandise, in which it carries on a brisk commerce; the inhabitants, amounting to 12,000, are a thriving and rich people. Farther to the south, on the island of Gerba, there is no small port of Gerba, or Cabes, from which the gulf takes its modern name. The town stands about a mile from the sea. It is supposed that Thapsus, or Epichus, once stood near this site. Gerba, the Meninx of Strabo and Pliny, is a considerable and populous island. Its greatest curiosity is a tower constructed of human skulls said to be those of 1400 Christians belonging to seaport Sicilian and Maltese galleys, who were taken in an action off Gerba in 1580.

The shores of the Gulf of Cabes are not so much frequented as the others, and there are few people in the interior. It seems to be established that there is a tide or rise of the sea, which is variously stated at three and five feet; near the island of Gerba it amounts to even ten feet. The difference in the level of the sea and the mainland is due to the sudden rise accounted for by the sudden opposition which the sea receives from the eastern coast of Tunis, and its lateral compression caused by the island of Sicily. The danger of the Minor Syris therefore arose not so much from the height of the tide as from the sharpness of its fall, and from the certainty of the tides on a flat shelving coast. From Cape Vada to the island of Gerba lie a number of little flats, banks of sand, oozy bottoms, and small depths of water, which make its navigation intricate and dangerous to strangers, but easy to the natives who know its channels and innumerable windings. The gulf is not more than 75 miles in extent from its northern to its southern point, and it penetrates into the mainland about 60 miles. But Major Russell, after a circumnavigation of Barboutus, Ptolomey, Pliny, Sicily, and every other author who has written upon the geography of this part of the world, comes to the conclusion that it at one time thrived deeper into the land, and formed a junction with the lake Lodowesh, called also the lake of Marks, the Triton Palus, of the antients; and he confirms this opinion from D. Shaw's account of them, who says that the land between the east end of the lake and the inmost recess of the Syris is flat and little elevated above the level of the sea, and that the space between them is about 22 miles in length and 10 or 12 in breadth. He describes the land also as not being cultivated and to be still gaining on the sea at Cabes, where at a distance of a town of Tarras, called Gabs, or Tarras. Nothing appears more probable than that such a change should have taken place in a situation where the continued operation of the sea is depositing sand on a flat coast where there is no barrier to sweep it into the sea. If the lake and the gulf were separated from each other by a bar of sand only, the perils of the Syris would naturally be deemed by the antients greater than they are present. In modern times the Gulf of Cabes is not spoken of by mariners with particular alarm, as it is made by the number of small vessels which carry on a trade in every season between Sfax, and the ports of Sicily, Malta, Alexandria, and the Levant. And in fact M. de Chateaubriand and the Chevalier Vaudreuil, who wrote, in 1776, that there is no bar to sail down it, says that the sea, from the shallowness of the water in the Minor Syris, is calm in the most violent winds; and that this gulf, so dangerous to the banks of the antients, is a sort of port in the open sea for vessels from Europe.

The Interior.—Tunis is so situated that it is never traversed by Europeans as the highroad between one country and another. It is only therefore from those enterprising merchants who, at no small personal risk, pass through it for the purpose of carrying on trade, that we can know anything of its interior provinces. Thus Dr. Possanel, at the expense of the king of France, made a survey of a great part of these territories in 1726. Dr. Shaw has made a valuable general work on the coast of Tunis, passed through it in several directions in 1727-26. Brayley, in 1766-68, previous to exploring the Nile, remained six months encamped in many parts of this country, and made a vast number of drawings of remarkable objects of art,
South of the Mediterranean on the north, is the Mediterranean; to the south, the range is the Cerbni, which rises to a height of 4000 feet. The rocks are of various types, including granite, basalt, and limestone. The vegetation is dense, especially in the lower elevations, with a variety of shrubs, trees, and grasses.

The town of Tun is located on the west coast, at the mouth of the river which flows through the southern part of the region. The town is situated on a hill, and is surrounded by a wall with five gates. The walls are of stone, and the gates are of wood, with stone arches.

The river is navigable for about 15 miles, and is used for the transport of goods and passengers. The river is also used for irrigation, and there are many wells and springs in the vicinity of the town. The climate is mild, with moderate temperatures throughout the year. The rainfall is adequate, and the soil is fertile. The main crops are olives, grapes, and wheat.

The people of Tun are primarily farmers and fishermen. They also engage in trade, and there is a weekly market in the town. The language spoken is Arabic, and the people are of Berber descent. The town has a mosque, a school, and a hospital.

The region is rich in minerals, including gold, silver, and copper. There are also deposits of coal and iron. The region is inhabited by a variety of animals, including camels, goats, and sheep.

The region is also known for its rich history. It was once a center of trade, and was ruled by various empires, including the Phoenicians, the Carthaginians, and the Romans. The city of Carthage was founded in the 9th century BC, and was a major center of trade and culture. The city was later destroyed by the Romans, and the ruins are still visible today.

The region is also known for its beautiful landscapes, which include mountains, valleys, and rivers. The mountains are covered with forests, and the valleys are fertile. The rivers are navigable, and are used for irrigation and transport. The region is also known for its beaches, which are popular with tourists.
forming Ras Addar with the continent. The Dakhil is noted for its fertility; but the interior, as far as it has been seen by travellers, appears to consistchiefly of rocky, stony, and barren districts, with little vegetation on them. Only the level tract, which lies along its eastern side, exhibits any great degree of fertility. It is from two to three miles wide, and consists of a plain which has been traversed by numerous torrents from the mountains and deposited at its base. This tract is well cultivated, and produces abundant crops of grain, and the fields are interspersed with villages surrounded by groves of olive-trees and orchards, in which fig-trees and peach-trees also grow. The various parts of this district have excellent pastures for cattle, which are numerous. The dairies are well attended to. The western shores of the Dakhil are far from being fertile; a great part of this tract is covered with stony soils, and is not very productive. North of the Jebel Zaghouan there are some lead-mines. The countries hitherto noticed may be considered as the agricultural part of Tunis. The greater part of the inhabitants are extensively or chiefly engaged in cultivating the ground and in planting olive-trees and orchards. In some parts these occupations are united with the rearing of cattle and attending to the dairy. They all live in fixed habitations, with the exception of a few families of Arabs who wander about in the southern desert with their herd of camels. Some other parts of the country are distinguished from the south, however, the bulk of the population consists of wandering tribes, who only occasionally cultivate the ground. There are several extensive tracts on which agriculture or horticulture is carried on with success, but these tracts constitute a very small proportion of the whole country.

The region is separated on the north from the upper valley of the Maghulls by the high Rif Mountains, and extends southward to 35° N. lat. and eastward to Jебel Usbalat (10° E. long.), is very imperfectly known. As far as can be inferred from the accounts of the few travellers who have travelled in this region consists of a succession of altitudes of hills and of plains of considerable extent. Some of the hills are connected so as to form long ridges; others are isolated. Part of them are wooded, especially in these northern latitudes, and inhabited by them, and they are certainly the richest parts of the country. The plains, however, are thirsty and barren lands. The several valleys contain the small tracts which are cultivated by the Arabs. The plains are entirely without cultivation, and serve only as pasture-grounds for sheep and camels. The interior of the region has no towns and very few villages. The Arabs live in huts, or clusters of huts. The numerous ruins of large towns which are dispersed over it shew that a considerable portion of this tract was once cultivated. This country must be considerably elevated above the sea-level and must be connected with the interior. To the east of this region lies the plain of Kerwan, which extends from the innermost recess of the Gulf of Hammamat to the town of Sfax. Nearly in the middle of this tract stretches a plain of more than 100 miles in length and about 30 miles in width, in this tract is situated from which its name is derived. The surface is stated to be almost a continual level, which is rarely interrupted by single hills; but the degree of cold which is experienced in the town of Kerwan proves that this place must be considerably above the sea. The plain is destitute of trees, and nearly without cultivation, except in the immediate vicinity of the town, where a large tract is stowed with several kinds of grain. The Arabs who wander about in this trifling pastoral pasture for their camels and horses, and appear to be much more wealthy than the other Arab tribes in Tunis. They sow small tracts with barley and pulse.

The plain of Kerwan reaches to the shores of the sea between Hammamat and Sfax; but further south it is separated from the sea by hilly tracts, which extend from the town of Susa southward to a point opposite the islands of Karkenah. This tract may be about 24 miles in width in the widest part, as it approaches on the west the ruins called Al Jen. The interior of this region is composed of a succession of sterile hills; but the eastern border, and the low tract which lies between it and the sea-shore, are tolerably fertile. It is chiefly planted with olive-trees, which frequently form traverses of many miles long and from two to three miles wide. This coast has several sea-ports, from which oil, wool, and wax are exported; the last-mentioned articles are brought by the Arabs from the interior. The most southern extremity of this region is the town of Sfax, whose olive-plantations extend 10 or 12 miles along the sea from to 6 miles inland, and are intermingled with pastures devoted to stock breeding and to the cultivation of grain. The country which lies to the south of the three regions already mentioned, and which contains the larger part of the country called by the ancients Byzacium, one may be considered as the most fertile and most productive region of all. It is not to be supposed that the Arabs ever admitted that we know nothing of the interior, we are very imperfectly acquainted with its most eastern and most western districts. Along the sea-shore there is a plain, whose surface is varied only by some sand-hills. These sand-hills, however, occasionally appear rising far to the west. Along the sea-shore the soil consists of sand, but further inland a great part of it is composed of more compact materials. The whole lower part of this district is well watered by the large streams of the tribes of Arabs, who have large herds of camels, horses, cattle, and sheep. In one or two places on the sea-coast indigo is cultivated to a small extent. The whole plain consists of trees, and even bushes are rare. The western districts, or those contiguous to the boundary-line of Libya, consist of a long valley, which extends nearly 60 miles, from 33° N. lat. to some distance south of 34° N. lat. Its soil is dry, and only a few small rivers are met with. The few small lakes which are present are of little extent. They are the only spots in the valley which are cultivated. The ridges, however, are destitute of trees, and nearly without vegetation. Towards the northern extremity of the district, however, some rocks, hilly tracts, and few large tracts of pasture-ground, for the wandering tribes.

The southern portion of Tunis is called the Jend. Beled-al-Jerid (the country of palm-trees). It extends from about 34° N. lat. southward to the southern shore of the great salt lake, Al Sibiah, on the south is contiguous to the Sahara. This lake is long from south-west to north-east, and about 50 miles wide on an average. In summer it is dry, but is flooded, or covered with water, at least once a year, and is considered a sheet of water. When dry, the central part has, for 15 or 18 miles, is covered with a layer of salt, which is not so strong as sea-salt, and not adapted for preserving provisions; but it has an agreeable appearance, and near the banks of the lake is a tract whose surface is sandy, or partially overgrown with bushes. In winter the whole surface is covered with water to a depth of two or three feet. It may however be passed over in the hunting or the crossing of the country. This lake extends from the eastern shores of the salt lake to the Gulf of Gabes, consists of a succession of hills. It is a great grassy plain, which is covered with reeds and grasses, to which circumstance its fertility is owing: the water is employed in irrigating the adjacent fields until it is exhausted. It is particularly employed in irrigating the plantations of date-trees, which in some places cover the face of the country. In some cases, however, the land is cultivated with numerous numbers of palm-trees, each of them surrounding a village, but between these cultivated spots there are large tracts that exhibit no sign of vegetation. In this region considerable quantities of henna are cultivated. Great care is taken in cultivating these grounds, and manure is applied to them. Some of the gardens are extensive, and cover a great variety of fruit-trees, as the peach, apricot, orange, lotus, pomegranate, and fig. Mellow and succulent stones are grown in considerable quantities.

On the west of the Sibiah occurs a similar tract, which extends from the southern extremity of the salt lake to its shore, and is of superior quality; the date-trees are of a better quality, and the soil in these plantations are of an exquisite flavour, and are considered superior to any in Barbary. The inhabitants of this tract are wealthy, and live in well-constructed houses of stone.

Near the boundary-line of Tripoli is the island of Gaba, which is separated from the mainland by a small strait and two straits. The narrowest of the straits is less than a mile across. The island is about 18 miles long, and an average half as wide. It is not much above 500 feet above the sea-level; but the soil is surrounded by a shallow water: the surface is level. The fertility is very great, and it is extensively cultivated that it resembles a large orchard. With the exception of two small towns inhabited by the Arabs, there is no part of the island which is not cultivated; but the whole surface of the island is divided with villas and...
houses, which are surrounded by fine orchards. Every spot on the island is cultivated; the produce is wheat and barley. Among the fruit-trees the lotus is most frequent, but dates, palms, and olive-trees are also abundant, and also the vine and orange-tree. The climate is much more temperate than that of the adjacent mainland. The islands consist of four parts, or rather landing-places—Aijem on the west, Terejas on the east, Marse-S-Sok on the north, and Marsa-Ich on the south. The population is estimated by Government at 150,000 individuals. The same author states that there are 400 mosques in the island. Many of the inhabitants are engaged in manufactures.

(Shaw's Travels and Observations on Barbary and the Levant; Temple's Excursions in the Mediterranean; and Eardley-Brown's Travels in Greece.)

Climate.—The atmosphere of the Regency of Tunis is generally pure and wholesome. The plague is not endemic or periodic, as in Egypt, and is only known when introduced from other parts. In all other respects the climate and seasons resemble those of Tripoli. The summer heats are moderated by sea-breezes along the coast, and the winters resemble our spring. Although the habits of the people are far from cleanly, and noisome insects and vermi are plentiful, and although their habitations, moveable as well as fixed, are seldom free from offensive smells, yet fevers are not frequent, and epidemic maladies are scarcely known. During the summer and autumn rain is very rare; it only falls before rain and clouds, and continues until the month of April. According to meteorological observations carried on for more than three years, the mean temperature at the town of Tunis was found to be as follows:

<table>
<thead>
<tr>
<th>Month</th>
<th>Mean Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 42°</td>
<td>April 64°</td>
</tr>
<tr>
<td>Feb. 57°</td>
<td>May 71°</td>
</tr>
<tr>
<td>March 56°</td>
<td>June 68°</td>
</tr>
<tr>
<td>Winter 59°</td>
<td>Spring 71°</td>
</tr>
</tbody>
</table>

The mean annual temperature is 62°.

Government.—The ruler of the territory of Tunis at present bears the title of Bey, and in state documents he is called the basha bey of Tunis, because he is invested with the rank of pasha (which, in the dialect of Barbary, is based upon Baasha), together as his political circumstances require the sultan's favour or protection. But the Porte has little control over him, and he is an independent prince, and the sovereignty of the country, with whom the states of Europe enter into treaties on matters international and commercial, and to whom they send their consuls, who are also diplomatic agents. Although he is nominally elected by a divan, yet the power as well as by his election, or by his easy obtains their suffrages for the nomination of his successor in the person of one of his own family; and thus the sovereignty has remained in the same dynasty for nearly a century. By a like management his power is discretion of the bey himself, and under him is general the will of its master. This kingdom is not divided, like Tripoli, into provinces governed by separate chiefs, but is under the direct control of the bey himself, whose power is consequently the more consolidated, and no one ever thinks of opposing it. As his revenue depends greatly upon the tribute which he exacts from the Arab tribes in the interior, he is obliged to keep up a standing force, which he annually engages to secure the country and export payment. The troops in regular pay amount to about 8000, who were raised in 1831, and taught European tactics under French officers. The body-guard consists of 230 Mameluks, all renegades, chiefly Italians; but Italy, as well as the regulars, now wear the new Turkish uniform. The contingents furnished by the Arab tribes, amounting to 40,000 men, chiefly cavalry, receive no pay, but are exempt from tribute; and they are only called out when occasion requires them to be in the field for the defence of the country, or to overawe and assist in exorting the tribute from the rest of the population. This is done in the most arbitrary manner, according to the caprice of the officers. These officers generally rank as relations of the bey. The collector goes into a field, whilst the crop is still green, and values it according to his caprice. The owner is then obliged to pay a tithe on this supposed value of his future crop, although when the crop is actually bestripped it may not exceed the fourth part of the sum at which it was estimated. The same is the case with olives and dates, in which consist the principal resources of the country. All ranks of animals and even the serfs, are also similarly taxed at pleasure. Those who have not money to pay their herds and flocks are made to pay in money, which is often extended by the bastinado; and many submit to this rather than incur the danger of declaring their means. The bey draws other tribute —a tax from the vineyards and the olive-trees by the pound, and a tithe by the cubic measure. (Letters of teskharus (permits to export grain and other produce, and for the importation of wine and spirits), from monopolies of various sorts, from a tax on the Jews, and from his own lands. He and the bey adhere to the same system of a casual nature, such as the wealth of his rich subjects who have his profits in trade, which are considerable, and his extortions from those who have money whenever a public pretext arises. It is impossible to form any estimate of his revenue. Formerly the Beys of Tunis amassed wealth, but of late years it is believed that the expenditure of the state has been equal to the revenue; for besides the cession of the profits of piracy, and the expense of the number of troops maintained by reason of the vicissitude of the large French force established in Algiers, the bey has been obliged to ward off by large presents the fate which lately fell upon the hereditary basha of Tripoli when he was superseded by a governor appointed from Constantinople. These altered circumstances have entirely changed the aspect of Tunis as a naval power. As long as she was allowed to plunder upon the seas, no state was ever more active in fitting out squadrons, and she was looking and considered than the Tunesines in filling up their losses. But their present powerful is reduced to insignificance since 1816, as well by gales on their own shores as by the total loss of the bey's command in battle. It is the only revenue at present (1842) his force consists of two corvettes, three brigs, three schooners, and a few gun-boats, for which he has no real use, unless for trading purposes, or transmitting presents and compliments to Constantinople. The bey is the chief of the religion of the state in Tunis, and is himself the first judge in his kingdom. He sits in the hall of justice almost daily, and his decisions, which are summary, are immediately put into execution. The kais or bey's officers, and the bey himself, for all public occasions, wear the uniform of the interior towns. The kads judge only in matters of religion.

Commerce.—The foreign commerce of Tunis is the most considerable of all the Barbary states. It is not confined to the capital, but is also carried on briskly from the ports of the eastern coast. Among the manufactured articles of export are—soap, maroeco leather, Gerba shawls, and the red scull-cap worn so generally by the people of Barbary, the best-looked for in the Levant, French, Christians, and Jews, who shave their heads according to their custom of the East. Wheat and barley (when permitted), as well as the inferior grains, olive-oil of an excellent quality, common wool, hides, rose-wax, dates, almonds, sponges, and orchilla-seed, are exported in considerable quantities. The goods are generally carried in slacks or camels, and of these the surplus is exported; those received from the interior of Africa, and afterwards exported, are—ivory, gold-dust, ostrich-feathers, slaves, and madder-roots. The imports are woolen clothes, cotton-prints, calicoes, muslins, coarse linens, damarks, raw and wrought silks, fine wool, gold and silver tissues, coffee, sugar, spices, alum, vitriol, cochineal, vermillion, gum-lac, iron, tin, lead, hardware, cutlery, arms of all sorts, earthenware, glass of every sort, wine, spirits, and tobacco. Formerly the European trade was entirely with France, Italy, and Trieste, the English manufacturers finding their way through the free port of Leghorn; but now, although the English have no direct intercourse with Tunis, an increasing number of the English trade is carried on through Malta. English merchandise, as well as that of those nations which have recently made treaties with Tunis, pays a duty of 3 per cent. upon entrance; but the Jews and others of the country pay a duty of from 5 to 10 per cent. on all kinds of goods. Certain kinds of naval stores are admitted free for the service of the government, although gunpowder has lately become a contraband article for the people, the Bey having now a manufacturing establishment of his own, with which he is generally satisfied. A considerable number of men loading, those of Sfax and Susa are preferred to Tunis, in consequence of the distance and delay of transporting merchandise in lighters across the lake to the Goletta, where ships generally lie; the commerce of Tunis vessels under 150 tons burden. The following enumeration, from Sir Grenville Temple's work, of vessels arrived at the port of Tunis (exclusive of A A 2
the small coasting vessels of the country), in all the year 1832, will not therefore give an idea of more than half of the commerce of the regency; but it will serve to indicate the number of goods which it is carried on, namely, ordinary 153, French 98, Neapolitan and Sicilian 48, Tuscan 22, English (mostly Maltese) 21, Austrian 15, Spanish 10, Ottoman 9, Tunisines 6, Greek 6, Tripolines 5, Ionian 1, and Russian 1. The trade with Central Africa passes through Gabumas. [TARPOL.] The caravans arrive at Toster, Cabes, and Safa about twice in the year, and barter their merchandise, which is thence introduced in various directions into Tunis. Besides the abode of the country merchants, the Djebels are inhabited, and they take in turn friendly, woolen-cloths, muslins, silks, colonial produce, skull-caps, and such like. Formerly the caravans fromConstantinato the capital were very frequent, sometimes arriving monthly. The annual Spanish galleons, to the amount of a large amount, for the purchase of European goods, which gave a great impulse to commerce. But about the beginning of the present century the Algerines found means to divert this trade to their own shores; and now the French have effectually possessed themselves of it, to the great disappointment of the merchants of Tunis.

Towns.—The territory of Tunis contains a great number of ancient towns, whose ruins lie scattered over the whole country, and now stand in the midst of these vast solitudes, some of them totally uninhabited, except by the lion, the wolf, and other ferocious animals, unless when the Arabs occasionally pitch their tents on their sites. The Djebels being free land and free soil, after Tunis is Cairoan, or Kairawan, which was the principal station of the first Arabian conquerors. It was founded by the Arabs about a.d. 693, and was afterwards the seat of learning and of power, next to the capital, until it was broken up from about 70 miles, and about 24 west of Sussa. The town is large and has good houses, and is surrounded by a crenellated wall with four gates. The great mosque, which is esteemed the most grand, as well as the most magnificent in all Barbary, is supported by many marble or granite pillars, said to amount to 500; but no Christian has ever been allowed to see them. Indeed Cairoan, the city of Almohads, was obliged to pass through it in deep silence, without venturing to be inquisitive. Its Kaïd is almost independent of the Bey, his being absolute in his own district; and he controls a force less than 50,000 Arabs, besides governing the 50,000 inhabitants which the town is supposed to contain. The inhabitants are famed for the beauty of their yellow marocoo boots and slippers, made of a leather which has never been successfully imitated. They are rich in riches and indolence and strength, and is the key of Tunis on the western frontier. Its walls are kept in good repair, and the fortress mounts 132 pieces of cannon. There was always a small garrison here, which has lately been increased to 100 men to form a fertile country, on the declivity of a rocky range of mountains, the view from it is very fine, embracing a great extent of land, diversified with rich plains and bold scenery. The town is not populous, but the Kaïd commands a district containing 50,000 males, and is consequently a man of great power and influence, both as regards the government and the people.

This district is the country called the Beloued-el-Jerid, upon the borders of the Sahara, or Great Desert, across which the people of Tozer, the great mart for dates in these parts, carry on an active traffic with the interior, as far as the Joliba, exchanging their dried fruit for black slaves, which have a great demand in the towns of the coast.

The towns and villages are more numerous and the population is greater in the northern parts of the regency near the capital. The Dachkhi, besides being an agricultural district, has good fisheries, and has several small rivers running into the sea, which fertilise the country. Proceeding in this direction from the capital, we first arrive at the considerable village of Telouet. At Telouet has a large population, the descendants of Moors who fled from Spain. At Hamman Leuf, where the Bay has a palace, and at Hamman Ghorbas, are mineral-baths famous for curing rheumatic and other diseases. Beyond these is Lowkareh, where there are extensive marigolds, which are said to have furnished the materials for the building of Carthage and Utica. Zovar, or Zagwán, a flourishing town built upon the skirts of a very high mount of the same name, about thirty miles south of the city of Tunis, supplied water to the city of Carthage by conduit and aqueduct. The Moslem town is also called Lowkareh, and is a considerable city, still standing. The stream is now employed in dyeing its woolen scarlet caps worn throughout Turkey and the Levant; and this mountain, as well as that of Kaff, furnish copper, which is brought for some distance from the African interior. The village is inhabited by a Christian population, although only about twelve miles distant from Tunis, and on the site of Utica there are only a few miserable huts, known by the name of Booshaster, standing almost as a mark of the banks of the Oued, which is covered with the sites of ancient houses. But in the actual condition of Tunis, it is not surprising that the lands remain almost uncultivated, the husbandman being always apprehensive the huis crop may be seized, either by his own chief or by some other rival. The government is accustomed to purchase from them, for example, for wealth, or even the appearance of it, subject an individual to oppression and spoliation.

The lion, the panther, the ounce, the wild boar, are the principal ferocious animals that inhabit the western parts of Tunis; for to the eastward the meridian of Tabarca the forests cease, and the country is less woody. Flies, noxious vermin, mosquitoes, gnats, and the scorpion are the torment of Europeans in all parts of the country.

Inhabitants.—The Tunisines in general, like the Algerines, are a mixed race of Turks, Moors, and Jews, in the towns, interspersed with a few Christians and negroes. The country consists of four different tribes. [ALGERIA.] The Moors of North Africa are a white race, and it is a vulgar error to imagine that a Moor must necessarily be a negro or a person of very low degree. There are four tribes, the one, called the 'Tamazuins, to which the abode in Spain, or with the Turks, who afterwards their masters, or from the blood of renegades or female slaves taken during three centuries of war and intercourse with European nations, are Moors. All the rest of the population, and many of their women would be reckoned had some in any part of the world. Although the people of this country are more civilized than those of the other nations of Barbary, it being the principal seat in which the Moors fled who were driven out of Spain; and some of whose manufactures have thriven among them, they are very ignorant: their most instructed men only a knowledge of reading and writing and arithmetic, just enough to manage their commercial concerns, in which they evince great acuteness, as the enterprisers of Europeans. Nor do they seem desirous of extending their learning beyond an acquaintance with the Koran; the nature of little towns, and its distance from the sea, where the Moors is the same as that of the Arabs of Africa, the desert becoming less pure according to their more distant situation from Egypt; but a bastard Italian, called the Lingua Franca, is spoken in the ports. They are simple and Mohammedans, and submit calmly to the restraints of fortune. But they are arduous, very jealous, and many of them abandoned to extreme licentiousness. Their principal amusement is smoking, or playing at chess or draughts. The females are excluded from society, and are shut up in almost constant confinement, and when permitted to go out they are closely veiled with a thick garment. They pass their time in making sweetmeats and in the care of their children, whom they use every way which is considered a point of beauty, but they are not deficient in grace; they are fond of dress, which is often splendid and sometimes tasteful. The houses of the Moors, though of ordinary appearance with rare exception, is very pleasant, and is composed of the black tiles, which consists of ten articles, such as carpets, mattresses, and cushions, which are often made of rich silks and embroidery. The Bedouins, or Arabs, who are the inhabitants of the large desert, are peculiar to it, and live wandering in the desert, pitch their tents in circles called dawars, according to the season, wherever they find a desirable spot either for shelter or for cultivation of the land. The Kabyles live in the mountains, and are noted for their hat, a garment made of hazel wood, or of clay and stones hardened by the heat of the sun. Both races are simple and abstemious in their
living, subsisting on bread, milk, and dates. The women are industrious, and make a great part of the cloth for their own use, and the men's clothing, as well as the hair-covering for their tent mats, mats, mats, and mats, the par- ticular work of the men. The field leads an indolent life when not employed in the chase, the rearing of cattle, or in some sort of urgent labour, such as the getting in of the harvest, which are attended as a matter of course, and a bed by night. The farther we advance into the interior, the more these people are found as described by Leo Africans, namely, rude and unkind to strangers. Travelling is attended with great risk, not only from probable violence, but from the rapidity with which cattle are worked, and upon their fears that they can be induced to supply a traveller's wants. Any attempt to manage them by mild means would be vain. In this respect there is a notable difference between these people and the Arabs of Tripoli, who have been found hospitable according to the accounts of all travellers. But in Tunis it is only the show of authority that can insure their compliance. The idea of the Bey's power is represented by the periodic excursions of his troops through the country, that his firmness may date and the appearance of a few soldiers never meet with a direct opposition. As to that part of the country situated on the frontiers of Algiers, the Kabyles and Arabs who live there are generally averse to strangers, and when they have committed a crime, they have only to pass from one country to the other to place themselves in safety. Since the possession of Algiers by the French, the personal freedom of the Christians, who, they think, form only one nation. The use of arms is universal: the traveller, the shepherd, the labourer, the camel-driver, and the people, all armed, and some of them being armed with daggers, gun, or pistol, to repel attacks, and sometimes to maintain the laws of Islam. The Moroccans, the Morea, Moors and Negroes, Bedouin Arabs and Kabyles, Jews and renegade Christians— all form one great body, in each of which seeks his own advantage and no one thinks of a more civilized state. This people in fact has made no advancement for a thousand years, although their country lies within two days' sail of the continent of Europe. The total eradication of Christianity may in some degree account for this. The number of churches which formerly existed in Barbary is almost incredible. In the 'Notitia Episcopatum Ecclésiae Africanae,' we find the names of 132 episcopal sees, in the prosconular province alone. Never however was there a religion and its symbol so completely exterminated. Works of art, columns, and statues are found in Barbary. Egypt in its Coptic period, and Turkey in its Armenian, Greek, and Maronite subjects, still preserve remnants of it, but Barbary has none.

The eastern coast of Tunisia is supposed to amount to about two millions and a half; amongst whom there may be 7000 Turks, about 9000 Christians (principally Roman Catholics and Greeks), and perhaps 100,000 Jews; but parts of the plague which raged in 1785, the population was estimated at five millions. In its former prosperity this country must have contained double this number, if we may judge from the numerous sites of towns of ancient times and of the middle ages which are now in a state of decay.

Produce.—All sorts of grain, except oats, are grown, as well as maize, beans, garbanzos, lentils, the ecer or chick-pea, and the like. One bushel of wheat or barley usually yields ten or twelve, and in some districts as much as twenty. The sugar-cane is easily reared, but the people have not learned to extract the sugar. Tobacco, coffee, and cotton flourish, and might be turned to profitable account, yet they are imported in large quantities. Olive-oil is the great staple produce, and is of excellent quality. All the vegetables of Europe are easily raised, although the potato is scarcely yet introduced. The artichoke and the gourd, or calabash, are the common food of the people; two triumphal arches, a temple, and an aqueduct which spans the clear stream on which the town stood, Ksarazer (the antient Colonia Scillitana), distant only a few leagues from Sbeitla, has also the remains of an ancient interest. Among the ruins of the greatest antiquity is a temple which conveyed the water from the mountain of Zugaw to

and equal heat; and this date consequently is the finest in Barbary, and is the principal food of the Arabs of the Sahara and the Atlas. With the exception of the grape-vine, the olive, and the various kinds of aromatic herbs and rare plants, which render the Tunesines renowned for distilled waters and vintners, the spring forth luxuriantly, sometimes among fruit-trees and fields of cauliflowers and cabbages. Game is plentiful, as well as all sorts of poultry and eggs; but the grazing of the camels has made agriculture a by-subject among the inhabitants always an article of export, as in Tripoli. Wool is produced in great quantities. The breed of horses, formerly so celebrated, is now entirely neglected. A considerable industry of the Sumer Thynnus, or tunny, is carried on by the Sicilians off Cape Farina, Monastir, and Bon. The Genoese, Neapolitans, and sometimes the French, fish for corali on the northern coast near Tabarka. It is asserted that the mountains near the capital contain ores of copper, copper, copper, but these sources of wealth are not yet turned to any account.

Antiquities.—Some idea may be formed of the number of antient ruins remaining in this country from the fact that every one may carry away a fragment of marble, and as many as he will. There are several temples, two thousand feet in length; several triumphal arches, seven Cipriani temples, and one of the Composite order, all in good preservation, besides many other ruined buildings. The ancient sites on the banks of the Medjerda abound in ruins, particularly at Dakhah (the antient Thugga), consisting of temples, an arch, a number of cisterns, baths, barracks, gates, theatres, an aqueduct, and many inscriptions. At Ayedhah a handsome triumphal arch dedicated to the emperor Septimius Severus, and columns of various beautiful marbles. The walls of the town retain their original height in some places, and have three gates; yet antiquaries have not been able to assign the place to its antient name. At Kaff (Sicca), which, like Ayedrah, is on the western frontier, is still to be seen a paved street like those of Pompeii, and here likewise several inscriptions. The ruins of Thugga, the most stupendous monument of antient times is on the site of Tysdrus, now called El Jem, a village situated midway between Susa and Sfax, and about 20 miles from the sea. It is the remains of its茁te, a great theatre, which Shaw refers to the reign of the Gordians. This is one of the most perfect, vast, and beautiful remains of former times that is known to exist. Its extreme length measures 425 feet and its breadth 308; and it is only surpassed in magnitude by those of Rome and Verona. Of the fourth or uppermost story little remains, and one of the entrances from top to bottom was destroyed about one hundred years ago by the beu of that time, to prevent its being made a stronghold by some rebel faction. With these exceptions it is in a complete state of preservation, with its seats, arches, and monuments, and retains almost the freshness of a modern erection. Coins and gems are found in these parts, which are bought up by the Jews of Sfax, and sold to Tunis for sale. In the ruins of Suftula, now called Sbeitla, about 120 miles south of Tunis, curiosity (says Gibbon) may still admire the magnificence of the Romans; and truly it is the most magnificent ruin in Barbary for the extent no less than the magnitude of its ruins. It stands in a large plain totally abandoned by man. The principal ruins consist of three contiguous temples, whose ornaments are very rich and of no mean size; one of the temples, and a fragment of another, from which we infer the pedestal of the two temples of the Sun and the Moon, and a fragment which contains the clear stream on which the town stood, Ksarazer (the antient Colonia Scillitana), distant only a few leagues from Sbeitla, has also the remains of an ancient interest. Among the ruins of the greatest antiquity is a temple which conveyed the water from the mountain of Zugaw to
Carthage, 52 miles in length, may yet be traced by masses of stone and cement, which lie, like the vertebrae of a huge whale, projecting from the whitish earth. But in its preserved portions it is still a mighty construction, rising in some places to 98 feet. The extensive cisterns into which this aqueduct discharged itself were until very lately occupied by a considerable reservoir, the remains of which are seen in the site of ancient Carthage; but in the year 1837 a society was formed in Paris for exploring these remains; and two of its members (Sir Grenville Temple and Captain Foulsham) arrived at Tunis in February, 1838, charged with the operations. Their labours were well rewarded by the very interesting discoveries they made. Among them may be noticed the finding of many hundred coins, and various objects of glass and earthenware on the site of the temple of Tanit, and a remarkable basin, once a villa near the sea-shore, buried fifteen feet underground. Eight rooms were completely cleared, and their size and decorations prove that the house belonged to a wealthy person. The walls were painted and the floors were beautifully paved in mosaic in the same manner as those of Pompeii and Herculanenum, representing deities, dancing figures, animals, birds, plants, and fish. In another house, still more beautiful, mosaics were found, representing gladiators combating with wild beasts, horse-races, and men breaking-in young horses. Many of these were removed to Paris; and an account with coloured drawings of some of them was published in 1838, under the title of "Excursions dans les ruines et le désert tunisois, ou Société établie à Paris pour l'Exploration de Carthage." These expensive excavations however were soon discontinued; not from any discouragement on the part of the government of Tunis, but from a want of energy or funds on the part of the French society.

History.—The town of Tunis, once known by the name of Tunes or Tuneta, is of great antiquity. But whether it was founded by a Thracian colony or by the Phoenicians, the native Africans seems to be an undecided point. It was founded and retaken several times during the Punic Wars. In A.D. 439 it fell into the hands of the Vandals; but in 533 was rescued from them by Belisarius. It continued to be subject to the Greek emperors until the irremovable arms of the caliphs overran Northern Africa, towards the end of the seventh century, when the conqueror Othman, or Obodas, with a view to secure the country for them, founded the city of Cairo, or Carthage, as a place of refuge against the accidents of war. It was here that the Arabicians began to consolidate their power in Africa. From this time they became so thoroughly intermingled with the natives, that Christianity was extinguished, and the Africans remained a Moslem people to the present day. The caliphs however, from the immense distance of their conquests from Bagdad, the seat of government, were obliged to convoke at acts of rebellion which they could not put down; and thus the caliphate in the course of time the several kingdoms into which Barbary was afterwards divided, of which Fez, Morocco, Tunis, and Algiers were the most considerable. The Arabian viceroys, at first under the name of Amer, were in fact caliphs of Africa, and established an independent government at Cairo, which became the capital of the country which now constitutes the regency of Tunis. Here the Aglabite dynasty took its rise in the ninth century; and from this time directed its conquests, and even attacked Rome herself. The Aquilines were succeeded by the Zeirides: and these were in their turn obliged to yield to the Almoravides, who came down from Mekkah, which city was built A.D. 1070, and its princes soon extended their power over all the provinces of Barbary, including Tunis. But in 1230, Abu-Ferez, who held the delegated government of Tunis, assumed an independent authority, and from him sprang the race denominated Lusais, who are considered the first kings of Tunis, being the first who established a court in the town of Tunis. Their dominion soon spread itself to Goletta, Constantino, Bona, and Tripoli; and their vessels subjected the Mediterranean, and the ships of the Christians to the Holy Land. Louis IX. of France undertook, in 1270, his chivalric expedition against this new power, which ended in his own death, and the destruction of the Goletta by the Saracens during the reign of Muley-Hassan. Muley-Hassan was the last of these kings.

He was deposed by stratagem of his throne in 1331, by the pirate Khaidarleen, commonly called Barbarossa II, who had been lately acknowledged as chief of Algers by the Genoese. He was afterwards delivered by the emperor Charles V., Muley-Hassan was restored to the throne as a tributary prince by Charles V. in 1533. For the Spanish domination was of short duration; for in 1574, by the treaty of Constantinople, Algiers, under the command of Sylam Pasha, made himself master of Tunis, and thus annihilated the kings of Morocco, who had reigned over the country for 2,000 years. It came then into the power of the Moors, of which it had been the seat of Caliphs. Already in possession of the territories of Algers and Tripoli, the conquest of Tunis completed the sultan's power throughout the Mediterranean coast of Barbary, which seems to have been desired as a check to the Christian power on the shores of the Mediterranean, and the want of Malta in professed hostility to the Turks, and whence Selim's predecessor had in vain attempted to dislodge them. Although Algiers was the most powerful of the two, and men, Tunis was the most formidable on account of its numerous havens. It was here in fact that Aroodeg, the first Barbarossa, organised his maritime expeditions before he got possession of Algiers; and even after Algiers was subdued as the first practical power, the Algerines were reduced to that son or other dependent of Tunis. Her northern and eastern sea-fronts offered a convenient refuge to the corsairs of all these states, when they sailed forth in every direction, plundering the shores of Constantino, Lassis, Tunesine, and Marocco; and the sand of Malta was cast at the head of the island of Malta, which was converted into a sort of base for repressing them. This horrid warfare was at one time carried on so successfully that a Genoese renegade who commanded the galley of Biserta is said to have reduced no less than 20,000 pirates to the ground, and to have been rewarded by the sultan. In this way it was that the galleys of Tunis were able to hold the castles and ships of these countries; and the Turkish sultan never held a firmer power over them, to the great sorrow of historians who continued to speak of them as kings, and in diplomacy they were decreed being viceroyalties, as they were attached to other powers, without regard to the sovereign state. How this happened at Tunis we shall proceed to explain.

Upon its conquest by the Turks, Tunis was governed by a Turkish basha, and a divan, or council of military men, with a body of janissaries sent from Constantinople, who were the real power in the state. They had great influence, and in diplomacy they were decreed being viceroyalties, or rather independent states, whose only power was to levy tribute from the people, and to be treated by other powers without regard to the sovereign state. How this happened at Tunis we shall proceed to explain.

The Tunisine corsairs continued their excursions at least until 1635, when Admiraal Blake, with a powerful English squadron, the first that had been seen in the Mediterranean, since the time of the Crusades, forced admittance for the Algerines to a peace, presented himself before Tunis, and without listening to subterfuges, destroyed the castles of Porto Territorio and the Goletta with his artillery, and expelled the Bey to promise that his patriarchal subjects should not commit further depredations on the English. France and Holland soon followed the same course. These piratical bases were afterwards often renewed, but were never again with effect. At length, in consequence of an agreement between the European powers, a new_cb the powers, which Lord Exmouth with a naval force sailed from the above-named havens.
TUNIS, a large and flourishing city and port, the capital of the vast territory bearing the same name, situated on the coast of Barbary, in the Mediterraean, in 36° 40' N. lat. and 10° 40' W. long., at a distance of about 30 miles by an amphitheatre of high mountains. It stands on the western side of a lagoon of an oval shape, about 20 miles in circumference, which by a narrow outlet, called the Goletta (or little throat), defended by a castle, opens into the extensive Bay and Gulf of Tunis. The city is encircled by a high wall with six gates, around which is another wall encompassing the suburbs, having eleven of its gates that pass into the country, and measuring about five miles in circumference. The town contains about 12,000 houses, and from 130,000 to 200,000 inhabitants, comprising Moors, Arabs, Turks, Negroes, probably 25,000 Jews, and about 9000 Christians. Of the Christian population, probably half are of French extraction. The similarity of their climate and language find employment as labourers, and in the petty traffic of the place; the remainder are Italians, French, and Greeks. Although each house has its own garden, rainwater collected from the flat roofs, the town is well supplied also with water from a neighbouring spring, conveyed by an aqueduct, which was built when the country was subject to the emperor Charles V.; and no place enjoys by nature a wealth of water such as this. The narrow streets are narrow, irregular, and filthy in the extreme, becoming after a few hours' rain a perfect marsh, and in summer still more intolerable from their dust, rubbish, and vermin, and from the effluvia of the various trades that are carried on. The houses of the rich are in the outskirts of the city, or, according to Dr. Shaw (Travel in Barbary), the great quantity of mast, myrtle, rosemary, and other aromatic shrubs with which the country abounds, and which are used in the daily heating of the ovens and stoves, that prevent all diseases. There are five principal and many smaller mosques, in which no Christian is permitted to enter. The houses in general, according to the custom in Barbary, are only one story high, without chimneys, and usually without windows to the street. In the middle of the court is an open space of no great extent, surrounded by shops for the sale of manufactures; and this is the only place where the tobacco auction is held. Tunis is not distinguished by magnificent edifices, unless we except one mosque built in the reign of Hammouda Bey, whose minaret Yuost built columns and marbles from Rome, at an expense of 200,000 livres, which he decorated it. The Bey's town palace is also a modern building, but in the Saracen style; and, although situated in a narrow street, is a handsome edifice, with marble courts and galleries. No expense was spared upon it, and it might have been the most magnificent palace in Barbary, had it been completed.

Hammouda Bey, the founder, had lived to complete it; but it remains, as he left it, in consequence of a prevailing superstition against the completion of the unfinished house of a dead person. In different parts of the town are five extensive barracks, built by the same by; but the finest building is the new barracks, erected by his successor Hussein, near the castle, out of the fortunes of three of the richest Moors in Tunis, who for this reason are rarely taxed. It is a quadrangle of two stories, each comprising 134 rooms, and will easily accommodate 4000 men. In fact it would be deemed handsome and well adapted to the purposes for which it was intended. Tunis, the chief manufacturing town of Barbary, and the most antient and comparatively the most populous commercial and civilized town in all Barbary.

The chief manufactures of this city are linen and woolen cloths, and embroidery, for which it is celebrated, and since the settlement here of the Moors from Spain, who brought these arts with them. But Tunis is more renowned for its woolen cap, which is dyed in the waters of the Zagwan, and is preferred to all others by the Oriental nations. It is said that above 50,000 persons were employed in the making of this article. At present its export is very much reduced by the competition of Europeans; but although supinations have been made to levant at a cheaper price from Marselle and Leghorn, they are still in the same measure in demand, and are now commonly cap in colour, fineness, and strength. The bazaars and shops offer for sale the produce of domestic industry, particularly the celebrated essences of musk, rose, and jasmine, and where silk and cotton are manufactured, and richly ornamented with gold, embroidery of all kinds, straw mats, carpets, the red skull-caps already mentioned, and fire-arms, daggers, and swords. Slaves from the interior of Africa are brought to Tunis; the number is variously stated from 300 to 500 annually. Up to the very lately negroes were always to be found for sale in the open slave-market; but by the command of the present basha, Bey Achmet, this practice is now discontinued. It was in 1841 that the chief of the state emancipated his own slaves; and this example was followed by the inhabitants, who, wishing to keep their slaves, it must be admitted that their condition and treatment are better here than in any other part of Africa. For slaves, if discontented, may oblige their masters to set them free. Judging from the number of negroes among the population, emancipation must be frequent and easy. In the suburbs vegetables, fruit, butter, oil, meat, charcoal, wood, and skins are exposed to sale, as well as all sorts of cattle, horses, asses, and other officers of the Bey. The town presents considerable bustle. From sunrise to sunset, when the Moors retire to rest, the streets are filled with people,
among whom the women make a handsome appearance, muffled up from head to foot to conceal their persons. This hustle is still more heightened by the manner in which goods are sold here by a crayer or broker, who walks before the shops, calling out the value of an article held of hand, and inviting the passers-by to purchase it. Valuable articles are thus exposed in the most unreserved manner. It is very common to see a hawkcr of jewellery and gold ornament, perched on a bough and calling to the passers-by to look at the articles he carries suspended from his arms, breast, and shoulders, of the value of many thousand piastres, without any protection, unless it be in the integrity of the surrounding multitude or the fear of prompt punishment. But it seems to be in these countries the most effectual restraint upon crime. Even the punishment of death immediately follows the sentence, which is always summary.

Being more given to commerce, the government and people of Tunis are more civilized and more civil to foreigners than those of the other towns of Barbary; and this was also remarked so long back as when Dr. Shaw visited this city more than one hundred years ago. They are very tolerant in matters of religion: the Jews have their synagogues, the Greeks and Roman Catholics have several places of worship, and the French government, under whose protection this community celebrates its rites, was permitted to build a great place of worship in the 18th century, on the spot where their king St. Louis died. The Moors are the only British subjects resident here; and although of the lowest order, and holding no great numbers, they live in the most ordinary manner under moral restraint by the sole influence and preaching of a few Capuchin friars of their own country, who have a convent in the city, and who, being intrusted with the Catholic mission by the Propaganda of Rome, are building also a church in the town of Suss. One of the Bey's own ministers, Signor Raffe, a Genoese, in fact a zealous Christian, and contributes largely to the splendour of the Roman Catholic religious ceremonies. But this tolerance would soon cease if any attempt were made to tamper with the faith of the Mohammedans, which is carefully avoided. The Protestants are too few to be known as a body. At the principal Moorish college the studies are almost confined to theology and jurisprudence; the operations requiring mathematical or philosophical knowledge, as well as the profession of physic, being mostly in the hands of Europeans or Jews. The Jews manage the monetary affairs of the government, and sometimes have the jewels of the reigning family under their care: they advance large sums, for which they obtain monopolies; and their wealth, which they however conceal as much as possible, is some compensation for their treatment. They are often received from the Moors, and the state of degradation in which they live among them. There are a few minor schools for boys, at which they are taught reading and writing, and to repeat passages from the Koran. The women, even of the upper class, are no educated; and, so far from being free from their traditions, they are under slavery, as far as to shut up their persons, and the adornment of their persons, they are scarcely ever permitted to go out of its walls; yet they do not believe there can be any condition better than their own. They are usually married at a very early age, and do not see their husband until the ceremony is over; but as it is merely a civil union, it can be dissolved without much difficulty. The dress of those of the middle and upper classes, is now laid aside for the unbecoming blue jacket and European trousers, topped with the plain red cap of the country; but the splendid trappings of their horses are still preserved.

Defences of Tunis. Little need be said. The gates in its ruined walls are closed every night, and for two hours on every Friday in the middle of the day, in consequence of a prophecy, that the Christians will take possession of the city on the 15th of the month. The Bardo, the fortress of the Bey, situated about two miles west of the town, in an uninteresting plain. It is surrounded by a high wall and a ditch, and is flanked by towers. The usual residence of the Bey is here, it is fitted up with great luxury, and even grandeur, and is said to contain upwards of 4000 inhabitants, who are all employed in one way or another in the service of the Bey. The lagoon, upon the banks of which the town is built, forms the access from seaward to Tunis; but as there is not more than six or seven feet of water near it, vessels must approach it only by boats. Even merchant-ships loading and unloading outside the Goletta forts, which guard the narrow entrance from the bay to the lagoon, and their cargoes are conveyed upon the backs of mules. The Goletta forts are strongly fortified towards the sea, and defend likewise the anchorage and the artificial harbour cut in the limestone which separates the lagoon from the bay, where there is a deep and basin, in which the ships of war are built and launched. Outside this bay, which contains the Goletta forts, is a large frigate on the stocks; but her works are suspended in consequence of the military attitude assumed by the Bey, and the undivided attention he pays to his lasts and intriguers.

The Gulf of Tunis comprehends a coast of 80 miles between Cape Farina and Cape Bon, which is now sounder; while the two inner promontories, called Cape Carthage and Cape Zaphra, approach each other within 12 miles, and form an inner bay, which is almost circular, and has from 10 to 20 fathoms deep in the centre. The approach to this bay is very easy, but in such a manner that the entrance of it, which is sometimes called the Bay of Carthage, holds well, and a fleet of any magnitude may ride bees beyond the range of cannon-shot, and in safety, by serving the coast, he is kept in an armament which is the anchorages is sometimes exposed in winter. The soundings in the Gulf are much deeper, being from 24 to 63 fathoms.

TUNJA. [GRANADA, NEW.]

TUNNEL, in civil engineering, an arched passage formed underground to conduct a canal or road on a lower level than the natural surface. The derivation of the term, which, in the sense above given, is unnoticed by most lexicographers, is rather to consider places it among the derivatives of tun, and defines it as 'any inclosure, inlaid way or passage;' as chimney, tunnel, or passage for smoke, in which sense the word tunnel or tunnel is used by Spenser and other early English writers; a passage for liquor, in which sense, as well as in that last mentioned, it is convertible with tunnel; or a net shaped like a tunnel for liquids, wide at the mouth, and diminishing to a point. The word is thus, says Turner, tun and its diminutive tunnel (Anglo-Saxon, Tunnel) are the past participles of the [Anglo-Saxon] wyt-yan, to enclose, to encompass.' From the same root tun- and tunn-, it seems to be derived, expressing a place enclosed, encompassed, or inclosed.

Long tunnels are usually made hills in order to avoid the inconvenience and loss of power occasioned by conducting a canal, road, or railway over elevated ground. The case of the balloon, or any other ascent, would be rendered dangerous and impracticable, and the excavation as would be necessary in order to preserve the requisite level. Those of least extent are frequently constructed to avoid the opposition of landowners, or to afford uninterrupted passage under a road, canal, or river. Many tunnels of the latter character differ in their level from bridges; but in the case of oblique crossings a tunnel is distinguished from an oblique or skew bridge by being at right angles with the direction of the lower passage; instead of being parallel with the upper. Of the upper passage of the tunnel. This character is the tunnels under the Hampstead road, between Euston Square and Camden Town, and the Kennett Green tunnel, under the Harrow road, both on the line of the London and Birmingham railroad; and that on the (unfinished) West London railroad, passing under the Paddington canal at Worms. Scrubs. The Thames tunnel is the most remarkable example of tunnelling under a river, although far less extensive than many other tunnels. It is, from the insuperable difficulties of its situation, perhaps the most astonishing work of the kind ever executed. Another class of tunnels is those made under towns, in order to form a canal or railway communication which cannot be accessible by an open passage, except at great expense. The Regent's canal, for example, passes under Islington, London, by a tunnel three-quarters of a mile long; and the Liverpool and Manchester railway is conducted from the station at
Edge-hill, on the outskirts of Liverpool, to the docks at Wapping, for goods traffic, and to Lime Street, in the centre of the town, for passenger traffic, by two tunnels, each about a mile and a quarter long. A tunnel is also projected to connect the Manchester and Birmingham railway with the united station of the Leeds and Liverpool lines at Hunt's Bank, which must, in consequence of its necessarily low level, be constructed by the main line by a vertical drop, or some similar contrivance.

The construction of tunnels is by no means of recent origin, although it is only of late that they have become common. One of the earliest tunnel excavations in Britain is in Boscotia [Boscotia, p. 43] is one of the oldest monuments of the labour of man. The great tunnel in Samos, which was seven stadia, or 4200 Greek feet in length, was driven through a mountain 500 feet high, for the purpose of serving as the principal road from the principal city of the city of Samos. (Herod., iii. 60.) The Positivo near Naples, which is as old as the beginning of the reign of Tiberius, is a tunnel three-quarters of a mile long. [Positivo.] The tunnel which was made at an early period in the Roman republic for the partial drainage of the Alban Lake is above a mile in length. [Alma Longa.] Of antient works of this character there is a remarkable example in the construction of the great tunnel from Doria to the port of Messina, or the lake of Celeno, originally formed by the emperor Claudius, and recently cleared out by order of the Neapolitan government. [Amzoro, vol. i., p. 41; Celano, vol. vi., p. 396.] This extensive tunnel, with which we shall deal. The kilometer is twenty-eight wide at the entrance, and nowhere less than twenty feet high, passes in part through solid rock, and in lined in other places with masonry; and it appears to have been constructed in a manner resembling that now usually followed, the excavation having been carried on by several parties or gangs simultaneously, by means of vertical shafts, and inclined passages or galleries of the same kind, the work being accounted for by the tunnel, as it appeared during the recent clearing-out, is given in the thirty-sixth volume of 'Blackword's Edinburgh Magazine' (p. 657), in a paper entitled 'Eight Days in the Abruzzi.' The object of this tunnel is to carry off the surplus waters of the lake; but in more recent times similar works have been executed for navigable canals. Some of the principal canal-tunnels in England are enumerated in the article Canal, vol. vi., p. 230. These are generally of small transverse dimensions, being calculated for the passage of single boats, and very often without tow-path ways, in which case the boats are either hauled through by a rope or chain, worked by a steam-engine, or propelled by a light screw. De la Beche or his agents, or project boards provided for the purpose, and thrusting against the sides or roof of the tunnel with their feet. This dangerous practice has occasioned much loss of life, and is also objectionable on account of its effect in the erosion of the sides of the passage: in consequence, it must be one end of the tunnel while a boat is coming from the opposite end. In the evidence before the House of Lords on the Great Western railway bill, in 1835, it was stated that great delays were experienced at the Isington station when any accidental derangement prevented the steam-engine and chain from working; because, although boats were occasionally 'legged' through in as little as seventeen minutes, the ordinary time required for working a light barge through one tunnel was one hour and a quarter; a loaded barge three-quarters of an hour, or frequently an hour. In such cases boats arriving in the opposite direction had to wait at the mouth of the tunnel, until, frequen- tly, as many as half a dozen were collected, which, when their turn arrived, passed through in a train. At some of the longer tunnels this inconvenience was even greater. At the Harecastle tunnel on the Trent and Mersey canal, the following practical advice is given: 'stoppage of the tunnel required to effect a passage of little more than a mile and a half. This place is so frequented, observes the Baron Dupin, in his "Commercial Power of Great Britain," that at the moment when the passage begins, no fewer than ten to twelve boats are kept in waiting to prevent confusion, those going towards Liverpool were allowed to pass in the morning only, and those in the contrary direction in the evening. This tunnel, which was formed by Brindley, and was one of the earliest of the kind executed in this country, was commenced about the year 1760. It is 2880 yards long, 12 feet wide, and 9 feet high, and is in some parts as much as 70 yards beneath the surface. It is lined with a semicircular brick arch, and was completed for the total sum of 14,000l., partly by a loan of 600l. upon the canal having rendered it necessary either to con- struct a new tunnel or to enlarge the old one, the former alternative was adopted; and in 1822 Telford was engaged to superintend the work. The line of tunnel is parallel with that of Brindley, is 2920 yards long, 14 feet wide, and 10 feet high; and, notwithstanding its greater dimensions, it was executed in less than three years: the number of men employed in 1822 amounted to 4000. The tunnel has an iron tow-path, so supported as to allow the water to play freely beneath it, which gives the advantage, so far as the play of the waves is concerned, of a waterway of the full width of the tunnel. It is perfectly straight, and the light can be seen from end to end, and so arrange is the travelling through it, that one of the bargemen said, after passing it, that he wished it extended all the way to Manchester.

Although in some cases the adoption of a tunnel on a line of railway or canal may be deemed by the necessity of non-interference with property on the surface, it is more generally a question of expediency, which involves the cost of the tunnel, and the cost of the works of approach, among which the nature of the ground is one of the important elements. It should be examined by numerous borings, because sudden breaks or faults in the strata, which may occasion great difficulty and expense in tunnelling, may otherwise escape notice. In this respect, the Lanarkshire section of the Manchester railway, presents a case in point; the trial shafts having been accidentally sunk just beyond the limits of a bed of sand and gravel, so full of water as to resemble a quick- sand, which occurred, so much difficulty that the con- tractors had to relinquish the work, which had been let for 99,000l., but ultimately cost upwards of 320,000l., or about 1387 per yard. If the first small borings appear satisfac- tory, the shafts of at least four years. The tunnel must be considered in selecting the positions for the working- shafts. These are only a few of the points to be con- sidered in estimating the expense of a tunnel, among the least prominent of which is the probability of being called upon for damages arising to the surface. In the case of tunnels which may occasion much mischief at a great distance. Cases have occurred in which the water has been drawn from wells a mile from the tunnel. This evil may often be remedied by sinking the wells to a greater depth, but in some cases it is better to offer compensation at once. The cost of the actual making of the tunnel varies greatly, according to the nature of the ground and the amount of brickwork required. Lecount, in the interest- ing work on 'Encyclopaedia Britannica,' states that many of the old canal tunnels were made for less than 4l. per lineal yard, and that railway tunnels of the ordinary dimensions vary from about 200l. to 500l. per yard. 'It is easy to excavate, and able to stand without any lining of brickwork or masonry, up to 100l. per yard in very loose bad ground, such as a quicksand, which may require a lining of brickwork twenty-several inches thick. The cost of the Thames Tunnel, according to the

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same authority, has been about 1200 ft. per yard; but in this case, in addition to the unparalleled advantages attending the use of gunpowder, the amount of brickwork is much greater than in ordinary tunnels, and there are two arches, each of which may be considered a distinct tunnel.

Rocky strata, if the stone be of a nature to work freely, and is hard enough for tunneling to the absence of lining, and the power of saving labour by the use of gunpowder. In the extraordinary tunnels and rock excavations at Bishopston, on the Glasgow, Paisley, and Gourock railway the tons of gunpowder were used to the length of 2300 yards in hard whinstone, some veins of which were so hard that the rate of progress at each face of the excavation varied from three feet six inches to six inches only per diem. The 12-ton tunnel, on the Great Northern Railway, was bored in two or three days, and the 30-ton tunnel, in a consideration through strata of Both freestone, geologically termed the great oolite formation, and presents some features worthy of notice. Reports having been circulated, since the opening of the railway, that this tunnel was unsafe, Major General Pasley was deputed by the Board of Trade to examine it, and from his report, dated August 12, 1842, the following particulars are derived:—The tunnel occurs on a gradient or inclination of 1 in 100, ascending from west to east, while the natural dip of the oolite strata is about the same in the opposite direction: they are nearly horizontal in a direction from north to south, or transverse to that of the strata, varying through the 20 to 4 feet and upwards, and are intersected by vertical fissures, of trifling width, but of considerable height; the direction of which is generally at right angles with that of the tunnel, but in some cases oblique to the strata. These fissures, however, emitted a sound or a noise, which the engineer, or an iron rod, while having it dangerous, the sound would have been hollow and dull. The examination of neighbouring quarries in the same strata, in which such fissures exist in greater numbers and in more hazardous situations, confirmed his opinion of the safety of the tunnel. One of the ends of the tunnel is, for a short distance, lined with masonry; beyond which, for about half a mile, the excavation is left without any support from masonry or brickwork, its extreme width being, in this part, 30 feet, and its height varying from 30 to 40 feet, in order to avoid finishing above in any stratum of doubtful character, which, though sufficiently strong in the sides, might not be so trustworthy as, at least, the core of the excavation, cut in the face of an oblong elliptical or nearly a Gothic arch; but the uppermost bed of oolite, which forms the roof of the tunnel, has not been completed in that form, but has, for greater strength, been given to a wide arch or to the flat; and in order to avoid the risk of exfoliation which would have attended the cutting of the edges of the strata to a thin wedge shape, had the curved line of the tunnel been continued unbroken where it intersects them in the sides of the roof, they are cut in the form of steps, each stratum presenting a thick blunted edge; so that, in the words of Pasley's report, 'the upper strata of the oolite being supported by those below them, beyond which they each successively project in a more or less degree, like corbels in an architecture, the whole enter into that sort of combination which has the strength of an arch without its form; provided that the vertical fissures do not cut through them longitudinally, no symmetry appears apparent.' The remaining portion of the Box tunnel, passing through the strata through beds of fullers' earth and clay below the great oolite formation, and towards the western extremity through the interior oolite, is arched over with brickwork, varying in thickness from four to seven concentric halfbrick rings, and at the western entrance containing nine such rings. An inverted arch is introduced excepting where the oolite forms the foundation or bottom of the tunnel, which parts a portion of the interior which had been formed of the inferior oolite, unprotected by brickwork, although it has not in any instance been trusted for the roof. The judicious adoption of such changes in the arrangements of the different strata of the design of the engineer, is essential to the construction of tunnels at a moderate expense, although it may occasionally lead to failure, in the case of the Summit tunnel at Littleborough, on the Manchester and Leeds railway, where, in tunnelling through beds of fullers' shale, the invert had been discontinued for a short distance; but the shale, although apparently hard and firm, was so affected by the atmosphere as to soften and yield under the pressure of the sides, rendering it necessary subsequently to put in a strong and substantial lining. Tunnelling in clay is frequently attended with formidable difficulties which render it very expensive. It is, when tough, a difficult material to remove, blocking being of no use, and spades being almost inapplicable. Leecount states that in such cases hatchets may be used to advantage, but that cross-cut saws answer best. The Primrose Hill tunnel, on the London and Birmingham railway, tunnelling through the London clay, was a failure of the difficulty of the material. The engineers, warned by the failure of the tunnel attempted some years before through the same material at Highgate, on what is now called the Archway road, fell in owing to the insufficiency of the brick lining, adopted unusual precautions in the first instance, excavating only nine feet in advance of the brickwork, and supporting the clay by very strong timbering until the arching was complete. Owing however to the extraordinary mobility of the moist clay, the pressure upon the brickwork was so great as to squeeze the mortar from the joints, and to bring the inner edges of the bricks in contact. The evil was augmented by the form of the bricks, which, according to Leecount, were laid in a bed made with hollow surfaces, and were consequently unfit to bear great pressure, because their inner edges only could come in contact. The result was, as stated in Leecount's History of the Railway connection London and Manchester, the bricks were grinding to dust, and the dimensions of the tunnel sensibly, but irresistibly, contracting. This difficulty was overcome by the use of very hard bricks laid in Roman cement, which, by setting had the advantage that serious pressure became so great as to force the bricks into actual contact, enabled the whole surface of the brick, instead of its edges only, to resist the pressure. The thickness of the brickwork was also increased, so that in most parts of the tunnel, which was cut in eastern and western directions, of a similar material in the line of the Fardale tunnel or the Gosport branch railway, occasioned great expense, as it produced a slip of the superincumbent earth which carried away forty yards in length of the brick arch, although it was of the usual thickness of three feet. Tunnels formed through chalk are often impeded by faults or cavities filled with wet gravel or sand, which, unless flooded, would greatly militate against the excavation as soon as they are cut into. The irrigation of the strata, as well as of water alone, has in many cases occasioned difficulties almost insurmountable. In the Watford tunnel on the London and Birmingham railway, which passes through four chalk formations, the bed of gravel, which is with a thick irregular bed of gravel, such breaks occasioned great inconvenience. The chalk had occasionally fissures, sometimes as much as one hundred feet deep, filled with clean gravel, which, observes Leecount (forge, &c., p. 114), 'when worked into, rushed down with such violence, as to plough the walls of the tunnel so that bullets had been shot against it. Such an accident, occurring at the foot of one of the working shafts, overwhelmed ten men who were employed on the tunnel, and led to the construction of the large ventilating shaft near the centre of the tunnel, which occupies the site of the cavity. Loose sand is perhaps the most difficult soil that can be met with in tunnelling, but it has been in such instances successfully passed through. In the tunnel of the Leicester and Swannington railway, one of the earlier railway tunnels, a loose dry running sand was encountered for a distance of five hundred feet, and much difficulty was given when it was necessary to make a wooden tunnel to support the sides of the brickwork was executed. When water occurs with the loose soil the difficulty is still greater. This was the case at Wapping tunnel at Liverpool, a portion of which fell in, to a depth of thirty feet. The Kisby tunnel, before alluded to, is a more striking example of this kind of difficulty. Mr. Stephenson, the engineer, conquered this obstacle by sinking shafts, which were filled with broken slate, and one of the shafts served for the water, and so draining the sand until it was sufficiently dry for tunnelling. These shafts were sunk through the
quicksand by means of wooden tubbing, and from the headings were driven to collect the water and to conduct it to the pumps. Steam-engines were erected to work the pumps, which were supported over a space of about six feet, until the sand was dry enough to allow the work to proceed; during a great part of that time two thousand gallons of water were removed per minute. When the work in the lower end of the tunnel was finished, the water from the pumping shafts to the bottom of the working shafts, by means of which the tunnel was freed from water. The quicksand extends over about four hundred and fifty feet from the mouth of the Box tunnel, and is twelve feet thick. On occasion of an irrigation of water in another part of the tunnel, in which it was desirable to complete the arched portion of the arch, directly executed, before it was possible to get rid of the water, the water horse-gin may be freed from the necessary materials to the spot upon a raft. Water has been met with in large quantities in several other tunnels. It flowed so freely from fissures in the freestone rock through which the Box tunnel is driven, that in November, 1837, the steam-engine employed in pumping proved insufficient, and the water filled one division of the tunnel, and rose to the height of fifty-six feet in the shaft, thereby suspending the work, until the water was overcome by means of a second engine, of fifty-horse power. After another irrigation in the same tunnel, the water was pumped out at the rate of thirty-two thousand board-feet a day. The progress of the Mersham and several other tunnels is this the business of the year. In no case however has the irrigation of water or the badness of the ground proved so serious a difficulty as on the Thames tunnel.

Shake tunnels are occasionally excavated from the ends only, but those of considerable length are usually formed by sinking vertical shafts, about nine feet in diameter, down to the level of the tunnel, and excavating in each direction from the bottom of the shaft until the surfaces of workmen meet in the intermediate portions. By this means the work can proceed at any required number of points or faces, so as to bring the execution of the tunnel, whatever may be its length, within a moderate period of time. The accurate junction of these detached workings is provided for in the following manner, of which our account is condensed from the Encyclopaedia Britannica, where, in addition to every practical point relating to the construction of tunnels, the necessary arrangements with contractors and landowners are detailed very minutely:

In setting out the tunnel, the engineer plants a transit-instrument in an observatory erected in the line of the tunnel, and supporting it on a pier insulated from the building to prevent vibration. In the ordinary observatory, the ground should be excavated round the pier to a depth of from six to ten feet, according to the traffic, for the same purpose. A distant mark should then be set up on the ground, at the probable quarter point, and placed as an adjusting spot for the line of direction, which point should be at a considerable distance. Intermediate marks for the working and ventilating shafts may then be set out correctly; and as these shafts are sunk, the points determined by the transit-instrument are carried downwards by carefully suspended plummetts, which should be of iron, and let down in buckets of water, or, which is better, in corks or saucers, to check vibration. When the shafts are cleared out at the bottom other transit-instruments may be placed in them, the plumb-line and transit being kept as far apart as possible. The intersection of the vertical lines in the transit with the plumb-line will then enable the engineer properly to lay out the work. By these means junctions are effected between the several workings, or shifts, with surprising accuracy. In a length of 1300 feet between two shafts of the Box tunnel, which has a slope of 1 in 100, the junction of the two shifts was perfect in point of level, and did not deviate more than an inch and a quarter in any place at the sides. Even in curved tunnels, although the difficulty is increased, great exactness is usually procured. In the Colne, Chiswick and Greenwich railway at Bilston, the deviation from perfect correctness nowhere exceeded two inches.

The number of working shafts in a given length of tunnel is determined by the nature of the ground and the time allowed. When all the shafts shall be at the proper depth, it is essential that they should be of such a length as to allow the tunnel to be excavated and lined, if brickwork be requisite, for a length equal to one half of the distance between two shafts, at least two months before the time appointed for the completion of the tunnel; that is, allow for eight months to allow the tunnel-fronts, ballasting and laying the railway, &c.

The shafts are usually nine feet diameter in the clear, and lined with brickwork nine inches thick, laid in cement; all the working men, except the horse-gins, are sheltered on the centre of the shaft; but the substance of the brickwork must vary with circumstances, and engineers are by no means uniform as to the dimensions of their shafts. The tunnels are mostly 25 feet in diameter, while some tunnels have been excavated as narrow as only three or four feet. Down to a depth of 50 or 60 feet the earth may be removed by means of a simple roller or winch worked by two men; and when the depth is greater it is necessary to drain the shaft. The water which at the depth at which the horse-gin becomes preferable is however dependent in some degree upon the nature of the strata to be excavated; because when they are hard, the men above may have to wait occasionally for the coming up of the skip; and it is better to have only two men at a stand-still instead of a horse, a horse-boy, and a bankman or skip-lader. The roll or winch is, at the beginning of the construction of the shaft, supported by four bars or cills laid across each other; upon the removal of the cills, the excavation is continued until the earth exhibits signs of weakness. A wooden cuf or ring about three inches thick, and as wide as the brick lining is to be, is then laid in, and the earth is laid. When the depth of the lining of the shaft, or any part of the shaft, which is frequently but half a brick, or four inches and a half in thickness, is completed, the excavation is recommenced, and is carried down in a vertical line even with the inner surface of the brick, which is then supported by the earth left under the cuf, which may be further supported if necessary by diagonal timber props. When the excavation has been carried so far as the line of the ground again appears weak, a second cuf is inserted in a groove cut in the earth; and between the two curfs is divided into four, six, or eight vertical masses, of which one or two are removed to a depth equal to the thickness of the brickwork. The wall is then built up in its place, and a further portion of the earth is removed, and so on until the lining is completed. When the shaft is carried down to the full depth, the miners begin to excavate laterally by forming a heading or driftway along the level of the upper part of the tunnel. Sometimes such a drift is formed throughout the whole length of the tunnel before any part is opened out to the full size; but in other cases it is made in short portions, little exceeding the length of the excavations which are carried on, which may vary, according to the ground, from three to fifteen feet. In the former case the driftway, which is about four feet wide and five feet high, affords a satisfactory test of the strata to be passed through, and of the water to be pumped out. The miners may in some cases serve as an adit or drain; and for these reasons such a heading is occasionally formed before letting the contracts for the tunnelling.

In addition to the working shafts, the contractor is usually allowed to sink any number of small air-shafts of three or four feet diameter, as may be necessary to prevent the accumulation of foul air in the workings of the tunnel; provided that no such shaft shall open into a public road, or be within fifty feet of a working shaft. These are formed in a similar manner to the working shafts, and both are finished at their lower ends by resting upon a cast-iron curb or ring imbedded in the masonry of the roof of the tunnel, and at the upper ends, after the works are completed, by building them about ten feet above the surface, and coping them with stone. In very long tunnels one or more large shafts are desirable for the purpose of ventilation, and also to admit light, so as to some degree to lessen their gloom. In the Kilsby tunnel, which is between a mile and a quarter and a mile and a half long, there are two such ventilating shafts, 60 feet in diameter and about 130 feet and 132 feet deep, respectively, one at the top downwards, in the manner above described, in portions ten feet deep, and from six to twelve feet wide. Let-count gives the following directions for the brickwork of such a shaft, if made in unfavourable circumstances, as that of stone. The lower part of the shaft, to the height of 40 feet, should be...
three feet thick; the next 17 feet, two feet eight inches thick; the next portion of the like extent, two feet three inches; and the uppermost 16 feet, one foot ten inches. The bricks should be laid in alternate courses of headers and stretchers, and each brick should be well fluxed up.

The tunnel, as it passes through a slight incline and an outer rail, is protected by an outer fence wall, to prevent the risk of any thing being thrown down the shaft either by accident or design. In some tunnels a large oblong excavation, called a cut, is introduced in lieu of a circular venting shaft. In the Bishopaton tunnel there is such an eye 300 feet long; and there are two similar openings in the Glasgow tunnel of the Edinburgh and Glasgow railway.

After the completion of the driftway, either through the tunnel or to the length of a single stage only, the miners excavate the tunnel to its full dimensions; beginning by cutting downwards, and propping up the earth with timber as they proceed; those which support the roof being at such an elevation as to allow the centering to be set up and the brick arching to be built beneath them. The bars which immediately support the earth, extending from the top or outside of the completed brickwork to a framework placed against the face of the excavation, are called side-bars, and are in favourable earth required at the upper part of the tunnel only; but in bad ground they are required sometimes as low as the springing of the inverted arch which forms the bottom of the tunnel. When a complete brick lining is required, the invert is the first built, and it is completed by a course of stone laid along each side, at the point where the side walls spring from it. These courses of stone, which are marked a, a, in the subjoined cuts, Figs. 1 and 2, consist of blocks about three feet long, well bedded in mortar, upon a few courses of brickwork laid as a footing. The side walls are next raised, with the thickness of a batten or curvature as may enable them best to sustain the pressure of the external earth; and when they are raised to the level of the springing of the arch, beams of wood, called cills, are laid across the tunnel and built in with the side walls. Upon these the timbers of the centering are set up, and adjusted with wedges to the proper height. Laggings, or pieces of wood stretching longitudinally from one centering to another, are then added, and upon these the bricks are laid. In some cases the cills are supported upon timbers, instead of being built into the walls; and where this is not the case, the holes left in the masonry must, after the removal of the cills, be carefully filled up.

The excavation should always be made as nearly as possible of the size and shape of the intended masonry, and as the building proceeds, every cavity left outside the brickwork should be carefully filled up. Well pounded clay may for this purpose be rammed under the invert, and aluminum powder may be used for the sides and roof. The ramming of the sides may be performed after the laying of every second course of brickwork, and that above the arch as frequently as convenient. The timbers used for centering should be removed in most cases as soon as the arch is completed; but in very bad ground it is sometimes necessary to leave them imbedded in the earth. When the work has proceeded so far that the excavations from the two adjoining shafts are within about fifty yards of each other, if no driftway have been previously made through the tunnel, it is advisable to drive a heading through the intervening earth, to insure a perfect junction of the two shafts.

Most tunnels were constructed with vertical sides and a semicircular arch; but it is now more usual to have the side curved or battered, the degree of curvature, as well as the shape of the arch which forms the crown of the tunnel, according to the nature of the ground, as soft semi-fluid ground will press much more equally in every direction than strata of a harder and drier character, and will therefore require a nearer approach to the circular form. The annexed cuts represent two varieties of form, the one of which is the ordinary arch of the series of Brecon’s ‘Railway Practice.’ Fig. 1 is the form of the Primose Hill tunnel, in moveable London Clay. The invert, which consists of three concentric half-brick rings, is a curve of 26 feet radius; the outside of this ring, or head of the arch, is struck with a radius of 11 feet 9 inches; and the sides are arcs of 27 feet 6 inches radius. The width of the tunnel is 21 feet 5 inches at the springing of the invert, and 24 feet 8 inches at the widest part. The clear height of the tunnel is 21 feet 8 inches, the remaining depth of 3 feet 4 inches being occupied by the ballasting, drain, etc. The inner arch is 16 feet 10 inches wide, and the outer brickwork 16 feet 2 inches, which constitutes the roof. Fig. 2, which represents the transverse section of the Lansdale and Kilsby tunnels, both of the Birmingham railway, has an elliptical arch, consisting of several circular arcs, of which the lower pair, extending from the invert to the point marked A, are back to back. Each has a radius of 42 feet 8 inches, the centres being upon an horizontal line 8 feet 4 inches above the springing of the invert; the portion from 6 to c has radius of 21 feet, the arch being built in half a vertical line; that from c to d has radius of 14 feet 44 inches; and the crown of the arch is a curve of 9 feet radius. In this case also the invert, instead of being struck from a centre in the crown of the arch, has its centre some feet below it. The internal height of this tunnel is, altogether, rather more than 27 feet, and its greatest width is 24 feet. These dimensions are rarely much exceeded on railways of the ordinary gauge, where two tracks are provided for; and for a single track perhaps 12 feet wide and 16 feet high may be taken as an average. Both the invert and the arch should be built in half a vertical line, for, in all cases, care being taken to put in the proper number of bricks to every foot of length, they may be uniform. In tunnels of the ordinary dimensions, each ring should contain five more bricks than that immediately within it. The side walls may be built in what is called English bond, consisting of alternate courses of headers and stretchers. The bricks should always be of the best quality, and, when the form of the tunnel requires it, moulded of a taper shape. In the laying also care is requisite, and every brick should be bedded with a wooden mallet, and the joints, if in mortar, well fluxed up.

The thickness of the lining is regulated by the nature of the ground, but Le Courct says that 27 inches at the top and sides, and 16 in the invert, if laid in cement, will be sufficient, even in a quicksand; there are however instances of a thickness of 10 rings, or 45 inches. It is sometimes considered advisable to lay the first or inner ring of the roof without mortar, and then to grout it, by which means additional strength is given.

A brick drain, built in Roman cement, with the joints left open for about half an inch to admit water from the ballasting, should be laid along the centre of the tunnel; and if the shafts let in water, it should be collected and conducted down the inside of the arch by pipes. Water should be excluded as much as possible during the building of the tunnel and shafts, by puddling with clay, or with other materials. Some circumstances may dictate, but whatever precautions may be used, the water will finally percolate through the brickwork to a serious extent. At the Chevet tunnel, near Wakefield, this inconvenience has been remedied by lining the roof with sheet zinc. In the Thames tunnel there is an interior lining of cement, behind which channels are provided in the brickwork for the passage of water. A remarkable instance of difficulty arising from this cause occurs in the Beechenbrook tunnel, 302 yards long, up London and Birmingham railway. It passes through alternate strata of rock and marl abounding in springs; and, in the first winter after its erection, a chemical action took place, which partially destroyed many of the bricks. It was proposed to line the arch with cement; but the approaching winter was entertained that it would not adhere, owing to the constant dropping, and it was determined to apply an interior lining of brickwork, nine inches thick, and to cut chasses in
the old work, which, when closed in by the new arch, would become so many drains, four inches and a half square, to conduct the water to the central drain or culvert. The tunnel was completed in four months from light to light, with a temporary partition, and the work was executed in one-half of the tunnel at a time, without stopping the passage in the other half. After executing as much as possible of the old arches, a new arch was laid on the other side, with a breast heading a close flooring, on which the men stood to complete the arch. The details of this curious operation, which was completed in forty days, in the latter end of December, were recorded in a paper before the Institution of Civil Engineers, in a paper laid before the Institution of Civil Engineers. In laying the roadway in a railway tunnel care should be taken to avoid the use of any ballasting of a character likely to retain water. The ballast is sometimes thrown down to a depth of twelve inches, which conducts it in the right direction. In spreading it, it should be well beaten down with wooden rammers, and the blocks or sleepers should be bedded with great care. As it is especially desirable to avoid all risk of accident in travelling through tunnels, while their darkness might prevent the immediate detection of any derangement of the rails, some engineers, for greater security, place the sleepers above the balls, so that in case of any explosion, the whole of the work and the structure of the arch will be thrown on the other parts of the line. The temperature being more uniform than in the open air, renders it easy, with proper care, to provide more accurately than usual for alterations in the length of the rails by expansion and contraction. It is also often the case that, in the passage of a train over a horizontal or vertical inclined plane, or in and canal practice, tunnels are constructed in the manner just described, there are exceptions which require notice. In tunnelling near the side of a hill expense is occasionally incurred by driving horizontal or nearly horizontal passages, which are called galleries, from the face of the hill to the line of the tunnel, and removing the excavated earth through them. The double tunnel of the Shakespear Tunnel, Dover, on the line from the south to the north, was constructed in this way. A benching or road was formed along the face of the cliff, to afford the means of access for the workmen; and the tunnel was excavated by means of seven galleries opening in the face of the cliff, and inclining towards the sea at the rate of 1 in 170. Their average length is about 400 feet; their width six feet, and their height seven feet; and the excavated chalk was conveyed along them in small tram-wagons, and tipped into the sea. There are also seven vertical shafts, of six feet diameter, and of an average depth of 180 feet. The tunnel consists of two arches or passages, 12 feet wide, separated by a wall of chalk 10 feet thick; they are about 240 feet long, and are pointed to the springing of the arch, and upon passing through them the height is reduced from about 30 feet high in the centre; and each will when completed have a single track or line of railway laid through it. The chalk of which the cliff is composed is very hard, but consists in many places of large masses of chalk, and is thrown into the sea by the tides. The tunnel was constructed for about two-thirds of the whole length. The arching consists generally of three half-brick rings, and is strengthened at intervals of twelve feet by counter-forts, which are carried up and stepped back, so as to sustain the weight of any flat beds of chalk that appear of doubtful stability.

Another variation from the ordinary process occurs in those tunnels which are formed by means of an open cutting, and subsequently covered in. Such are called open tunnels, and are sometimes preferred where the object of the tunnel is to avoid the permanent seclusion of lands rather than to penetrate ground too elevated for an open cutting. The short tunnel on the London and Birmingham railway, at Kensall Green, was formed in this way. In such cases the sides of the cutting are made nearly vertical, and supported by timbers until the brickwork is ex- ceeded.

While the projects for some of the principal English railways were before parliament, much discussion took place relative to the ventilation and lighting of tunnels, and the effect which they might have upon the health of persons passing through them. Most of the objections raised against tunnels during the period referred to are now exploded, and some of them appear not a little ridiculous. It was urged by their opponents that the damp cold air common to all subterraneous excavations would prove highly detrimental to health; that the noxious gases exhaled from the locomotive engines would accumulate, and render the air irrespirable; and that the sudden transition, which gives rise to an apparent pressure, would be injurious to the sight. The discomfort arising from these evils, so far as they really exist, and from the denuding noise of tunnel-travelling, are amply sufficient to give a sufficient tinge of disgust to any scheme of rail travel, at moderate expense, but they by no means bear out the predictions of the alarmed. Some interesting experiments made in the tunnel on the Leeds and Selby railway were recorded by Mr. Walsh in his "Transactions of the Institution of Civil Engineers," vol. I., p. 95. While the tunnel alluded to was in progress, it was determined to leave the working shafts open, to promote ventilation and to admit light. Reflectors were also fixed at the entrance, to prevent any serious inconvenience to passengers, but, so far as the trains are concerned, little benefit is derived from the light admitted by them, although attempts were made to diffuse it by means of tin reflectors. The experiment succeeded so far as to enable a person to read the larger print in a newspaper advertisement in any part of the tunnel; but it is stated that, owing to the rough and dirty nature of the roof of the railways, the rays thrown upon them, the rays reflected from them were too feeble to be useful in a case of such sudden transition from the light of day as that experienced by persons passing through a train. Reflectors would also be rendered useless during a storm, by the quantity of water and mud that would enter the engine. In order to settle the question as to the sup-

posed unhealthfulness of tunnels, in February, 1837, Dr. Paris, Dr. Watson, Mr. W. Lawrence, lecturer on anatomy and surgery, Mr. R. Phillips, lecturer on chemistry, and Mr. Lues, surgeon, were requested to visit and report upon the Primrose Hill tunnel. Although the ventilation was then imperfect, owing to the western extremity of the tunnel being imperfectly ventilated, the device was allowed to escape from the engine for a space of twenty minutes, during which it remained stationary in the tunnel, those gentlemen reported that for many feet above their heads the atmosphere remained clear, and apparently unaffected by steam or effluvia of any kind, and that neither damp nor cold was perceptible. They further express their opinion that the dangers incurred in passing through well-constructed tunnels are no greater than those incurred in ordinary travelling upon an open railway or upon a turnpike-road; and that the apprehensions which have been expressed that such tunnels are likely to prove detrimental to the health or inconvenient to the feelings of those who are chiefly ground is much less than was anticipated. These opinions are fully corroborated by the observations of Drs. Davy, Williamson, and Reid, upon the Leeds and Selby railway tunnel, which, as well as the report on the Primrose Hill tunnel, were given in evidence before the Select Committee of the House of Commons on the Coal and Cannel Railways, in 1837. The objection arising from darkness is obviated on the London and Birmingham and many other railways by the use of lamps in the roofs of the carriages, which afford an agreeable though small degree of light in the interior; but on the Brighton railway and in a few other cases the tunnels themselves are lighted by gas-lamps attached to the side walls.

Mr. Booth, treasurer to the Liverpool and Manchester Railway Company, contended and patented a plan for obviating some of the objections to railway tunnels by making, when practicable, two parallel passages, one for each track, and giving to each a full opening, or not less than ten or twelve feet in a mile, in the direction of the traffic to pass through it. As the rails are usually most, in consequence of the humidity of the atmosphere, the adhesion of the driving wheels is less than upon an open line, and consequently it is desirable, in order to pre-
The summit tunnel, North Midland Railway, about 2120.

Avebury tunnel, Cotswold Railway, about 2060.

Bishops Waltham tunnel, South-Eastern Railway, about 1950.

Newport tunnel, South-Western Railway, about 1950.

Bristol and North Somerset Railway tunnel. Single track.

The Thames Tunnel.—The idea of forming a communication between the banks of a navigable river, which is fixed by natural causes, would be inadmissible, appears to have originated from the subterraneous excavations in the coal-districts of the north of England, where there are excavations extending under the rivers Tyne and Wear. Perceiving from this the practicability of such a scheme, an engineer named Dodd proposed, many years since, to form a subaqueous passage or tunnel between the towns of North and South Shields; and, subsequently, a similar tunnel beneath the Thames between Chevet and Roydon was sent to Tilbury. Neither of the schemes was carried into effect; but the latter was mentioned by parliament, and the works were actually commenced, about the end of the last century. They were abandoned in 1834 another tunnel was commenced also under the authority of an act of parliament, a line below the site of the present tunnel. A shaft was sunk in the Rotheristle side of the river to a depth of 70 feet, from it to the northern bank, about 600 feet, at the bottom, and 2 feet 6 inches wide at the top, excavated in the line of the proposed tunnel, for a distance of about 1000 feet; when, although within 150 feet of the opposite shore, the undertaking was abandoned, it being considered impossible to commence the tunnel excavation by the repeated influx of sand and water. In 1823 another plan was brought forward by Mr. (now Sir) Isambard Brunel. In which it was proposed to form at once, with a preliminary tunnel, the greater part of the excavation, and allow the earth to be removed on points simultaneously, without exposing any considerable portion in an unsupported state; it was suggested, said, by the operations of the destructive worm called the tubeworm, which attacketh and penetrateth its way into the hardest wood. Parliamentary sanction having been obtained by the promoter of the scheme, operations were commenced early in 1825 by the construction of a shaft 50 feet in diameter, at a place three-fourths of a mile from the river, and at a point about two miles below London Bridge. The shaft was built on the surface to the height of 42 feet, the brickwork being 3 feet thick, and laid on a ring of cast-iron with a chisel-shaped edge projecting downwards from the outer extremity. Iron-ribs were passed up through the brickwork from this foundation-ring to another placed in the top of the shaft; and the brickwork, which was laid cement, was further bound together by timber-joists in an inch thick. This cylinder of brickwork was then successively sunk into the earth by the excavation of the great upper extremity, which was drawn out by a steam-engine mounted on the top. In this way the shaft was passed through bed of wet sand and gravel 20 feet deep, which had occasioned much difficulty in the sinking of the shaft for drift otherwise attempted, and was sunk until the lower at the level of the top of the intended tunnel, which the brickwork was cut by the river. A smaller shaft of 25 feet diameter, intended as well for reservoir for water drawn out of the tunnel drain, was sunk still deeper; but at about 80 feet from the river this was abandoned, and the tunnel was suddenly given way and water was blown up. The excavation for the tunnel was of an oblong square form, 38 feet wide and 22 feet high, presenting a sectional area of 855 square feet. To be entered by the Bristol and Gloucester Railway Company, and the powers of its act of 1839.
Fig. 3.

The whole apparatus may be compared to a massive cofferdam laid on its side, and capable of being moved forward by the action of several sluices against the end of the completed brickwork, which followed it up closely. This is shown in Fig. 4, which represents a longitudinal section of the tunnel, illustrative of the mode of carrying on the works.

Fig. 4.

The flat soles at the bottom of the shield supplied a firm base, which might be readily slid forward, and the top and sides were securely closed in by flat plates, which, being supported by massive framing and fitting close to the brickwork, effectually prevented the falling in of the soft earth. Each frame of the shield consisted of three stories, each of which formed a cell large enough for one man to work in conveniently; and the front of every cell was protected by a series of narrow poling-boards, each of which was separately held in its place by an apparatus which allowed of its being fixed either on a vertical line even with the face of the shield, or a few inches in advance of the brick wall. The top plate of the poling-board in its division of the shield, and excavating the small portion of earth thus exposed, to the depth of about six inches; he then replaced the poling-board, and continuing it to proceed with the excavation of the face of the excavation, and removed the second board, thus exposing a fresh portion of earth for removal. When all the poling-boards in one frame of the shield had been thus advanced six inches, it was pushed forward, and the same series of operations was repeated.

The several frames or divisions of the shield were thus alternately moved forward, by slow and cautious steps, and closely followed by a solid mass of brickwork, encasing two arches, passing inward a distance of 16 feet 6 inches to height from its base to the crown of the arch, and 13 feet 9 inches span at the springing of the arch. The arch, the invert, and the curved side-walls are laid in concentric rings; and the total thickness of the brickwork at the thinnest points, or those at which the inclosed arches approach nearest to the boundary of the rectangular mass of brickwork, is 3 feet. A solid wall, 3 feet 6 inches thick at the top, and 4 feet at the bottom, was built between the arches; and, as the work proceeded, a series of small transverse arches, forming openings from one tunnel to the other, were cut through it. One of these arches is shown in Fig. 4, which also represents the movable scaffold that followed the shield, for the use of the workmen employed in building the tunnel. The whole of the brickwork is laid in Roman cement, and each archway is, or will be, finished with a lining of cement, a carriage-road, and a narrow footpath adjoining the central arch.

A large machine, in which the workmen were carried from the centre or lowest point of the tunnel to the Rotherhithe shaft, by means of which any water that percolates through the brickwork may be removed. The water from the remaining half of the tunnel flows into the drain, owing to the inclination of the roadway.

The excavation of the tunnel was commenced in January, 1826, in a stratum of clay; but, before a month had elapsed, great difficulties were experienced from cutting into the rock, break, or fault, filled with sand and gravel. Notwithstanding this obstacle, which was passed through after thirty-two days of anxious labour, 360 feet of the tunnel were completed in the first year. Moist clay was occasionally forced through the shield, and cavities in the bed of the river were repeatedly filled with bags of clay, to prevent the water from breaking through. The nature of the ground is indicated by the circumstance of a shovel and hammer, which had been accidentally left in the river, during an examination with the diving-bell, being subsequently found in a mass of loose earth which broke into the tunnel, they having descended eighteen feet through the earth. The cutting of the works was further continued until 18th of May, 1827, when the river broke in with such violence as to wear the brickwork at the entrance of the tunnel down to one-half of its original thickness. No lives were lost on this occasion, nor did the finished part of the tunnel suffer any material injury. The cavity in the bed of the river having been filled up, and the tunnel pumped dry, the works were recommenced under circumstances of extraordinary difficulty and danger, arising from bursts of earth, water, and inflammable gases; but in the following January another irritation of the river stopped the works, overwhelmed some of the miners, and led to an apprehension, on the part of many, that the tunnel could never be completed. The river further was stopped by about 100 tons of soil, and the tunnel was again filled with water; but, owing to the exhaustion of the Company's funds, the works were not recommenced until January, 1833, when, after repeated applications to Government, it was agreed to advance money for their completion. A new shield was substituted for that injured by the irritation, and since that time the tunnel has advanced steadily to completion, although sometimes the excavation has been stopped by the weight of only a few inches per week, and three more irritations of the river have taken place. As the tunnel approached the Wapping shore, a shaft was commenced on that side of the river, similar to that at Rotherhithe; and on the 19th August, 1841, by means of this shaft, an opening was made into the tunnel along a small driftway. The excavation has since been completed, and now (December, 1842) no-
thing is required beyond the completion of the permanent staircases in the Rotherhithe shaft to prepare the tunnel for use by foot-passengers. The approaches for carriages, which are proposed to be by spiral roads and circular excavations, 200 feet in diameter, are not yet commenced. The tunnel is 1300 feet long between the two shafts; and it is expected that the total cost of its formation, with the approaches, will be between £600,000 and £700,000, which is far less than the cost of the modern metropolitan bridges. A detailed account of the progress of the undertaking is given in Knight's 'London,' vol. iii., No. 54.

TUNSTALL, JAMES, D.D., was born about the year 1710, and educated at St. John's College, Cambridge, of which he afterwards became a fellow and tutor. In 1739 he obtained the rectory of Sturmer in Essex, and two years later he was appointed chaplain to Potter, archbishop of Canterbury. In 1744 the University of Cambridge conferred upon him the degree of D.D. After having held the office of chaplain for several years, he received from the archbishop the rectory of Great Chart in Kent, and the vicarage of Minster in the Isle of Thanet. He resigned both places in 1757 for the more lucrative vicarage of Rochdale in Lancashire, which was given him by Archibishop Hutton, to whom he was related by marriage. He remained here until his death, on the 28th of March, 1772, although he spoke from the first much disappointed in the expectations which he had entertained concerning his position at Rochdale. This disappointment, together with various troubles in his family, is believed to have hastened his death.

Dr. Tunstall was a man of a most amiable and humble character; when he left the place of chaplain to the archbishop of Canterbury it was said of him, that of all the humble men that had ever held that office, he was the only one that remained humble when he left it. He was a scholar of considerable ability, although he has not done much. But there are some points which he has settled. The work to which we allude is his letter to Dr. Middleton, 'Epistolae ad Virum eruditum C. Middleton,' Cambridge, 1741, 8vo. In this letter he questions the genuineness of the collection of the epistles between Cicero and Brutus, entitled 'Epistolae ad Brutum,' which Middleton had made use of without any doubts as to its genuineness, while, according to the opinion of Dr. Tunstall, he had not paid sufficient attention to Cicero's letters addressed to his brother Quintus and to Atticus. His views respecting the doubtful character of the correspondence between Cicero and Brutus were further developed in an English essay, 'Observations on the present Collection of Epistles between Cicero and Brutus.' These two dissertations have so far settled the question respecting the authenticity of those epistles, that all the subsequent editors of Cicero have regarded them at least as very doubtful. The other works of Dr. Tunstall are of a theological or theologico-political character. A sermon before the House of Commons, May 29, 1746, 4to; 2. A Vindication of the Power of the State to prohibit Clandestine Marriages, 1755, 8vo; 3. Marriage in Society stated, with some Considerations on Government; 4. Academica. Part the First, containing Discourses upon Natural and Revealed Religion, a Concio and a Thesis. The second part of this work did not appear during the author's lifetime; but it is generally believed that the Lectures on Natural and Revealed Religion, which were edited after his death by his brother-in-law, the Rev. Mr. Dodsworth, were intended by the author to form part the second of his Academica. In the British Museum there exists a collection of letters forming the correspondence between Tunstall and the Earl of Oxford, in the years 1738 and 1739, on the subject of Ducett's Athelistical letters.

(Nichols, Anecdotes of Literature; Aikin, General Bio-
sketch.)

TUPAIA, Sir T. Stamford Raffles's name for a genus of mammals which Dr. Horsfield places among Cuvier's Insec-
torius Carnivorsi, the Fere of Linneus, and the Falcu-
lata of Illiger.

Generic Character.—Head oblong, depressed. Snout long, equally attenuated; nostrils lateral, semilunar. Ears very large and rather prominent. Ears large and oblong. Body cylindrical, covered with close fur and soft hairs. Tail longer than the body, linear, compressed. Feet planti-
grade and pentadactyle, the soles naked, the toes com-
presed, and the claws falcular.

Dental formula:—incisors 2; canines 2; molars 14.

Teeth of Tupaia barbata; nat. size. a, profile; b, seen from above. (Horsfield.)

Dr. Horsfield (Zoological Researches in Java) states that in the Malay language the name of Tupaia is a general term for various small animals which have the external form and agility of the squirrel; while each different species, agreeably to the observations of the natives of the islands of the Eastern Archipelago, where these animals are found, is distinguished by a particular epithet. Thus two small animals which, according to Dr. Horsfield, classification, belong to the genus above described, are, he says, denominated Tupaia Press and Tupaia Tana; while several other animals belonging to the genus Sciacrus are denominated Tupaia Ayung, Tupaia Tankahoe, &c. The same author states that three species of Tupaia had been discovered when he wrote, two of which are natives of Sumatra, Penang, and Sangea-pura, while the third has been found exclusively in Java, where it is distinguished by the name of Bangiring or Sisingar.

Example, Tupaia Javanica; Bangiring or Sisingar of the Javanese.

Dr. Horsfield says that this species has the appearance of a sprightly animal, a character which, with its manners, so far as they are known, perfectly agrees. 'Its body,' says Dr. Horsfield, is graceful and handsomely formed, and its limbs are slender and fitted for great agility; its size and exterior habits so nearly resemble the individuals of that family which Illiger has denominated animalia agilis, that, on a superficial view, it has been considered to belong to it. Our animal agrees with one of the most numerous sections of this family, the Squirrels, in the form of the body.
the proportional length of the extremities, the breadth of the tail, and the faculty of carrying it on the back as a plume; but the succeeding details will show that its structure and organization are essentially different.'

Dr. Horsfield then gives the following Description.

The head is oblong, rather depressed, and very gradually attenuated to a conical muzzle, which is somewhat compressed laterally. The nose is obtuse and naked. The nostrils are slightly curved, somewhat broader in the middle, and pierced from the sides. The upper jaw surpasses the lower but little in length. From the upper lip are protruded mustaches, consisting of numerous short slender hairs, and a few solitary bristles arise from the cheeks and chin. The eyes are very large and prominent, and situated at an equal distance from the gap or opening of the jaws and from the crown of the head: the pupil is circular, and the irides are dark. The ears offer some peculiarities both in their disposition and form. They are externally provided with a large helix, which, being margined in the upper part, passes in an angle to the sides, where a well-defined anthelix runs parallel to it, and between both; patches of short hairs are scattered without regularity. The tragus is of moderate size and naked, representing a scale, which is infeeted in part over the auricular auricular externus, and is calculated to cover it entirely whenever the economy of the animal requires this organ to be protected. The antitragus is naked, and occupies a considerable portion of the auricular cavity. The ears are situated far behind, near the commencement of the neck, which is of moderate length, and differs but little from the head in dimensions. The anterior extremities are slender, and somewhat shorter than the posterior: the latter are considerably more robust, and the thighs are muscular, and calculated for vigorous exertion. The feet are plantigrade, and the soles perfectly naked; the toes of the posterior extremities are considerably longer than those of the anterior, and the manner in which the feet are placed on the ground gives a peculiar character to the gait and appearance of the animal. Each foot is provided with five slender, compressed, distinct toes. The three intermediate toes have a similar disposition in both extremities; the middle toe scarcely exceeds the lateral ones in length. The small toe is shorter, and placed more posteriorly. The thumb is perfectly distinct, and movable in a direction opposite to the others; in the hind foot it is placed at a greater distance from the toes than in the fore foot.

The claws are sharp, compressed, and curved; and, in comparison with those of Sorcs, and several other genera of this order, of considerable strength: they are, he observes, individually supported by a small protuberance similar to that which is found in the Tarsii; and the construction of the claws in the Banggoring is adapted, he remarks, to the same food and habits as those of the other species of Tupaia. The linear tail, of the same length as the body, is compressed, with the hairs spreading far on each side; but, adds Dr. Horsfield, it is less full and ornamental than in the squirrel. The fur of the banggoring is close, silky, and delicate, with a few longer, more rigid, and darker-coloured hairs dispersed among the long and straight hairs closely applied to the skin, with which the back, neck, sides, tail, and extremities above are furnished. The upper parts are brown, slightly diversified with grey of different shades; the lower parts dirty white, with a slight tint of greyish: the tail agrees with the upper parts; and the scapular line, which is nearly an inch long, agrees with the neck.

Sir Stamford Raffles states that a tame Tupaia ferruginea was suffered to go about at perfect liberty, ranged in freedom over the whole house, and never failed to present himself on the breakfast and dinner table, where he partook of fruit and milk. Dr. Horsfield also quotes an extract from the Proceedings of the Asiatic Society, where it is stated that a living Tupaia ferruginea was brought to Bengal by a medical gentleman; it ran about the house tame, but would not allow itself to be caught for close inspection. Though at liberty to run out of doors whenever it liked, it showed no disposition to leave its quarters, and evinced some attachment to the family; for whenever strangers entered the house it showed dissatisfaction and made a chattering noise. It gave no trouble in feeding, for it was always on the search after insects, and its favourite food seemed to be flies, crickets, grasshoppers, and cockroaches.

Dr. Horsfield observes that although Tupaia has been placed among the Insectivora, its arrangement in a natural system requires further consideration. It is necessary, he remarks, for this purpose that we should be more fully acquainted with its internal structure and with its habits and manners than we are at present; for although in certain characters it approaches near to the genera Sorcs and Mygale [Sorcces] among the Insectivora [Carnivora], it in others it resembles Tupaia among the Quadrumanes; and withal it is masked by the external form and appearance of the Squirrel.
Greek word *tupis* (trumpet), a mallet or hammer, on account of the peculiar form of the flowers. The genus is little known, but has sometimes been cultivated in our botanic gardens.

The flowers are densely spiked. Perianth coroll-like, bell-shaped. Stamens 6 to 8, inserted in the tube of the perianth. Ovary subcylindrical, very small, 3-4-celled. Ovules 2 in each cell. The species are found in the islands of the Indian Ocean and in the hot and moist parts of India. They are stemless, with a thick tuberculous rhizome, annulate from the insertion of the bases of the leaves, the leaves are two-ranked, petioles linear, lanceolate, nerving and striated with a central scape; flowers of a dirty violet colour. *S. squillata*, from Ambonaya, is figured in Bot. Mag., t. 1055, and Rot. Reg., t. 1223.

**TURBARY, COMMON OF**, is a right to dig turf in an agricultural land in the lord's waste. This description of common right may be appanant or appurtenant to a house, but not to land; for the turf dug in virtue of the right are to be burnt in the house. The right is therefore confined to such a spring as is sufficient for the consumption of the house to which the common of turbary is appurtenant, and never extends to a right to dig turf for sale.

Where common of turbary is appurtenant to a house, it will pass by a grant of the house with the appurtenances. ([Rep. 37. Common.]

**TURBINACEA**, M. de Blainville's name for his sixth family of Polythalamaceae, including the genera Cibicidia and *Magilus*. For Lamark's *Turbinacea*, which might include M. d'Orbigny's *Scissurella*, see *Turbinidae*.

We shall here shortly describe *Scissurella*.

Shell subglobose, umbilicate, with a spiral groove terminating in the opening of the outer lip in a slit; spire short, aperture oval, modified by the last whorl; outer lip tranchet with a deep fissure near the spire. The *Scissurella* are small shells, and may be known from *Pleurotomaria* by their short spire. *Scissurella elatior*, a figure of which is given by Mr. G. B. Sowerby, Jun., in his useful *Conchological Manual*, may be taken as an example.

**TURBINELLAT**. [Siphonostomata, vol. xxii., p. 52.]

The family of gastropodous moluscos.

Linnaeus placed his genus *Turbo*, in his last edition of the 'Systema Naturae,' between *Trocus* and *Helix*, with the following characters:

*Subula.* Shell univalve, spiral, solid. Aperture narrowed, orbicular, entire. And he divided the species into the following sections:

**The Naticidae**, with the columbar margin of the last whorl entire, by the author says that it is only possible by this way making the conchological system of Linnaeus accord with that of modern authors that he has established.

The animals of this family appear, he adds, to be all phytogamous; a small number respire air, and the greater part of them are marine. However, in his work, the Cricostomatidae are well represented.

With regard to M. de Blainville's observation touching the slight distinction between *Trocus* and *Turbo*, we recall to the reader his recollection the figure and description of *Trocus imperialis*, the operculum of which determined MM. Quoy and Gaimard to place it among the *Turbinidae*.

The following is M. de Blainville's definition of his genus *Turbo*:

Animal nearly entirely resembling that of *Trocus*. body capable of being ornamented with terminal appendages in number and form: head proboscis; tentacles slender; eyes large and tuned to the sight; mouth without a labial tooth, but provided with a very long lingual ribbon rolled spirally, and contained in the abdominal cavity; a transversal furrow at the anterior border of the foot; two branchial pseudopodia.

Shell thick, nacreous internally, depressed, conical, or subtruncated, umbilicate or not, slightly or not at all carinated on its circumference; aperture round or slightly depressed, subcylindrical, with the middle of the opening of the last whorl finely striated; operculum, when provided with an operculum. When one of these shells is placed on its base, its axis is always inclined more or less, and is never vertical. ([Animais sans Vertébres.]


The Sabot (Turbo, Linn.) of Cuvier comprise the *Sabot* of his time, *P. perversus*, *P. duplicatus*, and *P. conjugatus*, of which he considers the *Siphonostomata* of D'Orbigny living species. ([Tubinacea.]

The *TURBINELLAT* is a genus of the *Turbinidae*, *Turbinellat*, Lam. *Scissurella*, Lam., and the terrestrial and fresh-water genera *Cyrtostoma*, Lam., and *Voluta*, Mull. ([Tubinellata, ante, p. 267.]

Cuvier describes the Sabot as having a shell round or oval, thick, and with the mouth completed on the side of the spire by the penultimate whorl. The animal has, he tells us, two long tentacles, with the eyes carried on pedicles at their external base, and on the sides of the foot membranous alae, which are sometimes simple, sometimes fringed, sometimes furnished with one or two filaments. It is to some of these, he observes, that those stout and thick *opercula* remarkable in collections belong, and which, when once exposed in the market, he gives the name of *Unguis cards*. There are some of them, he adds, umbilicate (*Melagrria, Mont. and others not umbilicate (Turbo, Mont). ([Rez. Anim. 23.]

The *Cricostoma* of M. de Blainville consist of the genera *Turbo*, *Pleurotomaria*, *Dilophina*, *Turritella*, *Proto*, *Scissurella*, *Vitraceus*, *Magilus*, *Voluta*, *Cyrtostoma*, and *Pululina*.

M. de Blainville therefore defines the genus *Turbo*, Linn. —

Animal slightly variable, rather however with reference to the form and proportion of certain external parts than to the totality of its organization, and bearing a general resemblance to that of *Trocus*.

Shell external variable in its general form, but the aperture of which, always nearly circular, is completely closed by a calcareous or horny operculum, with but few spiral whorls, and with a subterminal apex.

M. de Blainville observes that this family is really hardly distinct from the *Goniostoma* (Trocus, Linn.), which preceed it; and, in fact, he remarks, the Linnaean genus *Trocus* is fused in insanable gradations into his genus *Turbo*. ([Tubinelles, ante, p. 267.]

*The Cricostoma* of M. de Blainville is a family of gastropodous moluscos.

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Shell thick, nacreous internally, depressed, conical, or subtruncated, umbilicate or not, slightly or not at all carinated on its circumference; aperture round or slightly depressed, subcylindrical, with the middle of the opening of the last whorl finely striated; operculum, when provided with an operculum. When one of these shells is placed on its base, its axis is always inclined more or less, and is never vertical. ([Animais sans Vertébres.]

Turbinidae are immediately succeeded by the Trochidae. (Synopsis Mus. Brit.)

MM. Quoy and Gaimard, who give a figure illustrative of the anatomy of Turbo marmoratus, the largest and perhaps the best-known species of Turbo, select the animal as the type of the organization of the genus, and thus describe its structure:

The head is large, escutcheoned (ecussoné), heart-shaped, and provided with two short, slender, obtuse tentacles, coming out from between the ocular peduncles; and there is an internal prismatic appendage, which MM. Quoy and Gaimard occasionally digitated. The peduncules, which carry very small eyes at their extremity, are themselves triangular. The mouth is elongated into a sort of very movable proboscis, enlarged, and a little drawn out at its extremity, expanding more or less largely on the foot. From the base of the eyes issues a fleshy, undulated, and sometimes filamentous fringe, which lies itself on the sides of the root of the foot. The last three or four regular, thick, and oval valves, and the many-storied operculum, which is convex above, and membranous and pauceispiral on its lower surface. It is, perhaps, the largest and heaviest of all known opercula.

The pulmonary cavity is very large, horizontally divided by a membrane, on which are applied, above and below, the branchial lamellae. This organ, then, observe MM. Quoy and Gaimard, is double, and a little oblique from left to right; its single point is free, and directed towards the right edge of the foot or body, which is the external one. Below this partition, and on the same side, are seen the following organs:—1st, the free and fringed point of the anus; 2nd, the tube, in form of a proboscis, of the organ which severs the purple dye; it penetrates into a large lamellose cavity, above which repose the end of the intestine and the body of the uterus: 3rd, farther backwards, the uterus, of a cylindrical form, the linear ovoid-shaped, and large, of which there are two, very large, thick, and oval valves, situated above. Its internal walls are villous and velvety. It is the same, observe the describers, in the Monodonta of our coasts.

MM. Quoy and Gaimard do not know what purpose is served by a large fasciculus of tubes conducted to each other, separated transversely by another tube, applied upon the reestum and corresponding to the uterus. As this organ has some analogy with the circulmuctions of the uterus
of the *Pteroceras*, MM. Quoy and Gaimard think it may belong to generation. The heart is elongated, very delicate, and attached upon the rectum at the part where it begins to form a loop. It has two arteries, one anterior and the other posterior, to receive the blood from each gill.

The mouth is a fleshy mass, ovoid, and provided with protractor and retractor muscles, with a horned bifid plate at its aperture, and with a rather long and wide tongue furnished with strong hooks. As in *Parmophorus*, the oesophagus contains four long, membranous, and very villous folds. Its salivary glands form but a moderate bundle placed below.

The tract of the oesophagus is rather long before it enters the liver, where, partially, is placed the stomach, which last is very ample, globular, and divided, as it were, into two compartments by a transverse part which portion is smooth, folded longitudinally; the pyloric covered with linear granulations, converging towards the aperture. A little farther on, the intestine forms many close-set circumvolutions, whence issues the great loop which terminates by the rectum.

The liver is enormous, and composed of itself nearly the whole of the spiral portion of the animal (*tortillon*), embracing, as has already been observed, a portion of the stomach and intestine into which it pours the bile. It did not appear to MM. Quoy and Gaimard to be easily divisible into lobes. It is covered by an organ consisting of a delicate layer, ordinarily of a different colour, most frequently of a pale yellow, which MM. Quoy and Gaimard suppose to belong to generation. Perhaps, however, one might look for the analogue of a penis in the spirally-rolled body seen on the left side of the liver. But though MM. Quoy and Gaimard show that they have not been able to follow out the relations of this spiral with the uterus or its appendages, they are certain that it has no reference to the tongue.

The nervous system, they observe, differs from that of the other mollusks, in having the upper ring placed very near the mouth, and the lower more backward below the oesophagus. They remark that one may easily overlook it, and take another loop for it, especially in *Halosia*. Ganglionic points of this nervous circle give off filaments for all parts of the body.

The colour of the foot is grass-green on the sides, slightly brown above, and of a beautiful yellow below; the head is red-brown and striated, with a narrow green band at the base of the eyes and the palmettes. These four appendages are bordered with green, as well as the muzzles, which is striated with brown. The tentacles and the edge of the lateral fringes of the feet are green also. The contour of the mantle is yellow, and the operculum white (we may add, externally, for in the inside it is chestnut).

The anatomy of this *Turbo* is given in the atlas of the *Astrolabe* (Zoologie, pl. 69, f. 10).

I brought back to the *Astrolabe* at Ambon, and there only, by the Malays; and MM. Quoy and Gaimard could not obtain any account of the habits of this species. They add that the inhabitants of Vagiuu probably eat it, for they often found the shells of this *Turbo* empty upon the heap of other molluscan shells, from which the natives obtain food. (*Astrolabe.*)

The number of living species of *Turbo*, recorded by M. Dehayes in his tables, is fifty-six.

Examples.—*Turbo marmoratus.*

**Description.—**Animal (see above).

Shell subovate, very ventricose, imperforate, smooth, green marbled with white and brown or subfuscated; the last is transversely nodulous in a triple series, the upper nodules greatest; the lip at the base flattened into a short subreflected tail-like process; mouth silvery.

This shell when deprived of its external layer exhibits a silvery, iridescent, and very brilliant nacre.

*Turbo torquatus.*

**Description.—**Shell obiculate-convex, broadly and deeply umbilicated, transversely sulcated, substriated with close-set longitudinal lamelle of a grey-green colour; whirls above, coronated; the last with a median carina; spire blunt at the apex. (Lam.)

MM. Quoy and Gaimard state that the foot of this *Turbo* often takes a quadrilateral form, but it can elongate itself into a trumpet-shape, as they have represented it; it is yellow below, dotted with red-brown on the lateral parts.

The mouth is under an enlarged hood, which is notched, greenish, and striated below, striped with red-brown above. The tentacles, moderately long for the size of the animal, are yellowish, annulated with brown. They carry the eyes at their base upon a fringed pedicle. The palmettes are equally incarnate. The lateral fringes of the foot have only a single yellowish filament. The parts contained in the spire are also yellowish, after la cuisson. The oval operculum is remarkable for its doubly spiral guilloche* of a fine white, and granulated.

The shell, when deprived of its first layer, is beautifully nacreous.

This species, which grows to a large size, inhabits King George’s Sound. Only a few individuals were found alive.

*Turbo Cookii.*

**Description.—**Shell obiculate-convex, with a ventricose dilated base, longitudinally plicate, rough, nito-fossaceous; the pleations very frequent, close-set, oblique. imbrocato-aquamous; the whorls convex, lower surface rather convex, concentrically rugous, and imperforate. (Lam.)

The animal has long, filiform, white tentacles, dotted with red-brown, without palmettes at their internal part. The eyes pediculated. The mouth is elongated in form of a proboscis, or is widened into a hood. It is white, striated...
fossil Red Sea shells that species and *Monodonta tectum* and *Egyptiaca* (all living) are noticed. Mr. Lyell also includes *Monodonta Vietilloti* among the fossil shells from the flanks of *Etna*, immediately above the Bay of *Trezza*. *Monodonta* occurs also below the chalk, in the Portland stone for example. (Fitch's *Stratigraphical List*.)

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*Monodonta* have been found generally on rocks and weeds.

The number of species of *Littorina* given by M. Deshayes in his tables is twenty-four, and ten are recorded as fossil (tertiary). *Littorina littorea* and *striata* are noted as found both living and fossil (tertiary). *Littorina* occurs also below the chalk. Dr. Fitch, for instance, records seven species in his *Stratigraphical List*. Most of these are from the lower green-sand, but one is from the Portland stone, and another from the Oxford oolite. Mr. Murchison records a species from the Silurian rocks (Carboniferous limestone).

Recent *Littorina* (the common periwinkle an example) are generally found on rocks and weeds near and
on the shore. *Littorina pulchra* has been found on mangrove-trees fourteen feet above the water. They have also been kept alive six months without water. See the *Zoology of the Astrolabe* for descriptions and figures of many species. [PENWINKLE.]

**Phasianella.**

MM. Quoy and Gaimard express their opinion that the *Phasianella* are true *Turbinella* in all the forms of their organization, and that they ought only to form a division in the genus. These shells, they observe, once so rare, began to be of less value in consequence of Baudin's voyage, and that of the Astrolabe has rendered them common. The place probably alluded to by them is, according to these zoologists, Port Western in Bass's Strait. They cover the sandy beaches of this vast tract. Each tide carries these mollusks to the shore, where they live high and dry for some hours, and endeavour to withdraw themselves from the heat of the sun by hiding under the *fuct*. Under such shelter they congregate so numerously that seventy-six were found under one of these plants.

The *Phasianella* observe the same zoologists, are always smooth. This polish, and, still more, their continual movements, prevent them from being covered with *Serpula*, *Flustria*, and other parasites which encrust sluggish shells. This agitation makes it difficult for them to preserve the contour of their aperture perfect, for it is very frail. In millions of individuals MM. Quoy and Gaimard always found the limp tentacle, never thick or with a border.

The species appeared to them very difficult to characterize, both with regard to the animal and the shell. The last especially presents so much diversity of colour, and sometimes of form, that one may be deceived, and advance simple varieties to the rank of species. MM. Quoy and Gaimard saw some of these shells, which were brown and greenish during life, become red after death by the solar action, &c.

The most common tint of these mollusks is stated by them to be brown dotted with greenish. This colour is proper to those whose shells are nearly of a similar hue, whilst those which approach white or are speckled with red have the animal of a grass-green.

These are lively active animals, and voracious withal, for they were taken in nets baited with flesh let down into the sea. Their foot, endowed with great mobility, is elongated like a proboscis; its great peculiarity is its faculty of moving in two portions as it were; that is to say, each of its sides advances separately and successively; and a longitudinal gutter may be perceived on its lower surface.

On the coasts of New Holland, the *Phasianella* found at King George's Sound are larger and less numerous than at Port Western. They are few in number on the coasts of Van Diemen's Land. The *operculum* is always calcareous.

**Example.—** *Phasianella bulimosides.*

_Description._—Shell oblong-conical, smooth, pale yellow, transversely banded; the bands frequent and diversely variegated and spotted; spine acute at the apex. The animals are generally of a fine green nearly throughout. One will have more white dots on the foot, and another a violet or reddish spot on the lateral fringes of the foot; a third will have this organ yellowish and slightly fringed upon the borders. In all the tentacles are slender and long, the ocular peduncles stout and button-shaped, the palps thickened.

The muzzle, which is elongated a little in the form of a proboscis not retractile, can also modify itself into the shape of a rounded scutcheon (tectus). The fringes of the sides of the feet are very finely fringed, and sometimes present brown ramifications of vessels; they carry three greenish filaments on each side. The *operculum* is oval, calcareous, slightly convex, white, and covered for a portion of its contour by a fleshy lamina of the foot which forms the *lamina*.

**Locality.**—Very common at Port Western, being the species above alluded to, and large at King George's Sound. MM. Quoy and Gaimard observe, that Lamark indicates it as coming from New Zealand: this, they remark, is possible, but they never found any traces of *Phasianella* there.

The animals above described came from King George's Sound.

Phasianella bulimosides.

a. animal and shell seen from below; b. the same seen from above; c. shell; d. operculum. (After Deshayes.)

The number of species enumerated by M. Deshayes in his tables amounts to nine living and four fossil (tertiary). Of these *Phasianella pullus* is noted as recent and fossil (tertiary).

**Phasianella** occurs also below the chalk. Mr. Fitton records three species, all from Blackdown, for example. Here we may notice the genus *Tuba* of Lea, which that acute zoologist thus defines:—

Shell conical, umbilicate; whorls rounded; mouth round; margin not united above; columella thickened and reflected at the base.

'This genus,' says Mr. Lea, 'is nearly allied to *Turbo* and to the *Rissoa* of Laemmle; but not being able, with propriety, to place it with either, I propose to constitute for it a new genus. The reflected margin, which is disposed to be effuse, has at the place some similarity to the *Melantic*, and therefore cannot be placed in the genus *Turbo*. It cannot be placed in the genus *Rissoa*, being umbilicate. In eight species of *Rissoa* in my cabinet, all are thickened round the margin, forming a varix. The *Tuba* has no thickening of this kind, the margin being crenulate. The *Rissoa* has an acute apex, while that of the *Tuba* is almost truncate, the superior whorls being smooth and gibbous. Mr. Sowerby's ' *Mineral Conchology,'* plate 305, figures a shell (*Turbo sculptus*), which I think, should be placed in this genus. It is from the London clay of Barfon. Of it, and the preceding one, he says, they "do not agree precisely with the character of the genus *Turbo* of Lamark," and further, "they form a passage towards *Delphinula.'" Mr. Lea enumerates three
The proceed to the consideration of the genera Nerita, Natica, and Naticina, and, though they cannot be said to belong to the Turbinidae, especially the last-named genus, which we shall find to be very peculiar, are yet so far analogous to the forms which compose that family, that they may well be placed here.

Nerita, Linn. Linnæus placed the genus Nerita between Helix and Nautila, and he divided the genus into the following sections:

- Umbilicata.
  Species: canrena, glaucina, vitella, albumen, mamilloata.

- Imperforate, with a toothless lip.
  Species: corona, radula, cornea, flauvilia, littoralia, and laecuriata.

- Imperforate, with a toothed lip.
  Species: puligeria, papo, bidea, viridia, virigina, yolta, pteronata, albicila, nistror, plicata, gross, chameleon, undata, and exuvia.

We find then that in the Systema Naturae Linnæus made no marked distinction between the marine and fresh-water species of the subfamily Turbinidae.

Neritinae of Lamarck comprise the genera Nerivella, Neritina (Freshwater Nerita), Nerita (Marine Nerita), Natica, and Janthrina. Cuvier makes the Nerites (Nerita, Linn.) immediately follow the Naticae (Natica, Linn.), and here he includes under them Nautes, Linn.; the Nerites, properly so called (Nerita, Lam.; Pelifonta, Oken); Velates, Montf. (Nerita peloronta, Gmel., a large fossil species); Neritina, Lam.; and Clithon, Montf. (the crowned Neritines).

M. de Blainville's Hemicyclostoma, equivalent to Nerita, Linn., comprises the genus Natica, Nerita, and Neritella, or, as he terms it, Septaria.

Nerita he divides into the following sections:

- Right lip toothed. (Genus Nerita, Lam.)
  A. Species with a single median tooth on the left lip. (Genus Pelifonta, Oken.)
  Example, Nerita polaronata.
  B. Species with two teeth.
  Example, Nerita exuvia.
  C. Species with three or four teeth.
  Example, Nerita lineata.

- The right lip not toothed. (Genus Neritina, Lam.)
  D. Species less thick, with the right lip trenchant, and the operculum very oblique. (Genus Neritina, Lam.)
  Example, Nerita fluvatilia.
  E. Species of similar lip is toothed, and which are provided with spines.
  Example, Nerita corona.
  F. Species with the columnar lip toothed; the two extremities of the right lip prolonged much beyond the aperture and forming, with the calculus which covers the columnar lip, a sort of auricles produced by the tentacular lobe of the animal.
  Example, Nerita auriculata.
  G. Calyptrodit species, with the upper summit vertical and spiraled; the last whorl forming the whole base of the shell, and occupied below by a large callousity, which sometimes covers the whole spire. (Genus Velates, Montf.)
  Example, Nerita pervosa.

H. Patelloid species, which are elongated, non-symmetrical, with a dorsal summit, and not spiraled.
  (Genus Patella, Montf.)
  Example, Nerita altivallisus.

M. de Blainville observes that this genus is formed of marine and fluvial species, which led Lamarck to subdivide it into two genera, according to the thickness of the shell, which is greatest in the first, and the denticles on the right lip, which are entirely null in the second. M. de Blainville's observations lead him to the conclusion that the species are still more easily distinguished by the sculpture (sculptura) of the external surface of the operculum than by any other character. He remarks that Lamarck enumerates seventeen species of Marine Nerits, which are all from the equatorial and southern seas, and twenty-one River Nerits, or Neritines, of which only are European and those which inhabit America and Asia.

M. de Blainville states that only two fossil Nerits are known and two Pileoli. But immediately afterwards he says that Defrance reckons five species of fossil Nerits, two of which are analogues (Italy) according to Broeche; and four species of Neritinae, two from the same country, and four Pileoli.

M. Rang adopts the arrangement of M. de Blainville, and condemns Lamareck for generically separating the marine and freshwater species. M. Rang says that there are many species of fossil Nerits.

Mr. Swainson places the family Naticidae between his Turbinidae and Trochidae, making it consist of the following subfamilies and genera. His arrangement is, he says, founded on the subfamilies only, from ignorance of the animals of the major part:

  Genera: Natica, Lam. (with the subgenera Naticella, Globularia, Mamillaria, Sigaretus, Naticat, Larus, Leucotis).

  Genera: Nerita, Linn. (with the subgenus Neritopsis, Gray); Neritina, Lam. (with the subgenus Clithon, Velates (Velates), Pileolus, and Navicella). (Malacology.)

Mr. J. E. Gray makes the Neritidae the sixth family of his Podopodhphalina, and places it between the Fissurellidae and the Ampullariidae. Mr. Gaimard, in his Neeritinae comprise the following genera: Nerites, Pileolus, Culana, Neritina, Clithon, Dosia, Velates, and Navicella.

Adsonus appears to have been the first to make known the animal of a Nerita, and Cuvier afterwards, in his work on the animals of the ocean. M. Lamarck and M. de Blainville have added some further details in the zoology of the Ursate, from individuals brought home by MM. Quoy and Gaimard, who, in the zoology of the Astrolabe, thus follow out those details.

The Nerits are marine or fresh-water animals, a modification of habit which MM. Quoy and Gaimard think sufficient for establishing a simple division between these mollusks, which Lamarck erroneously in his Systema Naturae divided into two genera, Nerita and Neritina: for their organization is entirely similar. Thus the Nerita, with a comparatively thick shell, which is rarely furnished with an epidermis, are always found in the sea; and the Neritina of Lamarck, whose shell is more delicate and almost constantly covered with an epidermis, are always inhabitants of fresh-water: a single instance of one of these Neritina having wandered into the sea, they may, they say, perhaps have had to cite. The Neritinae have a particular and distinctive appearance: they pass a part of their life out of the water without ever removing to a distance from it. Those which haunt streams or marshes may adhere to the banks, the branches, or the stones. Those which are found on land are carried there by Pagur or by some accident. Marine Nerits are also seen at the mouth of rivers; and MM. Quoy and Gaimard remark that these are transitions which nearly all the mollusks undergo without suffering injury of any kind.

MM. Quoy and Gaimard state that they were sometimes astonished to see these animals bear, upon the black rocks, all the action of an equatorial sun without appearing to be affected by it. They owe this faculty to providing, when they adhere, some drops of water which sufficiently refresh their branchiae. This store, or what is left of it, they discharge when they are lifted from the rock.

The Nerits are very widely spread in warm climates. They are gregarious, and many species are found grouped on the same rock. Some live on the banks of streams, others are exposed to the fury of the waves; and, among those which haunt fresh-waters, some live in the deeps in the midst of the strongest currents; others, on the contrary, keep themselves in the slime of marshes. In their sufficiently agile movements their lips are constantly observed in motion.

The animal has a large head, a little notched in front, with two rounded lobes on the sides. The aperture of the mouth, which is subjacent to this sort of hood, is wide and plicated. The tentacles are always very long, pointed, and soft, carrying the eyes at their base upon a pedicle. The foot is oval, furnished, a little pinnate behind, wide in front, with a marginal furrow, and sometimes a depression, which gives it the appearance of being slightly lobated. The edges of the mantle are fringed, so as to correspond with the internal furrows of the shell. The pulmonary cavity is proportionally very large; a single, long, triangular, and pointed gill traverses it from
left to right. It is free at its extremity. Its lamellae appeared double to MM. Quoy and Gaimard. The heart is simple, placed backwards and to the left; its ventricle embraces the end of the intestinal loop, which has the appearance of traversing it.

To the right of this cavity, and in the female, is a group of organs worthy of attention. There are seen, first, the extremity of the rectum, and then a very elongated pyriform body, surrounded partially by a sort of gland which is striated transversely, and which opens below. This organ is hollow, and contains within its cavity, coadapted to each other, many bodies in an elongated mass, terminating in filaments. They are of a resisting substance, fibrous as it were, and appear granulated under a magnifying lens. The particular use of this little apparatus MM. Quoy and Gaimard cannot divine, but they think it doubtless fulfills some functions relative to generation, for it is only found in females. More externally is the uterus, composed of a pyriform pouch, and of a reformation which is coadapted to it, which contained a great quantity of round, white, and crenated eggs. The large, long, and tortuous oviduct causes this organ to communicate with the ovary, which is placed at the right border of the liver.

In the male the testicle occupies the same place. The deferent canal is knotted upon it; it is a thread, which in water may be unraveled to the length of two feet. It becomes stouter at its termination, which MM. Quoy and Gaimard traced to the exciting organ, which last is short, and placed at the base of the right tentacle.

The mouth, of which something has been already said, is an oval mass, sustained by two small articulated cartilages, and covered with musculce. Above is inserted a rather long ribbon with five rows of hooks. The oesophagus is slender, as well as the stomach, which is hardly distinguishable from the rest of the intestinal canal. This last, after having passed into the liver, returns to the boccul enlargement, thus describing a great circle, and touches the heart, which is applied upon it at the base of the gill, and terminates by the rectum. Two great salivary glands, which are flat and granulated, and shortly pedunculated, repose upon the oesophagus without adhering to it. Their ducts pass under the brain. The liver appears to be formed of a single mass describing an elbow-like figure (coudes), from left to right, and lodging in a cavity of the shell, the commencement of the spire, which returns forwards, and is placed under the dentilsations of the aperture of the shell.

The cerebral ganglion forms a triangular loop in which the oesophagus passes. The branches unite below in two small ganglions, which touch each other. From it are given off nervous filaments for the different parts of the body. (Astrolobe.)

Example.—Nerita polita. Description.—Shell thick, smooth, somewhat shining, longitudinally striated very finely, varying in colour; the spire very refuse, the lip toothed, smooth above. (Lam.)

This species, according to MM. Quoy and Gaimard, is the most plentifully diffused of any of the genus, and is found in nearly all the seas of warm climates. It is heavy, polished, marbled, and often coloured with three red transverse bands.

The animal is of a uniform yellowish white, with the exception of the tentacles, which are of a smoky-brown colour.

Nerita polita, with its animal. (Astrolobe.)

Nerita Ascensionis. Shell solid, transversely furrowed, ribbed, greenish-grey, spotted with white and brown; spire prominent, the apex yellow; aperture white; the lip toothed, ragous above; marked above with a yellow spot. (Lam.)

This shell is deeply striated, rugged, yellowish-grey, with circumscribed brown spots upon the parts in relief; aperture smooth, yellowish-white; peristome dotted with white and brown.

The animal has the foot yellow below, striated and dotted with deep brown on the sides, so as to appear nearly black on a yellowish ground. The head, which has a very small eye and hood, is striated in the same manner. The neck is violet. The tentacles are long, pointed, livid-brown, striated longitudinally with black. The eyes, placed at their base, are at the extremity of a triangular pale of yellowish-white, having a black stripe at the external border. They each has its contour dotted with brown. The operculum is red-brown, very much granulated, angular at the posterior border, and provided with a very projecting heel or process.

Locality.—The Island of Ascension. (Astrolobe.)

This fine species is uniform chestnut, with the stripe of growth strongly marked; these converge on the spire, which is covered by the right lip.

The animal has long delicate tentacles, which are yellowish soiled with brown. The head and sides of the foot are yellow, spotted with brown and white. The under part of the foot is reddish.

The operculum is large, of an apple-green colour, with black transverse bands proceeding to converge towards the spire: its contour has a reddish line. (Astrolobe.)

The drawing from which MM. Quoy and Gaimard have figured this species was made at Umata in the island of Guam. They state that there are also Nerita pulisera a Vanikoro. They are found on the trees dead shells whos.
Mr. Broderip has described four living species, and Mr. Sowerby the same number, brought to this country by Mr. H. Cuming, which can hardly have been included in the numbers stated by M. Deshayes. *Neritina* is found below the chalk: example, *Neritina Filifera* (Hastings sand).

**Navicella.**

With the exception of the disposition of its operculum and of the muscles of attachment to the shell, the animal may be said to be nearly similar to that of *Nerita.* Its head is large, convex, notched, a little auriculated anteriorly, carrying two long and very pointed tentacles, having the eyes at their base, on a rather elongated pedicle. The foot is regular, oval, and does not overborder the shell: at its union with the mantle, near its root, it presents a remarkable bourselet, which is due to the internal disposition of the operculum. It is palse-yellow below, deeper upon the sides, with spots dark-brown, as is the case with the head and the ocular peduncles; only the tentacles have a smoked colour, with black and very delicate longitudinal stripe. Mantle light yellow.

The semi-septum which completes the posterior part of the shell seems, in the living subject, rather formed by a fibrous substance of a nacrescent-yellow, than a calcarceous deposit.

After having raised the shell, the first remarkable object is the disposition, a little in the form of the letter S, of the muscles of attachment on each side: their whiteness is striking, contrasted as they are with the sombre colour of the mantle, which forms the pulmonary cavity. This last is very ample, and contains a single triangular gill, which is slightly prismatic, free at its extremity, retained at its base by two lateral membranes, and placed less obliquely than that of the Neris. The heart envelopes the rectum by its veriters.

Four cartilaginous pieces compose the ovoid buccal mass, which the retractor and protractor muscles set in motion. The lingual riband is long and furnished with seven rows of hooks. The osophagus has, at its origin, two long salivary glands. The stomach is hardly distinct from the digestive tube, which describes a great loop, as in the Neris. In the male, the deferent canal describes endless circumvolutions, which one may easily unroll. This very delicate body is of another length than it is in the Neris—many feet, as MM. Quoy and Gaimard believe. The excreting organ, placed at the base and in front of the right tentacle, is short, large, slightly curved, and furnished with a small hook. It is always projecting. The orange-coloured testicle is connected to the liver, and occupies the extremity of the spine. The liver is covered with white vascular ramifications.

In the female, the uterus opens on the same line as the anus and at its internal part. MM. Quoy and Gaimard did not remark the singular appearance of the uterus of *Navicella.* A furrow only leads from the uterus to the extremity of the foot. They say that they have found it in many female mollusks, and it should serve, they think, for connecting the egg to their exit. The whole of the visceral mass is only separated from the operculum by an excessively delicate skin. MM. Quoy and Gaimard then quote the following observations of M. de Blainville:—

**The form and especially the position of the operculum of *Navicella* are so abnormal, that it may be said that it is not a true operculum, and that it is situated in the foot. But it is an evident operculum, and its place is, as in all the cephalopod mollusks which are provided with that organ, above the foot: its form is subquadrilateral; it is adherent throughout its lower surface, free on its upper surface, and terminated behind by a cartilaginous part, by means of which it is carried. It is termed the operculum, by a very small appendage of the foot, which overborders it a little behind. But that which renders it so anomalous, that the foot, which is really subtrachelian, is, that, only attached below the body, is united, nearly throughout the rest of its length, to the visceral mass by the skin which envelops it: whence it results that the operculum seems to be contained in a sort of pouch situated between the foot and the visera, and whose aperture, in the normal animal, is at the posterior side of the body. This disposition of the operculum of the *Navicella,* says M. de Blainville, prevents it from really serving the ordinary purpose of one.

Example, *Navicella elliptica.*

**Description.**—Shell ovate, elliptical; subepidermis greenish-brown, smooth, shining, squamously spotted with white and cerulean; the apex recurved, subprominently beyond the margin. (Lam.)

The number of species of *Navicella* recorded by M. Deshayes in his tables is two living: no fossil species are mentioned. M. de Blainville gives three as the number of recent species (fluvitile), and these from the Indian Archipelago.

**Natica.**

MM. Quoy and Gaimeard remark, that the *Natica* are animals to which their foot gives a remarkable aspect. It is a long oval lamella, ordinarily squared in front, oval behind, and does not overborder the shell. It is covered with a thick esetecheon, a little auriculated, which ascends on the front of the shell, which it covers, at the same time that it hides all the head of the animal, of which otherwise nothing but the tentacles are visible. A groove on each side indicates the two parts of the foot.

The posterior esetecheon, which is less considerable, supports the operculum, which it overborders in order to cover the left lip and the extremity of the shell. There are individuals in which this part has the same size as the foot, from which it is distinguished by a circular groove. Thus, observe these zoologists, throughout their development the *Natica* resemble a mass of flesh, on the summit of which one perceives a part of the shell. The operculum, although very large, is not apparent; placed transversely, it is hidden by the extremity of the shell, which contains the mass of visera. A very small muscle binds all this development of flesh to a rather slight columella. The rest of the animal, which is but slightly spiral, offers nothing remarkable.

The head is large: the tentacles very distant, flattened, long, and pointed. MM. Quoy and Gaimard did not detect the eyes. The gills are horseshoe-shaped, having the same size as the foot, from which it is distinguished by a circular groove. Thus, observe these zoologists, throughout their development the *Natica* resemble a mass of flesh, on the summit of which one perceives a part of the shell. The operculum, although very large, is not apparent; placed transversely, it is hidden by the extremity of the shell, which contains the mass of visera. A very small muscle binds all this development of flesh to a rather slight columella. The rest of the animal, which is but slightly spiral, offers nothing remarkable.

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rarely developed itself twice. The operculum is oval, paucispiral, and represents the arc of a circle. It is membranous or calcareous: the latter appeared nearly always to belong to those Natici whose umbilical fissure is to the right of a callous columnella; for those which have this fissure to the left of that callosity have most frequently a horny operculum. MM. Quoy and Gaimard know of one exception only to this rule. MM. Quoy and Gaimard observe that the examination of their viscera indicates that their nourishment must consist of substances already attenuated. All specimens, they remark, furnish Natica, which are however most widely distributed in warm climates. Nevertheless, they add, from the fragments found on the beaches, New Holland must possess as great a number as many countries nearer the equator. Some species, they state, have an epiphrisus, and, perhaps, all. (Naticidae.)

Example.—Natica melanostoma.

Description.—Shell oval, ventricose, convex-depressed, thin, white, zoned with yellow; spire somewhat prominent; lip blackish-brown, umbilicus semi-closed. (Lam.) Length 15 lines, breadth 11 lines.

Operculum membranous; paucispiral on the left border; the rest of its lamellae obliquely transverse. Colour deep chestnut brown, lighter on the edge.

Locality.—Tonga, the Moluccas, and many other places.

Found by MM. Quoy and Gaimard some fathom deep in the rock, and also in the sand at the bottom of the sea of Japan. From the surface to the depth of forty fathoms on mud and sandy mud, in estuaries and in tidal rivers.

Mr. J. E. Gray makes the Naticidae the first family of his second section, Eocephalina (Edriocephala?), of his second order, Phytophaga. Under the Naticidae he comprehends the following genera:—Natica, Nerita, Nucula, Ceratophyllum, Polinices, Mammilla, Cerina, Globulus, Naticidae, Cryptostoma, Styliina, Babel and Naietopsis.

The number of species of Natica recorded by M. Deshayes in his Tables is 66 living and 41 fossil (tertiary): of these Natica millepunctata, Quillement, camerena, Valenceniar, Bifurcata, Lyrotricha, gastropus, monilifera, mamilla, and zebrata are noted as recent and fossil (tertiary). In addition to these, Natica melanostoma, manillarum, Gracila, and alba occur in the list of Red Sea fossils above alluded to, collected by Mr. James Burton, communicated to Mr. Lea by Mr. Gray, and named by Mr. J. E. Gray and Mr. Frembly.

Natica occurs in the tertiary of Alabama. Mr. Lea describes eight species from the Calhoone beds, and remarks that the genus is widely distributed through the various strata from the inferior olite to the cretaceous beds in Great Britain, where nearly twenty species have been observed. Twelve of these have been found in and about London. Those mentioned by M. Deshayes appear to be well distributed through the Pliocene, Miocene, and Eocene periods of Lyell. In America casts have also been found in the cretaceous group of New Jersey by Dr. Morton, and four species have been described from the tertiary of Maryland by Messrs. Say and Conrad. (Contributions to Geology.)

Dr. Pitton records five species from the strata below the chalk—upper green-sand, gault, lower green-sand, and Blackdown; and Mr. Murchison two from the Silurian rocks. He noted a species in a middle and upper limestone for Lulworth, Lulworth rocks, and Lymington, and lower Ludian rock.

TURBINOLIA, [Madrephyllae.]

TURB. [Madrephyllae.]

TURBO. [Turbinae.]

TURBOT. [Pleuropectinea.]

TURDIDE. [Meritidae.]

TURENE, HENRI, VICOMTE DE, second son of Henri de Bouillon and of Elizabeth of Neussel, was born on the 11th of September, 1611. His Constitution showed symptoms of weakness till he attained his twelfth year. His imagination was so remarkable by the partiality of the lives of celebrated warriors, and perhaps by the conversation at his father's court, before he was ten years of age; and it is possible that the opposition at first accorded him in training up his arms as a profession on account of his indolent nature might have assisted his wish to become a soldier. The due de Bouillon was one of the ablest soldiers bred in the school of Henri IV.; his high rank, love of letters, attachment to the Calvinistic faith, and political sagacity, made his son, raised to the rank of a leader of the Huguenot party after the death of that prince; and his position as sovereign of the small state of Sedan opened a range to his ambitious views, and lent to his character a tone of independence which he could not have acquired in a mere peer of France. The spirit instilled into the young mind of Turenne in a court which took its character from such a prince was, even from the first, more the ambition of the statesman and scientific commander than the imaginative chivalry which inspires most boys, athletic exercises, which contributed materially to strengthen his naturally weak constitution.

The due de Bouillon died in 1633; but the system of education so much adopted for the young Turenne was preserved in by his widow. Jealousy of the designs supposed to be entertained by Cardinal Richelieu to the prejudice of the Huguenots induced this lady to send Turenne, in 1625, to Holland, where he served the prince of Orange, and as a great warrior Prince Maurice. This statesman and warrior soon detected a large and good sense beneath the novel showy exterior of his nephew, and exerted himself to cultivate the lad's natural talents. He made him commence his apprenticeship to the art of war by carrying a musket and a sword, and rendering himself practically familiar with the duties of the private soldier and subaltern officer. Three months after the arrival of Turenne in Holland, Prince Maurice died; Prince Frederic, who succeeded to his high office, was equally attentive to their young relative. In 1626 Turenne obtained a company of infantry, and continued to serve under his uncle till 1630. He distinguished himself by anxiety to learn the whole theory as well as the practice of war. His company was the best disciplined and accounted for in the army; his own routine duties were performed with unfailing regularity; and his leisure time was spent in taking part in every enterprise where experience could be acquired. He was naturally of a restless disposition: in his anxiety to learn he appeared to forget the very existence of danger. Eagerness to do his work thoroughly was apt, when an attack was ordered, to carry him beyond the limits of prudence. Under Prince Frederic and Henry, and opposed to Spinola, he acquired in the learned of six years an intimate and extensive knowledge of the kind of war at that time carried on in Holland—a succession of sieges.
In 1630 Richelieu contemplated placing a French garrison in the town of Sedan, and the only means by which the dowager duchess of Bouillon could avert so dangerous a step was her address to the king and her own personal presence in the field. He was, however, closely watched and suspected by the king, and Richelieu, though he was a minor, was by sending a hostage to the French court. For this purpose her younger son was sent to Paris. Turenne, whose reputation had preceded him, was received with the highest honor, and the king, who had intrusted the command of the army to the command of the country, the 1639, to the French court, and those three days, the twenty-third, the appointment of marchéchal-du-camp, then the next in rank to that of marchéchal de France.

In 1635 the cardinal de Richelieu sent four arquebusiers into the province of Turenne. This was a new weapon, and Richelieu, intrusted with the command of the army, made of it a successful experiment in many different points. One under Châtillon and de Bézé marched into the Low Countries; the Marechal de Crèqui led another into the Milanese; the Duc de Rohan a third into the Valételine; the Cardinal of La Valette was placed at the head of the forces destined to co-operate with the Swedes in Germany, and Turenne was attached to him as marchéchal-du-camp. La Valette joined the duke of Weimar at Bingen on the Rhine in August, and, the combined forces of the two, under his command, were engaged with the Imperial general Gallas contrived, by a movement from Worms, to cut off their communication with France, and the allied forces, stationed in a country exhausted by war, were forced to retreat; and in the capture of Milan procured provisions for the soldiers under his immediate command. In the disastrous retreat that ensued, while discipline was almost entirely lost and the baggage thrown away by the rest of the army, Turenne and his followers, in the accursed order, abandoned only so much of the baggage as enabled him to procure waggons for those who were unable to march, and by mixing familiarly with the soldiers and sharing his provisions with them kept up their spirits and re-established discipline on the spot. He left upon him, and in the discharge of this arduous task he had an opportunity to show how he had profited by his education in Holland, in the art of being upon defensible posts and in flanking them as long as might be necessary. The disasters of this campaign indisposed La Valette to undertake the command of that projected for the countries on the Upper Rhine in 1636, and Richelieu only overcame his reluctance by consenting that Turenne should again accompany him. The success which attended this division of the French forces, while those on the frontiers of the Netherlands were less fortunate, induced Richelieu in 1637 to give the command of the army against Flanders to La Valette, who again commanded in the front of one of his marchéchals-du-camp. This was a campaign of sieges, and the conducting of them devolved almost exclusively upon Turenne. With infinite difficulty he took La Charité and commenced operations for the liberation of men, to surrender at discretion in a few hours; defended Maubeuge successfully against the Cardinal Infant; and, being intrusted with the pursuit of the retreating enemy, closed the campaign by driving the Spaniards across the Saar. In 1638 Richelieu sent two reinforcements to the duke of Weimar on the Upper Rhine, under Turenne and Guébriant, who were designated lieutenant-general, the first of that title in France. After the death of the duke of Weimar in 1639, Richelieu, who again commanded the forces at one of his marchéchals-du-camp, was the natural candidate for the command of Turenne. The relations in which his brother the Duc de Bouillon stood to the court rendered it unavoidable in the eyes of the minister to intrust Turenne with the command of the army. During the remainder of the reign of Louis XIII. the political conduct of the Duc de Bouillon kept Turenne in the background. One of the first acts of Anne of Austria as regent was to send him letters patent appointing him general of the armies of the king in Italy.

Italy was not however destined to be the scene of his exploits as a commander-in-chief. The Duc de Bouillon, who had recovered himself to the new court, soon quitted it with, as with the old, and took refuge at Rome. Mazarin thought it unsafe to leave the brother of this disaffected prince in command of an army so near him, and ordered Turenne to return to Tuscany with the army which, originally raised by the duke of Weimar, laid again been left without a leader through the death of Guébriant and capture of Rantzau by the Imperialists. Turenne took the command of this collection of soldiers of fortune without a country, most of them Germans by birth, in December, 1643, and retained it till after the conclusion of the peace of Westphalia in October, 1648. During the winter 1643-44 he succeeded, by the most strenuous exertions, in reorganizing the French army. He restored the discipline of this army, which was, instead of receiving the command of one from him. And in the last year preceding the peace of Westphalia, he had sent this same army to France, after it was on its march to join the enemy on the allegation that the French government had broke faith with it, at a time when he could only pay for it by its mutinous soldiers. He commanded this army on trial, and that they were in the rear. Yet with such an army, so great was his power of conciliating the affections and keeping up the spirits of the soldiery, he struggled through five campaigns, against leaders of no ordinary ability, to a complete triumph. In 1648 he tried the ardour of the French soldiers, and the last campaign of the Imperialists, flushed with recent success in 1644. In 1649 he prevented the bad effects of the defeat at Marienbad, incurred through the misconduct of Rosen, by his splendid retreat; and concluded the campaign by reinstating the Elector of Trèves in the possession of his territories. In 1651 he put an end to the mischievous custom of separate independent action on the part of the allied armies of France and Sweden, and he had united their operations which led to the conclusion of peace on the frontier of the Bavarian territory and the emperor's consent to the treaty of Münster.

The peace of Westphalia, which released France from foreign wars, was the signal for the commencement of civil broils. In the commencement of 1649 the regent and cardinal left Paris with the king, and the prince of Condé, who had the command of the blockade of the French forces in Bouillon embraced the party of the Fronde. Turenne was at this time stationed with his army on the frontiers of Germany. Strongly engrossed with his military duties, he had hitherto taken no part in politics. The Huguenots, amongst whose party he had been bred and educated, were opposed to the court. He was not a subject of France; his allegiance to that crown could be dissolved at any time by resigning his commission. Thus situated he rejected the command of Paris during a minority appeared to be an unwarrantable stretch of power, and he endeavoured to persuade his officers to take part against the Cardinal. The court however had gained so many regiments that he soon saw the attempt was vain, and retired to Holland with some of his personal friends. A hollow truce was soon after arranged between the contending parties, and Turenne returned to France. A quarrel between Condé and Mazarin led, after numerous petty intrigues, to the arrest of the former. Condé had not long before reconciled himself with the duc de Bouillon and his brother: Turenne was faithful to the prince in this instance. He was obliged to called a regiment which he had designed to revive, its being taken by the royal troops. He alone rallied the dispirited friends of Condé, and, by calling the Spaniards across the frontiers, procured the release of the prince, the exile of Mazarin, and the conclusion of a peace with Spain.

Turenne returned to Paris in May, 1651. The court

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offered him favours and advancement; the Prince of Condé sought to enlist him in his party. He intimated to the former that he desired no preference; to the latter, that he had relinquished his rank in the royal prison, his regiment towards him was fully discharged. A less penetrating mind than Turenne’s could have discovered that a Huguenot party existed only in name; that the Fronde was an incongruous association of various principles, each of which served only his personal aggrandisement; that the age of petty independent sovereignties such as existed in his house had passed; and that the only career of honourable ambition open to him must be sought by becoming a Prince. He said to himself: ‘I am capable of organising a strong government in France. With characteristic absence of display or precipitation he declared for the regent and Mazarin, and accepted in 1656 the command of the royal army. It was soon evident that the same mind which alone upheld the Prince of Condé’s cause when he was imprisoned, now struggled to uphold the royal authority, against apparently as fearful odds. The Cardinal Mazarin, the object of popular execration, was again with the court, and all France seemed to unite against the prince. The king had to oppose one army to the Spaniards in Catalonia and another in Flanders; and only 9000 or 10,000 men could be mustered to oppose the rear of the parliamentary vanguard of the court, even an anxious moment, offered to Turenne the insult of proposing to divide the command between him and Hacquecourt, an officer ten years his junior. Knowing that time was running out, he composed the unanswerable reply. But his genius maintained its ascendancy, and the plan and execution of the campaign were really his. By the close of the year Condé was obliged to quit France; the king was crowned at Rheims, entered Paris, and confirmed the Cardinal de Retz, the only remnant of the Fronde, to a dungeon.

From 1653 till the conclusion of the year 1659, Turenne’s genius for war found ample scope in the wars of the Pyrenees and the Netherlands. Thanks to the infallibility of this prorogated struggle he had to contend against the Prince of Condé, the most brilliant military genius of his age. It was on the part of Turenne intense but regulated energy, sound judgment and sleepless observation, opposed to an almost miraculous quickness of perception on the part of his adversary, and an impetuosity of execution, to which an ardent imagination would have lent irresistible force could the effort have been made continuous. The treaty of the Pyrenees put an end to a struggle more persevering and destructive than any that Europe had previously witnessed, and yet indicative of that growing equality of European states, the full sense of which can only be understood by the peace concluded between the belligerents in 1667. Lodovico Sforza allowed himself of the peace to form a combination against Spain, with a view to make himself master of the Spanish Netherlands. The campaign in Flanders, in which Louis told Turenne he wished to learn the art of war under him, was the consequence. The fears entertained by England, and by the partisans of the House of Orange in Holland, of the consequences of French aggrandisement on this side led to the last war of Turenne. The narrative of the war, which commenced in 1667, belongs rather to biography, which confines itself to the illustration of individual character, at least in a sketch like the present, in which the subject is presented merely in outline. The victories gained by Turenne from the year 1672 to the year 1675 serve to far better advantage. Turenne, to place in a more brilliant light the qualities which he had amply displayed on former occasions. These victories served to impress Louis XIV., who grasped the fact, and could mine his soul no longer; but they taught William of Orange, who suffered by them, to act in future years as became one who really was the scholar of Turenne. In Montecuculi Turenne found an opponent worthy of him, one who, like himself, had passed through every grade of service. The premature death of the vicomte prevented either from claiming a personal advantage over the other. Henri, Vicomte de Turenne, fell near Basseuch, on the 29th of July, 1675, while Prince Condé was marching to join his troops in Flanders. His troopers cried, ‘Our father is dead! ’ The hostile general declared that a man had fallen who did honour to human nature; and the surviving French leaders, although their troops were marshalled for battle, freed without hazard from action. The letters of Madame de Sevres, a lively picture of the effect produced on the public mind at Paris by the intelligence of Turenne’s death.

Turenne was born, like Condé, in 1653. Charlotte, only daughter and heiress of the Duc de la Fosse, a zealous Protestant. Regard for his wife’s feelings appears to have kept him longer in the Protestant communion than his own inclinations. The French Protestants had allowed themselves to be made the instruments of political factions; and this circumstance, which had made Silly withdraw from their councils, kept Turenne from entering them. He had been educated by a moderate Calvinist, and, like most active men who seek not a religion of abstract opinions, but of practical and religious application, he could not bear the fierce controversies of the Calvinists and Arminians disgusted him; and the numberless sects which sprang up in Holland and England confused him. Persuading the con-
consistence, and allows of its being raised in alices by the plough or the pearling tool made for the purpose.

The turf is generally called pearled; and when the latter is taken from the surface where living plants are growing, the name of 'turf' is very applicable to it. It is derived from the Dutch woord, which generally applied to perfect pear as well as to turf. The origin and formation of pear have been described in its proper place. [PAR.] We shall only here notice the uses to which turf is applied, when we mean a sod taken from the surface on which some living plants are still growing; we do so in order to bring out more effectually how extensive heaths which have never been reclaimed, and in situations where no regular peat-bogs are to be found, turf becomes a very useful fuel. It is pared off the surface with a clay knife, or a knife stuck across a long handle, into strips about a foot wide; and a very sharp flat instrument with a bent handle, so as to work horizontally, is thrust an inch, or a little more, below to the surface, and the strip of turf thus cut has been marked. As the workman who cuts the sod advances, another rolls it up before him, until it is of a proper size to be carried off. A cut is then made across the strip, and another roll is begun. Thus a large space may be somewhat rapidly cleared of turf, and the land put to a better use than it was before.

The turf, the ground is levelled, or laid in any desired form. It is well rolled and beaten, to make it firm, and if the weather is dry, it is well watered before the turf is applied. When a heap is formed in the form of a cone, it is of great advantage; for the turf is a great advantage: it should therefore be taken, if possible, from a poor thin soil. The turf which lies immediately over the chalk is best adapted to this purpose. If the ground to be covered is of a rich quality, it is best to remove the soil and lay some of the poorer subsoil here, to place the turf on: a rich moist soil would make the grass grow too rank, and require constant mowing and rolling to keep it down. Brickkuts and rubbish are often spread over the surface of the turf heap, to prevent its drying up; these not only form a poorer soil, but also keep it drier by their porosity. It need not be observed, that wherever turfing is resorted to, to cover bare places in meadows or pastures, it is of the greatest importance to clear the ground, and manure spread over the places where the turf is to be laid, so that the roots may be invigorated and a rich pile of grass may spring up.

When there are banks and inequalities in pastures, it is often useful to pare off all the turf, rolling it up, from the places which are to be levelled. The superficialous soil is then removed, and if it has been long in the form of a dry bank, it is spread over the grass, which it greatly invigorates. The new surface is enriched by the turf, and it requires it, and in moist weather or after watering it, the turf is rolled over it and well beaten down. A heavy roller drawn over it will greatly assist its rooting, and thus an enormous amount of grass is obtained. The operation

Another important use of turf is to cut it into small strips and divide these into pieces of a square inch in size, or somewhat more, for the purpose of laying land to grass by turf-matting, if this is only a partial turfing, which extends rapidly, and in the course of a very few years converts a field which was not very productive as arable land into a valuable meadow, with as much gravity as they would decide the most important interests of the state. TURGOT, ANNE ROBERT JACQUES, was born in Paris on the 10th of May, 1727. He was descended from one of the most ancient families in Normandy, and the name (the 'God Thor') seems to imply that he was of the race of those northern conquerors who gave their name to Normandy, and the greater proportion of whom afterwards emigrated to England with their chieftain William, called William the Conqueror. His father, Michel-Ktienne Turgot, was President aux Requêtes du Palais, and after wards Prévost des Marchands, counsellor of state, and first president of the Great Council. His great-grandfather Jacques Turgot was one of the presidents of the Chamber of Normandy in the States of 1614. Being the youngest of three sons, Turgot was destined by his parents for the ecclesiastical profession, for which his taste for study, the munificence and liberality of his manners, and the manner of which kept him a score from dissipation, appeared to fit him. But he very early formed a resolution not to be an ecclesiastic. Turgot's earnest, early imbued, and single-minded love of truth and justice to represent the immorality of taking a solemn engagement to maintain always the same opinions, to preach what he might perhaps
cease to believe, and to teach others as truths what he might regard as errors. With his passion for science, as well as literature and poetry, he might be suspected that, having obtained his father's consent to his plan of not entering the church, he would have desired no other employment than that of a man of letters. But Turgot resolved, without discarding his favourite pursuits, to adopt a more active employment which he foresaw would enable him to exercise a more direct and effective influence on the affairs of men than any mere closet philosopher, however gifted, can hope for.

Turgot having determined to adopt the profession of the bar, or the robe, as it was called in France before the Revolution, selected that branch or department of the business of which was used to be called masters of requests (Maitres des requêtes), and according to the admitted rules. It was evidently necessary to have been magistrates who had written requests or petitions of parties before the king's council presided over by the chancellor. The term afterwards also came to signify those members of the profession of the robe, or bar, whose business it was to make a verbal report of cases before the council of state. (Dictionnaire de l'Académie Française, art. 'Requête.') The nature of the occupation of a master of requests, as it is called, will appear from the following anecdotes told by Dupont de Némours in his 'Memoires,' the first of which contains a hint that may be useful to many a young lawyer besides Turgot. The first time that Turgot made a speech before the king, he thought it highly necessary that he should appear as much as possible. After he had ended, some of the counsellors of state said to him, 'You have spoken very well, but you have been a little long; be more brief another time.' It might well be argued that in such circumstances, somewhat puzzled the young lawyer. Turgot reflected on it, and on his second appearance before the council pursued a different course. He developed very much in detail the facts of the case and the evidence in support of them, and he recapitulated each head of his speech before he proceeded to the following head; and then recapitulated the second a whole time at the end of the speech he directed you, 'I hope you have said a great deal, and you have been brief?'

On another occasion, when Turgot supported his conclusions by arguments drawn rather from the spirit than the letter of the law, the council rejected them, but eight days after the two parties compromised the matter, conformably to Turgot's conclusions, and without regard to the decree of the council. ('Mémoires, par Dupont de Némours, pp. 29-32.') It would appear from the above cases, that the lawyers of ancient and modern days were offended by Turgot, who corresponded in some respects with that of a counsel in England practising before the privy council; with this difference however, that the maitres des requêtes were not employed, or for four years, to that of a court: so that in some respects they resembled rather our masters in Chancery; with this difference again, that the master in Chancery's report is written, and neither spoken nor yet read by himself.

In 1761 Turgot was appointed intendant of Limousin. The office of intendant of a province in France, before the Revolution, was an administrative office. Turgot had, with a view of preparing himself for the duties of his new office, specially studied those branches of science which had most relation to them; particularly such of the physical and mathematical sciences as applied to agriculture, to manufactures, to commerce, to the construction of public works. During the thirteen years that the province of the Limousin was under the administration of Turgot, the more equitably distribution of impôts, the making of roads, the militia, the providing of subsistence for the people, and the encouragement of commerce, were the principal objects of his labours. He also introduced his the Society of Agriculture of Limousin, and to direct its labours towards a useful end; he caused the midwives, who were scattered over the country, to be properly instructed, and he secured the people, during epidemins, the assistance of skilful physicians; and he introduced into his district the cultivation of potatoes, which the people at first looked down upon as a sort of food unfit for man; but Turgot overcame their prejudices by using them at his own table.

Turgot's plans for the 'répartition des impôts,' and for the removal of the 'côvées,' the old contrivance for the repair of roads and bridges, deserve, on account of their importance, a more particular detail. The greater part of the lands of Turgot's province of the Limousin was farmed by 'metayers,' whom the owner of the land furnished with the seed, cattle, implements of husbandry, and everything necessary for the prosecution of cultivation. Condorcet says it was very difficult to distinguish between that portion of the whole produce of the land which was to pay the expenses of cultivation, in other words, the interest, or rather profits of the capital, and that which came from the shape of cottage and implements of husbandry, as well as the wages of labour, and that portion which remained after such payment in the shape or under the name of 'produit net,' or rent. But it seems evident from the above account, the metayers bore only the character of labourers, without any degree partaking of that of capitalists. Consequently whatever part of the produce went to them must be considered simply as the wages of labour, while what went to the proprietors consisted at once of the rent and profits of capital.

Instead of the impôts or land-tax being raised upon that part of the whole produce which could be justly considered as a true product of the land, the propertied had, with justice and with sound principles of public economy, been subjected to taxation, the tax was imposed levied without reference to that, and a part, probably the principal part, as described by Turgot, in the shape of tax, opened to the public the capital. Turgot laboured long and arduously, but in vain, to obtain an adjustment of this matter—a measure which he considered as of so great importance, that he remarked, that no man was capable of the impôt territorial, or land-tax, properly apportioned, impracticable or unjust, could possess sound views on administration. Turgot seems to have considered that the best mode of levying the land-tax was to take a certain proportion of the land-tax levied by the state, and to use it for the public interest, one scale for war and another for peace. Arrangements would be made in consequence in purchases and sales, and the part of the rent that bears the tax would no longer be purchased, any more than the share of the curé. At the end of some time, it is very likely that nobody would pay taxes. But the king would be proprietor of a proportion of the whole of the revenue of all the land. This revenue would increase with the riches of the nation; and if this increase should be counterbalanced by the treasure, would supply them. The riches of the king would be the measure of the riches of the nation; and the administration always affected by the reaction of its errors, would consequently be that of the nation. Turgot proposed to the 'communards' adjoining the highways by the contractors to do the work directly by contract. By this means the original construction of the roads was at once more substantial and more economical, and they could be kept up afterwards at a less cost. Those features of the contrac-ultures that implied contracts were not considered as taxes. The impost distribution of the work for the king still remained; for it was beyond the power of an intendant to alter it.

According to the plan already mentioned, the wider field was opened for the execution of Turgot's enlarged and beneficent policy. The state of France, oppressed and exhausted by
an accumulation of abuses, demanded a reforming minister; and the public voice called Turgot to the highest offices, as a man who united to all the knowledge which is the result of all experience, being obliged to supply Paris and Rouen with a certain quantity of glass at a low price, would have derived no advantage from bringing their manufacture to perfection, and had remained in that state of mediocrity to which the public impression or prejudice to which it is submitted are ill-advised. He was at first appointed minister of the marine; but after continuing only a month in this situation, in which he felt that he wanted much of the necessary knowledge, he next was placed as controller-general of the finances, an employment for which all the labours of his previous life had prepared him. The comptroller-general of finance was then prime minister of France.

According to the knapsack method of Turgot, 1774, Turgot said, I confine myself presently, Sire, to reminding you of three words—No bankruptcy, no augmentation of imposts, no loans. To fulfill these three conditions, he says, there is but one means: to reduce the expenditure below the revenue, by an increase of the taxes, to economize every year twenty millions, in order to clear off the old debts. Without that the first cannon fired will force the state to a bankruptcy. He then explained at some length the means he considered best for effecting the saving in question, and thus concluded:—

'These are the points which your majesty has permitted me to recall to you. Your majesty will not forget that in accepting the place of controller I count only on the value of the confidence with which you honoured me. I felt that you intrusted to me the happiness of your people, and, if I may be allowed to say so, the care of rendering your person and your authority beloved; but at the same time I overlook myself. I foresaw that I should have to contend alone against abuses of every kind, against the efforts of those who gain by those abuses, against the mass of prejudices which are opposed to the reform, and which, if a powerful means is not used in the hands of interested persons to eternize disorders. I shall even have to struggle against the natural goodness, against the generosity of your majesty, and of the persons who are most dear to you, and who will be fearful—ever hesitate even baton the greatest part of the court, by all who solicit favours; and they will impute to me all the refusals, they will represent me as a harsh man (dur), because I shall have represented to your majesty that you ought to do to the people what their enemies do to them—serve them, and love at the expense of the substance of your people. That people to whom I shall have sacrificed myself are so easily deceived, that perhaps I shall incur their hatred by the very measures which I shall employ in their defence. I shall be calumniated, and perhaps with sufficient appearance of truth to deprive me of the confidence of your majesty. I should not regret the loss of a place to which I never raised my expectations. I am ready to give it up as soon as I shall have accomplished my mission."

He concluded:—

'Condescend, Sire, to my address. I am not ignorant of the dangers which are immediately threatened to the greatest part of the court; I know, also, how much perfect freedom in the external trade in corn would add to the security of subsistence, but he knew that the time was not yet arrived when such a measure could be attempted with success. Besides the restrictions on the free passage of corn from one part of the kingdom to another, there were numerous local restrictions and exceptions, most of which (such as the exclusive privilege of bakers, the bannalité, and millers, &c.) were removed during Turgot's second ministry. He also abolished the convulsions throughout France, a law which, with the characteristic infatuation of the privileged classes, who would give up nothing till it was too late, was revoked immediately after Turgot's removal from office. By these different measures, the inhabitants of the rural districts was nearly destroyed. Turgot also abolished most of the restrictions and exclusive privileges under which the inhabitants of the towns suffered. Freedom of trade was granted to the glass-works of Normandy, Plessis-les-Bourgeois, and the like, all the manufactures which have the misfortune to be subjected to them.

In regard to his financial operations, the characteristics of Turgot's administration were exactness in payments, prudence in expenditure whenever it could be effected without hardship, and, above all, a just distribution of the public lands. Pensions were three years in arrear; Turgot caused two years to be paid at once of all those which did not exceed 400 livres; that is, of all which were necessary for the subsistence of the pensioner. He increased the amount of the pension. Ten millions due for advances made to the colonists had been payable for five years, and the payment of them had been suspended. Turgot paid at first 1,500,000 livres, and secured a million yearly for the payment of the rest. The finance appointments had been multiplied with the sole object of procuring a temporary supply by the first sale of offices. Most of the offices were double. Turgot proposed to reduce the double offices to a single one, to the functionary whose office was retained reimburse him when his office was abolished; and when one person held two places, to suppress the salary of one of them.

'Such, observes Condorcet, had been the operations, such were the views of M. Turgot: it was thus that while they accused him of not knowing finance, apparently to console themselves for the superiority which they were obliged to acknowledge in all the important parts of the administration, he had augmented the public revenue without putting on a new impost, and after having suppressed or diminished several; and that without having recourse to new loans, he had made repayments and diminished the public labours in the course of twenty months; and two attacks of gout, an hereditary malady in the family of M. Turgot, had hindered him for several months from carrying on his plans. The forced labour to which his zeal for the public good had made him devote himself at the peril of his life had prolonged these attacks, and rendered them dangerous.'

(Vie de M. Turgot, pp. 115, 116.)

In short, those men, those ranks, and that profession who subsisted at the expense of the nation, either by imposts or by any service in return, who lived by abuses—nobles, courtiers, financiers, farmers of the revenue—all united in a powerful confederacy against Turgot, and succeeded in driving him from his post after fourteen months.

After his retirement from office he occupied himself less than formerly with political matters, particularly with such as had relation to the government and the laws of France. The sciences to which he now chiefly devoted his attention were the physics and the etymology. He lived at Montmorency, and continued to indulge his early taste for literature and poetry. He had never lost the habit of making verses—an amusement very valuable to him in his journeys and during the sleepless nights caused by the gout. But he seldom showed his verses: a few fragments were made public, and were attributed by the critics to Voltaire. All that was known of his labours in that department was a single Latin verse, intended for the portrait of Franklin—

'Eripuit ovo lumen, vinctus tyrannis.'

Among the many points in which Turgot was in advance of the statesmen of his time, there is none which has offered the English reader more than the view he took of the American war as compared with the views even of the most enlightened of the contemporary English statesmen on that subject. Even Burke, who saw farther than the others, had not admitted into his calculation the consideration of the most remote possibility of the ultimate independence of the colonies. Turgot's 'Mémoire' on the American war contains views on the nature of colonies that have been recognized since by the boldest thinkers as correct ones. His work on the laws against usury contains almost all that is valuable in Bentham's Letters on the usury laws, written many years later: not that Bentham copied Turgot; but the fact is as stated. His article 'Fondation,' also in the 'Encyclopédie,' contains many ideas which were new at
The principal fault that was attributed to Turgot as a statesman was want of address. He himself thus answers the charge in his letter to Dr. Price:—‘Dr. Franklin has sent me, sir, as from you, the new edition of your “Observations on Civil Liberty,” &c. An attack upon me in his letter, does not prevent me from paying the work its due, of which I have long known the value, and which upon its first publication I read with avidity, notwithstanding the multiplicity of business in which I was engaged; and, in the next place, for you cannot conceal the importance of want of address, which you had inserted, among many things much to my advantage, in your “additional observations.” I might have deserved the imputation, if you had meant no other thing than that of being unable to control the secret springs of those intrigues which were practised against me by persons much more adroit in that respect than I am, or ever shall, or ever desire to be. But I understand you to charge me with a want of address in grossly shocking the general opinion of my nation; and, had that been your meaning, you would not have done justice either to me or to my nation, which is much more enlightened than is generally thought by yours, and which is most certainly more approved of by you than even the English. I come to this conclusion, as well from having seen your countrymen so infatuated with the absurd project of subduing America, that nothing could in their opinion prevent filling the country with Burgoynes from the system of monopoly and exclusion which is in fashion with all your political writers upon commerce, except Mr. Adam Smith and Dean Tucker, and which is the true source of the loss of your colonies, and from all your controversial writings upon the questions which for these twenty years past have been discussed among you, in not one of which I remember to have read, till your observations were published, is the question considered in its true point of view; I never could conceive how which has so successfully cultivated every branch of the natural sciences could remain so far inferior to itself in the most important of all sciences, that of public happiness; a science in which the liberty of the press, that exists and where else, must have given it much vast advantages over every other country in Europe.’

But as we are informed by his biographers that he could not dissemble his hatred for knaves, his contempt for cowardice or baseness; that those sentiments involuntarily showed themselves on his countenance; even when we take along with this what these friendly biographers add, that as they were only the consequence of his love for truth, and was not inspired by a spirit of justice nor of vengeance: yet when we consider of what materials that portion of his countrymen were composed with whom he must have come chiefly in contact as prime minister of France, we need not be surprised that he made himself master of the conduct of government and power was devolved to him by those who were not his enemies. But in whatever degree the charge may derogate from his claim to practical talent in statesmanship, it leaves untouched his character as a statesman for reach of intellectual vision, for purity and benevolence of intention, for undeviating adherence to principles hitherto unrivalled.

Turgot’s attacks of gout before his ministry had been painful, but not dangerous. The violent and incessant labour to which he devoted himself in the midst of these attacks during his ministry changed the nature of them; and when he was restored to leisure, it was too late for repairs to repair the mischief that had been done. The attacks became more and more frequent, and at last sunk under them. His last attack, which was long and severe, did not impair his mind nor even his temper. ‘He only displayed towards his friends,’ says Condorcet, ‘a more lively sense of the attentions they showed him; and his spirit beheld with tranquillity the approach of the moment when, according to the eternal laws of nature, it was about to fill in another sphere the place which those laws had left free for him.’ (Vie de M. Turgot, p. 206.) He expired on the 30th of March, 1791.

The following are the principal works of Turgot.—Articles in the Encyclopédie—Etymologie, ‘Existence,’ ‘Vendanges,’ ‘Fœurs et Marchands,’ ‘Fondations,’ ‘Éloge de M. de Gournay,’ ‘Rapport sur les lettres, mémoires, et projets, lois, édits, &c.; Réflexions sur la Formation et la Distribution des Richesses; ‘Lettres à M. le Contrôleur-Général sur le Commerce de Grains,’ ‘Mémoire sur la Porte des Conflans et la situation de la Marne de Rochefort;’ ‘Lettre à M. l’Abbé Terray sur la Marque des Fers;’ ‘Sur la Prosodie de la Langue Française et la Verfication Métrique;’ ‘A M. de C. sur le Livre de Dr. Condorcet, relatif a la division de l’Europe;’ ‘A Earl. of Derby, in thank you for the work for the share of which, of which I have long known the value, and which upon its first publication I read with avidity, notwithstanding the multiplicity of business in which I was engaged; and, in the next place, for you cannot conceal the importance of want of address, which you had inserted, among many things much to my advantage, in your “additional observations.” I might have deserved the imputation, if you had meant no other thing than that of being unable to control the secret springs of those intrigues which were practised against me by persons much more adroit in that respect than I am, or ever shall, or ever desire to be. But I understand you to charge me with a want of address in grossly shocking the general opinion of my nation; and, had that been your meaning, you would not have done justice either to me or to my nation, which is much more enlightened than is generally thought by yours, and which is most certainly more approved of by you than even the English. I come to this conclusion, as well from having seen your countrymen so infatuated with the absurd project of subduing America, that nothing could in their opinion prevent filling the country with Burgoynes from the system of monopoly and exclusion which is in fashion with all your political writers upon commerce, except Mr. Adam Smith and Dean Tucker, and which is the true source of the loss of your colonies, and from all your controversial writings upon the questions which for these twenty years past have been discussed among you, in not one of which I remember to have read, till your observations were published, is the question considered in its true point of view; I never could conceive how which has so successfully cultivated every branch of the natural sciences could remain so far inferior to itself in the most important of all sciences, that of public happiness; a science in which the liberty of the press, that exists and where else, must have given it much vast advantages over every other country in Europe.’

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3. Chorun; 4, Bosoz; 5, Duvvaj; 6, Janik; 7, Araboglu. Balli mentions eight sanjaks, but there are but four.

VIII. Trebun, or Terezibid, has three sanjaks: 1, Trebun; 2, Gonjas; 3, Batum.

IX. Kars contains at present three sanjaks: 1, Kars; 2, Artik; 3, Erzum.

X. Chidir contained twenty very small sanjaks in the time of Selim; but the greater part of this eyalet has been ceded to Russia, and the remaining and smaller part has been united with the eyalet of Kars, of which the eastern part has likewise been ceded to Russia.

XI. Erz-rum contained fourteen sanjaks during the reign of Selim, but it seems that it has now only the following eight: 1, Erz-rum; 2, Kamakh; 3, Mudan (§); 4, Erz-inlan; 5, Artuklu; 6, Mustafa (§); 7, Buyuk Bayazid; 8, Ertugrul.

XII. Wan had fourteen sanjaks, including the dominions of some hereditary chief; but it has now only five: 1, Wan; 2, Mush; 3, Bedlis; 4, Khoshous; 5, Bayazid.

XIII. Rakk'a had ten sanjaks, which are now reduced to the following five: 1, Rakk'a; 2, Orfu; 3, Bir; 4, For; 5, Khabur.

XIV. Diyarbekir had twenty-six sanjaks, but Balbi mentions only three: 1, Diyarbekir; 2, Kirk-Kamand; 3, Mudan (?); 4, Sawerek; besides which there are several principalities of the Kurd chiefs, such as Pahu, Agil, Guh, and others.

XV. Shehrzorl, or Shehrzur, formerly contained thirty-two sanjaks, but has now been united with the eyalet of Baghidal, and contains the sanjaks of—1, Kerlik; 2, Shehrzorl; 3, Erbil; 4, Bayan. There are several principalities of the Kurds in this eyalet.

XVI. Mosul has six sanjaks, but has now only three: Mosul and El-khalil. Several tribes of Kurds, Turkmans, and Arabs are quite independent.

XVII. Baghidal contained eighteen sanjaks, but has now only nine, besides those of the eyalets of Shehrzorl and of Basrah united with this eyalet. The sanjaks are—1, Baghidal; 2, Meshed-Ali; 3, Meshed-Husein; 4, Hilla; 5, Anah; 6, Nisib; 7, Mardin; 8, Basrah; 9, Korna. It contains also several half-independent principalities of the Kurds, and there are some tribes of Arabs that are quite independent.

XVIII. Marash had formerly five, and has now only four sanjaks: 1, Merash; 2, Antab; 3, Malatia; 4, Albastan, B. (Kern?); 5, Basrah; 6, Bassora, contained thirty sanjaks during the reign of Selim, and a great number more before the accession of this sultan: it is now united with Baghidal.

XX. Adana had formerly five, and has now seven sanjaks: 1, Adana; 2, Taras; 3, Alavate; 4, Sez; 5, Payas; 6, Anemur; 7, B. (Sefeksh, B. (Ielati)?)

X XI. Haleb, or Aleppo, contains six sanjaks, the names of which in Balli do not always agree with those in the division of Selim. 1, Haleb; 2, Halebe, including Tarsus, and Adana; 3, Constantine, including Alexandria; 4, Antakia, or Antocie; 5, Shogur, Jess-Shogur, or Shergur.

XXII. Tripoli, or Tabulnis, in Syria, had formerly five, and now has two sanjaks: 1, Tripoli; 2, Latika. This eyalet contains the half-independent countries of the Nomaries, the Maronites, and the Ismaelites, who have the names of sanjaks in the division of Selim.

XXIII. Damascus, or Damas, has formerly eight sanjaks. According to Balli, it is now twelve: 1, Damasce; 2, Hama; 3, Homs; 4, Tedmor; 5, Jerusalem; 6, Bethel-Kail, or Hebron; 7, Ras, or Jericho; 8, Nabulus; 9, Gaza, 10, Immadi; 11, Jaffa, 12, Joppa; 13, Nil, 14, Acre. The following is a list of contains five sanjaks: 1, Beirut; 2, Sidre, or Tyrus; 3, Nasrah, or Nazareth; 4, Tabarna; 5, Ashtaba; this eyalet is situated in the districts of the Mutasilis and of the Druzes.

XXIV. If the Syrian eyalets are still divided among being for a long time in possession of the type, Mehmed 'Ali, who has lately been attached to the Sultan. Since the establishment of the 组织, the most important information concerning the division of these provinces.

XXV. Idala and Salda in Arabia; the number of

XXVI. twelwe bays of the which was formerly governed by a bey of this

XXVII. Creta, or Candia, has three sanjaks: 1, Canea; 2, Retimo; 3, Candia.

XXVIII. The administration of the provinces is described below. We only observe here that the number of sanjaks in Asia has greatly diminished; and that neither the eyalets nor the sanjaks have such variable limits as provinces in Europe have.

The present sultan, Abd-ul-Mejid I., succeeded his father Mahmut II., in A.H. 1256 (A.D. 1840). The Sultan of Turkey is absolute in this sense, that there is no political body in the empire which has any recognised power to check his will: but he is obliged to reign conformably to the religious, political, and civil principles contained in the Koran: conformably to the Sunna, or the words of the Prophet Mohammed, as interpreted by the Ulemas, the unanimous decision of the Assembly of the Ulemas, in which the Mutfi presides; and conformably to the Canun-name. The Canun-name, a word derived from the Greek (κανονικό), is a kind of code containing decisions and institutions which have been made since the beginning of the empire, and conformably to the Koran. This legislation is also called 'Urfi, or the arbitrary legislation, because it treats of such matters as have only been decided in a general way by Mohammed. However, as the principles of absolute monarchy contained in the Koran are very large, and the Sultan is the chief of the Mohammedan religion as successor of the Khalifs, his power is less checked by law than it is by any other earthly authority, and, as the religious and political canons are in his hands, he is the spiritual and the temporal head of the nation.

Government. The civil and religious law having only one source, the Koran, the highest dignitary is the Mutfi, who is the supreme authority with regard to the religious, civil, and ecclesiastical acts; but the Sultan is the high chancellor of the empire. His counsellors are, the Sheikhu-l-islam Kinyazi, or vice-mufti; the Telibhijsi, the representative of the Mutfi for daily affairs; the Mektibi, or chancellor; and the Pevey-Emini, or director of the ecclesiastical for the issue of fetwa, or ecclesiastical decrees. The Sultan does not declare war nor conclude peace; nor does he undertake anything of importance without previously asking the Mutfi for his consent. He has, according to law, the right to execute the Mutfi's orders; and the Mutfi decides the matter by a fetwa. Sometimes also the nation applies to the Mutfi for similar purposes, especially in cases of rebellion, which becomes a legal opposition as soon as the motive of it is declared to be just and legal by a fetwa. The Mutfi and his counsellors, the high judges of Rumi, of Anatoli, of Constantinople, of Meccea, of Medina, and several other high functionaries, are called the dignitaries of law' (Memsibi-shereyiye), or the dignitaries of the Mutfi (Memsibi-yelcm). The assembly of these functionaries is called the assembly of the Ulemas, or wise men. Ulema is the general name of theologians and jurists, who are bound to aid the Mutfi and other functionaries of the empire, or branches of the emirates. All the Kadi, or judges, and the mudders, or professors of sciences, are under the authority of the Mutfi. The council of the Mutfi is not unlike the Ministry of Instruction and of Ecclesiastical and Medical Affairs in Russia, which however has not the administration of justice.

State Dignitaries. Dignitaries of the pen. They are divided into three classes, viz. Rijal, Khoja, and Agha.

I. Rijal. The men of this class form the Sublime Porte of the grand-vizir, or the state ministry and state council, the president of which is the grand-vizir. Under him are three ministers: 1. the Kinya-basar, or minister for home affairs; 2. the foreign Office, or minister for foreign Affairs; 3. the Mutfi-basha, or minister of the executive power, under whom are 360 chishe, or state messengers, divided into 18 companies, commanded each by a bakubasha; but the title of rijal belongs only to the above-mentioned three ministers, and to six under-secretary of the state, among whom is the Kanuni, or the minister who has the revision of the decrees and other legal acts of the ministers, and who takes care that these decrees are conformable to the religious and the Koranic rules of the empire.

II. Khoja. The members of this class form the Porto of the proted, or the ministry of finance, the director of which is the first director. Under him are the second and the third director, the Notaries, the Engraved signature (seal-keeper); and the Pevey-emini, or the superintendent of the office of finance, who have the rank of ministers. The ministers have the
title of Vizir, and their assembly is called the Diwan: they are also called Vizirs of the Cupola, because they used to assemble in an apartment surmounted by a cupola.

3. Agha. To this class belong, or belonged, several military and civil officers, such as the Bostanji-bashi, or controller of the great treasury of the Sultan, the Toplj-bashi, or commander of the artillery; the Mir-Alem, or bearer of the standard of the Prophet; the Htibab-aghá, or præfet of the public markets; the Kapil-Jehl-bashi, or chief chamberlain; and others. Several of these functions have been abolished, as observed below.

11. Dignities of the Sword. To this class belong the governors of the eyalts, or Beyler-beys, who are pashas of two tails; the governors of the sanjaks, or Sanjuan-beys, who are pashas of one tail; and the woyws, or division of the sanjaks, who are not pashas, but only beys. The viziers are pashas of three tails, and so is the Serasker, or general-field-marshals; but the rank of a vizir is often given to the governors of eyalts, and the governors of the sanjaks are very often pashas of two tails. The governor of an eyalat has always a sanjak, or sometimes several, of which he is also the governor; and he has little authority over the subordinate governors. The pashas combine the functions of military commanders, judges, and of receivers of the taxes. With regard to the taxes, there is a double mode of administering the sanjaks. The pashas either hold their province by the title of sanjak-bashi, or they pay the revenue of the province to the defender in Constantinople, in which case they are called by the name of the sanjak only, and are then called Mutca-sarrif. If a pasha receives a second sanjak, he is another mutes-sarrif or mute-sellim in respect of it, but not a Muhassal, or receiver of the taxes.

There is great confusion in the system of administration; and it depends entirely upon the Sultan to change the division of the eyalts, and to make as many sanjaks or woyws of them as he finds convenient to give to his officers.

The late sultan, Mahmud II., made great changes with regard to divisions and to the number of subordinate places, especially in the Porte of the defterdar (finance) was abolished, and important changes were made concerning the rank of the different functionaries, who all wear a kind of European uniform. The changes in the army were radical: the Janissaries were exterminated, and the regular troops received a European organization. The general-field-marshals has still the name of Serasker, or Serasker-Pasha. The second in rank is now the Beyler-Bey Vizir, or the commander of the Sultan's life-guard, whose full title is Mushiri-askari Khass; or county-councilor of the house-troops. The Beyler-Bey Vizir has been substituted for the Bostanji-bashi, a dignity which was formerly given to the first (or main) minister mentioned above. The Mushiri-Tophikhy-Asre, or the county-councilor of the imperial artillery, is another new military dignity, which has been substituted for the Toplj-bashi. The sanjak-bashi is, as before, divided into 'ferik' or divisions commanded by a Ferik-Pasha. Each 'ferik' is divided into 'liva', or brigades commanded by a Mini-liva-Pasha; or 'liva' consists two 'alii', or regiments commanded by a Mini-alii-bey, or colonel; an 'ali' is composed of four 'tabur', or battalions, commanded by a Bunit-bashi, or major; each 'tabur' has eight 'buluk', or companies, commanded by a 'Yiz-bashi', or captain; and a 'buluk' is composed of eight 'on', or sections, each commanded by an On-bashi, or ensign.

Similar changes have been introduced into the civil department. Many offices in the imperial household have been abolished, such as those of the Sillalhm-Agha, or armurer-hearsay of the Sultan, which, in former times, was a post that gave great personal influence over the Sultan.

The 'Dilbend-Agha,' or keeper of the Sultan's turban; the 'Kahbejji-bashi,' or the first coffee-maker; the 'Bilbil-bashi,' or the first shoe-maker; the 'Jami-bashi,' or the first porter-keeper; the 'Yeziji-bashi,' or the first baker, the 'Bostanj-bashri,' or the keeper of the Sultan's purse, have likewise disappeared from among the offices of the imperial household.

The all officers, who are soldiers, officers, and servants employed in the Serasker amount in Europe alone to 10,000, of whom that is, men, besides the females. The first officer of the herald (a word which signifies the apartment of the women) and of the whole sultanial body is the Kislah-Agha (the master of the girls), who is also called 'Babes-aselat-Agha,' or master of the door of happiness. One of his first subordinate officers is the 'Peshkejji-Bashi,' the surveyor of the presents, who receives the presents which foreign ambassadors make to the Sultan within the Saray, and all these presents are divided into five classes:—1. Kadim, or wives of the Sultan; in number from four to seven; 2. Ghedikli, or chamber-maids, among whom the Sultan usually chooses the handsomest of them, who have titles of honour. Those who are preferred by the Sultan are called 'Tskal, or children of happiness,' and 'Khasis-adiklik, or private women of the Sultan. In Europe they are generally called 'Uda-derikli,' which is the Latin word for mistresses, generally called 'khallifah,' or attendants, divided into 'takin,' or companies of thirty women each; 4. Shagird, or apprentices; 5. Jaffrej, or slave.

The changes introduced by Mahmud II. into the system of educational are no less remarkable. This enlightened sultan improved the school for engineers founded by Selim III., and he founded a school for architects, and another for the study of medicine. The medical school is divided into four classes. The students of the fourth class are mere beginners, and learn writing and reading; in the third class they are taught the grammar and the syntax of the Turkish language, and foreign languages. The fourth class, composed of students of medicine, physiologists, materia medica, and therapists, are taught in the second class; physical and chemistry, in the first class.

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the Sultan had given a modern constitution to his subjects, and that the French Code Civil had been adopted as the general law of Turkey. It afterwards proved, however, that the Sultan was not bound to observe the decree, things continued the same as before.

History.—The Turks-Osmanlis are a branch of the Turks in the larger meaning of the word. The Turks, a family distinguished from other nations by their language, eus- thematic alphabet, and the peculiar character of their immense extent of Asia, from the desert of Gobi to the shores of the Mediterranean, and from the northern part of Siberia to the Persian Gulf. In some parts, as in South Siberia, in Turkistan, and in the south of the western part of Minor, they form a compact population: in others, as in Syria, Armenia, and Mesopotamia, they are much less numerous than the original inhabitants. In Europe the Turks of population spread in Römili, and in the government of Kazan and Astrakhan in Russia. In Africa there are only a few Turks-Osmanlis.

We cannot precisely ascertain when the Turks (we speak in the larger meaning of the word) first appeared in Europe, nor can we tell those who that some tribes were settled in Southern Russia as early as the beginning of Greek history. Herodotus (iv. 22) mentions a nation by the name of Turca (Tıpe), which probably lived south-west of the present town of Uzès in France. A nation of the same name and next to the Turca, or, as the Greeks called it, Turca, or, Pliny (Hist. Nat., vi. 7) and Pomponius Mela (i. 19), the learned Count J. Potocki (Voyage dans les Stips d'Astrachan et du Caucase, ed. F. Klaproth, vol. ii., p. 5) thinks that Pliny's Turca is identical with the Ttepin, or Ttipin, the work of this historian than we have, and that in the above-mentioned passage of Herodotus we must read Ttipin, instead of Tıpea. This opinion has been adopted by Eichwald (All Geography des Kupischen Mecres, &c., p. 265, &c.), and by Hammer (Geschichte des Osmanischen Reiches, x., p. 649), who adds, that the text of Herodotus would be correct even without the proposed alteration, Türik, or Yuruk, being the well-known name of a tribe living in Servia, which may be the Turk of Pliny (p. 306, ed. Casaub.) does not mention Turks, but he men- tions a nation called Urgi (Oşeya), which occupied nearly the same tract as the Iricse and Turca.

Eichwald (ibid., pp. 289, 291, 295) proposes to alter Oşya into Oşiya, or Tşeya (Thyrig, or Tuyrak). The same author (p. 291) thinks that the Tauri, the ancient in- habitants of the Chersonesus Taurica, now the Crimea, were likewise of Turkish origin. The general opinion is, that the Turks became first known to the Europeans through the Byzantines, in the fourth or fifth century, and this opinion has not been abandoned by F. v. Klaproth. But however antient our knowledge of the Turks may be, they are only a nation of the present day, and several centuries before there was an historian in Europe.

The history of the Turks cannot be well understood without a knowledge of the different tribes into which they were divided from the remotest times. According to Abu-l-ghazi, the Kifysh (Tıka, Kipchak), the Kuylik, the Sarmat, and the Kühgürs, known in Europe as Palzincas, or Pobelgenes; 16, the Tulaž, 17, the Taghzaghaz; 16, the Mejre, now Mecher-yeke, in the southern part of the Ural; 19, the Zarih, or Zerdikin; 20, the Kaykut; 21, the Kari-kalpak; 22, the Mafa-tob, the Oddak, 23, the Mousoul; 23, the Tartars of the Golden Horde, and of the Oguzes, or the Oguzuli, 24, the Tartars of the Golden Horde, and of the Oguzis, has been related under Tartars—Kipshak; Cimria; Kazan; Astrakan; and that of the Khazars and other Turkish, or rather half-Asian, or half-European nations of the Caucasus, and the Bashkirs, tribes, not mentioned by Abu-l-ghazi, under Tartars—Khanan; Kipshak; or Mongol, is here only the history of the most remarkable of the other tribes, the Oguzes, the Seljukis, and the Osmanis.

1. Oguzes. —Tradition says that Oguz-khan, the son of Kar-khan, a descendent of Turk, who was the ancestor of all the Turks, was a mighty king in the time of Abraham. His empire was the country called Turkistan (Turkistan), known to the Persians by the name of Turan. Under his successors the empire was divided: three khan, the three arrows, ruled over the eastern, Oguzes, and extended their dominions towards Chir: three other khan, the three breakers, were masters of the western Oguzes, around the Oxus and the Jaxartes. The first of these khan, the breaker of the mountains, was the ancestor of the younger Oguzes, or that part of the Oguzes which preserved their name in later times, and of the Turkomans. The second was the khan of the half of the mountains; the third was the khan of the heaven, the ancestor of the tribe Kayî, from which are descended the Osmanis. For many centuries the Oguzes were perpetually at war with the Persians, and afterwards with the Arabs, who, in a.h. 93 (A.D. 711), conquered Bukhara and Samarqand. Abu- Bokhara Khan extended his dominions as far as China, a.h. 380 (A.D. 999). His empire was broken up by civil troubles during the fifth century a.h. (the eleventh a.d.), and became an empire, or empire, in the tenth century.

2. Seljukis. —Their ancestor Seljuk was a mighty under- khan of the Oguzes, and lived towards the end of the fourth century a.h. (tenth a.d.). The influence of his family increased during the civil troubles by which the empire of the Oguzes was shaken after the death of Boghra-khan Harun. Toghrul-Bey, his grandson, who lived in the middle of the fifth century a.h. (the eleventh a.d.), was an independent Mohammedan prince. His power was at its height. All his subjects were divided into twenty-six khalif of Baghdec or the house of Abbas, who was an instrument in the hands of the Persian family of the Buyeh, was saved by Toghrul-Bey from the oppression of his brother Abul-Kasim, whose designs of his son Besarsir (Nassassiri in Degagnes) who was put to death by order of the khan of the Seljukis. The khalif rewarded his liberator with the title and power of the Amir-l-onma, or prince of princes, and married a sister of the khan, and Toghrul-Bey married a daughter of the khalif. In a.h. 462 (A.D. 1069) Toghrul-Bey was succeeded by his nephew Alp-Arslan, who also married a daughter of the khalif Al-Kayim. Alp-Arslan conquered a large part of the Turkistan, the north-western part of Persia, Armenia, Georgia, Mesopotamia, and Syria. He was in- volved in long wars with the Greeks, which he terminated successfully in a.h. 464 (A.D. 1071) by a victory over the Emperor Romanus, and became a ruler of the Seljukis. The prime-minister of Alp-Arslan was Nizamun-l-Mulk, famous as a statesman and historian. Alp-Arslan's son and successor, Melek-Shah, conquered the greater part of Asia Minor, called by the Turks Krum, or the country of the Krum, and his successor was his son, the grandson of Seljuk, Seljuk, part of Persia, and Western Turkistan, during one hundred and thirty years. Towards the end of the seventh century a.h. (the thirteenth century a.d.) their power was at its height, and was destroyed by the ambition of the rival princes and those of the under-khan. Mesud, who died 957 (A.D. 1257), was only the shadow of a king. Ala-ed-din II, his suc- cessor, was the last sultan of the line of Alp-Arslan. a.h. 672 (A.D. 1273) and the Seljukian monarchy was divided into the following states, all, except one, governed by princes of the tribe of the Seljukis.
Kârîsî became master of Myia; Sâri-Khan and Aîdin reigned each in a part of Lydia; Menthesa in Cares; Teke in Liça and Pamphylia; Hamid in Pisidia and Isauria; Karîsî and Aîdin reigned and reigned as sultan in the city of Koniah, once the capital of the Seljukian empire; Karîsî founded a petty state in Northern Phrygia; Ghâzi Chelebi, the only one among these princes not descended from the House of the Seljuks, led the life of a pirate at Sinope and Hersones on the Black Sea. Another tribe, which had lately arrived in these western countries, had subdued Galâlia and Phrygia: this was the tribe of the Turks-Ösmanis.

Turk-Osmanis.—Soliman-Shah, the son of Kay-alp, the chief of the tribe of the Kayî, lived in the environs of Mahân in Khorasan in the beginning of the seventh century (a.d. 700). He was a cousin of Genghis Khan, in a.h. 621 (a.d. 1224), and settled with 50,000 of his men in Erzenjan and Aktilat in Armenia. Seven years after, when Khorasân and Khòwârezm had been conquered by 'Allâ-âd-dîn, the sultan of the Seljuks in Koniah, Soliman returned to the steppes of his native country. Crossing the Euphrates near Jâher, he was drowned in that river, and his tribe erected a tomb to his memory, which still exists, and has the name of the 'Shield of Soliman.' One of his tribe continued their march to Khorasân; another, commanded by Ertoghrul, 'the upright or the brave man,' one of the four sons of Soliman, resolved to remain in the western countries, and founded for the Ottomans the sultanate of Koniah. On their march to the west, they saw in a plain two armies preparing for battle: one of them was numerous, the other feeble, but of warlike appearance. Without hesitating, Ertoghrul resolved to assist the feeble. It was the army of 'Allâ-âd-dîn going to fight with the Mongols; and with Ertoghrul's assistance the Seljuks gained the day. 'Allâ-âd-dîn rewarded Ertoghrul with a dress of honour, and gave him and his tribe the fertile pastures of Timur, Ermeni, and Sügord, or, according to some, the Mountains of Kârîsî-dağh near Angora. Ertoghrul assisted the sultan in all his wars with the Greeks and the Mongols, and afterwards received the district of Sultan-üde, on the frontiers of the dominions of 'Allâ-âd-dîn and the Byzantine empire, as a fief, on condition of defending the frontiers against the invasions of the Byzantines. Ertoghrul died in a.h. 697 (a.d. 1296). His successor as chief of the tribe was his son Osman.

Osman (a.h. 697 till 720; a.d. 1288 till 1326) was the founder of the Turkish empire; he is the ancestor of the reigning dynasty; and he has given his name to a numerous tribe. The first emir of this race, and the future grandeur of heroes are often announced to the nations of the East by dreams and visions. Ertoghrul dreamed that his house would rise to power. Osman dreamed that a tree grew from his lap and overbore all the trees in the forest to which the world. The Kârîsîs explained for God's houses; and as the Koran says that 'good dreams come from God,' the warriors of his tribe joyfully shed their blood to prove the truth of the words of their prophet. During the life of his father, Osman had signalized himself as a virtuous youth and an intrepid warrior. Accompanied by a chosen band of 'alî pero (that is, strong and gallant men, the plural of 'alî, 'strong'), he was the dread of the Greeks and the Mongols of Persia, Osman, and the three bravest of his companions, Komur-alp, Torghod-alp, and Aîghâûd-alp, appear in Turkish history like King Arthur and his knights, or Charlemagne and his paladins. They took by storm a strong fortress at Malengeha, which received the Turkish name of Kârîsî-hisar, or the 'black castle,' and Osman was invested with it as a fief by Sultan 'Allâ-âd-dîn (a.h. 688; a.d. 1290). His power grew gradually by conquests from the Greeks, and afterwards from some petty Seljuks, princes of Asia Minor, especially by the conquest of Bruss in a.h. 717 (a.d. 1317).

In a.h. 722 (a.d. 1321) the first Turks-Osmanis crossed the Bosporus and appeared in sight of Constantinople, two thousand of them having crossed the Bosporus. They were received by the Seljuks, in a.h. 662 (a.d. 1263), and in a.h. 708 (a.d. 1308). At his death, which took place in a.h. 726 (a.d. 1326), he left to his successor, Urkhan, a state which comprised a large part of Bithynia in the east, and Phrygia in the south, the western frontiers of which were the river Sangarius and its southern tributary, the Thymbris. This state, after Sultan 'Allâ-âd-dîn had been killed by the Mongols in a.h. 707 (a.d. 1307), became almost independent. It was called the Seljuk of Asia Minor; and the name Osman signifies literally 'the breaker'; but it also designates a species of large vulture, usually called 'the royal vulture,' and in this latter acceptation it was given to the son of Ertoghrul.

Urkhan, the son of Osman (a.h. 726; a.d. 1326), was the successor of Osman, and his eldest son. His reign was signalized by conquests, and by some political and military institutions which have been the groundwork of the Turkish constitutions. Until our days, the Tâbâkhan, a prince distinguished by the modesty of his character and by his faithful devotion to Urkhan, was his prime-minister, the first grand-vizir mentioned in the Turkish annals. 'Allâ-âd-dîn made wise laws concerning the dress of the people, and the form of the government; and he erected the edifice of the first empire of the Turks. During his reign, he annexed Thrace to his dominion, and gave it the name of the 'kinâth.' As the 'kinâth' or the capital of Thrace, he chose the city of Adrianopolis, which was already a flourishing town among the Thracians, and which, after the death of Urkhan, was called by his name. The name Adrianopolis is derived from the name of its conqueror, Ertoghrul, and the name Thrace is derived from the name of its first conqueror, Urkhan. The city of Adrianopolis was thus called by its conqueror to commemorate his victory over the Thracians; it was in the latter part of the thirteenth century that the city of Adrianopolis became an independent empire. To secure the rising power of his brother, 'Allâ-âd-dîn, assisted by the high judge Kârîsî Khâlit Chenderelli, established a standing army long before any such thing was known in Europe. This was the forerunner of the Janizaries. A d-dîn and his successor, Kanî Urkhan, was entirely defeated by Urkhan and 'Allâ-âd-dîn, and compelled to cross the Bosporus, and to take refuge under the walls of Constantinople (a.h. 731; a.d. 1333). The conquest of Nicæa by Sultan 'Allâ-âd-dîn is supposed to have taken place in the thirteenth century. Younger than the conqueror of Nicæa, Sultan Kanî Urkhan, to the thirteenth century. Younger than the conqueror of Nicæa, Sultan Kanî Urkhan, was the first to attempt the conquest of Constantinople. He made two attempts to conquer the city, and was repulsed by the Turks of Asia Minor, and the emperor John Cantacuzenus (a.d. 1341-1350) reconquered Urkhan by giving him his daughter in marriage (a.h. 747; a.d. 1346). Urkhan was then sixty years old. Notwithstanding his relationship to the emperor, he continued his hostilities, and in a.h. 756 (a.d. 1356) his son Soliman crossed the Dardanelles with a few troops, and surprised the castle of Trizyme, now Chini, near Gallipoli, which from that time remained in the hands of the Turks, who were therefore called the Turks of Asia Minor. During the civil troubles between the emperors John Cantacuzenus and his son-in-law John Palaeologus, Urkhan assisted the emperor, and seized the castle of Gallipoli, the key of the Dardanelles, in the year 1339. The emperor John Cantacuzenus against the troops of the emperor John Palaeologus. The conquest of Gallipoli was an event so important, that Urkhan announced it by pompous letters to the petty Seljuks. The Seljuks of Asia Minor, Urkhan died in a.h. 761 (a.d. 1356), at the age of 84. His empire was divided into several provinces, which were governed by pashas. This word, which comes from the Persian pâ-shân, or 'the foot of the Shah,' is of very ancient origin. It is derived from the remotest kings of Persia were called his feet, his hands, his eyes, his ears (Xenophon, Cyropaedia, v., c. 2, 10), and his tongue. The

* Hämmer, vol. i, p. 145, says a.h. 746 (a.d. 1346). But Trizyme was conquered before Gallipoli, and both the castles were lost a short time before the accession of John Cantacuzenus, in the month of January, 1346.
title of 'pai-shah' was principally given to the governors of the provinces who were also commanders-in-chief of the troops in their province, and the chief supporter ('the feet') of the king. The title was bestowed by Osman. However, it was at first given to scholars and poets; and the first pashas we find in Turkish history were Muhkalis-Pasha (the sincere pasha), formerly known as Mirad, and afterwards was given as a title to Phaish (the loving pasha), the author of a poem on divinc love, upon whose title this was conferred by Osman. Urshah was succeeded by his younger son Mirad, the chief of Servia, having lost his life by a fall from his horse.

Mirad I., or Amurad I. (A.H. 761 till 791; A.D. 1359 till 1389). No sooner was Mirad on his throne than he undertook the plan of conquering the remaining part of the Byzantine empire, which was under the nominal sovereignty of the Seljukian princes in Asia Minor. As early as A.H. 763 (A.D. 1361), he took Adrianople, the second capital of the Byzantine empire, which he afterwards chose for his residence. In the following year he conquered Philippopolis, and the terror of the Turkish name spread over Europe. Pope Urban V. preached a crusade against them; and the kings of Hungary, Bosnia, Servia, and the prince of Wallachia formed a league of vassals (a.h. 765), or the West Balkan) with their combined forces; but before they had seen the towers of Adrianople they were totally defeated by the Turks, and King Louis of Hungary narrowly escaped captives (A.H. 765). This signal victory at battle fought between the Osmanlis and the European princes, in memory of his happy escape King Louis founded the abbey of Maraisell, in the Ape of Styria, which is still one of the most famous places of pilgrimage in Germany. After this victory, the greater part of Thrace, Bulgaria, and parts of Macedonia, Thessaly, and Epirus fell into the hands of the victors. Turkish soldiers appeared at Apolonia, where Augustus was staying when he was informed of the renunciation of the duchy of Caesar. In A.H. 766 (A.D. 1366) Mirad carried his arms into Asia, and defeated Ala-ed-din, the Seljukian prince of Karmania, who was compelled to take the oath of vassalage. The result of this battle, which was fought near Adrianople, was principally due to the irresistible charges of Bayzad, the son, and afterwards the successor, of Mirad. Meanwhile Lazarus, the kral or king of Servia, who had recovered from his defeat, prepared an attack on the Turkish dominions, assisted by strong bodies of Bosnian, Bulgarian, Hungarian, Polish, and Wallachian auxiliaries. Although his army was twice as numerous as that of the Turks, he was attacked by Mirad on the field of the Oussels, near Kossova, in the month of October. The Annals of the Battle of the Oussels state that the Servians were at first victorious; but prince Bayzad, armed with an iron club, broke their phalanx, and they were routed with dreadful slaughter: their king Lazarus was made a prisoner. Mirad received his ransom from the hand of Kobilowich, a noble Servian, posternated himself before the throne, and kissed the feet of the victor; but suddenly he seized a dagger, which was hidden under his clothes, and stabbed Mirad to the heart. Mirad ordered king Lazarus to be beheaded in his presence, and then expired on his throne. The famous battle on the field of the Oussels, and its consequence, the vassalage of Servia, became a subject for the national songs of the Servians, a collection of which has lately been translated into almost all European languages. During the reign of Mirad I., the feudal system, an old Turkish institution, was developed and strengthened by several regulations, principally concerning the obligation of the serfs, or 'Timar,' and the great military feats, or 'Sliut.'

Sultan Bayzad I. (from A.H. 791 till 805; A.D. 1389-1403). The eldest son of Mirad I., who was crowned the title of Sultan. His first act was an order by which his youngest brother Yakub was put to death, a crime which he justified with the words of the Koran, that 'death is better than uproar;' from which we may conclude that Yakub had perhaps formed some ambitious plan. Bayzad, who, for the eminence of his manoeuvres and the impetuousity of his charges, deserved the surname of 'Idlerim,' or the 'lightening,' successfully pursued the career of conquests opened by his ancestors. The emperor Manuel of Trebizond, who, for the eminence of his manoeuvres and the impetuousity of his charges, deserved the surname of 'Idlerim,' or the 'lightening,' successfully pursued the career of conquests opened by his ancestors. The emperor Manuel of Trebizond, who, for the eminence of his manoeuvres and the impetuousity of his charges, deserved the surname of 'Idlerim,' or the 'lightening,' successfully pursued the career of conquests opened by his ancestors. The emperor Manuel of Trebizond, who, for the eminence of his manoeuvres and the impetuousity of his charges, deserved the surname of 'Idlerim,' or the 'lightening,' successfully pursued the career of conquests opened by his ancestors. The emperor Manuel of Trebizond, who, for the eminence of his manoeuvres and the impetuousity of his charges, deserved the surname of 'Idlerim,' or the 'lightening,' successfully pursued the career of conquests opened by his ancestors. The emperor Manuel of Trebizond, who, for the eminence of his manoeuvres and the impetuousity of his charges, deserved the surname of 'Idlerim,' or the 'lightening,' successfully pursued the career of conquests opened by his ancestors.
by a careful education, was called by his countrymen 'Kurcalla Chelebi,' or 'the gentleman.' He was a worthy descendant of Osman; but, in the time of his ances
tor's death, the monarch, the son of his late brother Soliman. The reign of Mohammed was short, but eventful.

From the field of Chamurlit he hastened to Asia, and in twenty-two years subdued the Juljuk princes of Karamania and other parts. He was less fortunate against the Venetians, whose admiral, Loredano, destroyed a Turkish fleet off Gallipoli, in A.H. 819 (A.D. 1416); but peace was con
cluded, and a Turkish ambassador appeared at Venice. In the same year a Turkish army, which had made an expedition into Germany, was destroyed at Redk
sberg in Silesia. But Mohammed quelled a dangerous plot of fanatic desires, or monks, which had led to the refusal of a certain number of emoluments, as well as by force, compelling the emperor Manuel Palaeologus to keep in prison a certain Mustafa, who was called Mustafa the Impostor, but who was most probably that prince Mustafa, son of Bayzid and brother of Mohammed, who had disappeared after the battle of Angora. [Timur.]

In A.H. 824 (A.D. 1421) the Sultan paid a visit to the emperor Manuel in Constantinople, where he was received with exultation. He died in the same year; he left to his successor, Mirad II., an empire of greater extent than that of his father Bayzid before the invasion of Timur.

Sultan Mirad II. (A.H. 824 till 855; A.D. 1421 till 1451), the third son of Mohammed I., was a youth of eighteen when he ascended the throne. Immediately after the death of Mohammed, Mustafa was released from his cap
tivity at Constantinople, and disputed the throne with Mirad, who defeated and killed him, and took his name of Adorno, Doge of Venice, and commander of the Venetian fleet then assembled in the sea of Marma.

The following years of the reign of Mirad II. were signalised by some conquests in Greece, by the conquest of the Thessalians, by a siege of Constantinople, as well as by several contests with some rebellious khans in Asia, and with Wlad Drakul, the cruel, prince of Walachia. A Polish embassy appeared at Adrianople in A.H. 844 (A.D. 1440). In A.H. 844 (A.D. 1442) Mirad was involved in a war with Ladislaus, king of Hungary, whose general, John, Hunyad, defeated the Turks at Nissa in the following year, and penetrated as far as Philippiopolis, whence, laden with booty, he led his army back to Hungary. This war, though interrupted by a peace (A.H. 845; A.D. 1444), was afterwards continued, and proved most fatal to the Hungarians.

Mirad was a lover of peace and philosophical studies; he was very fond of the Hungarian solemn oaths on the Koran and on the Evangelists, the sultan was persuaded that there was no danger on the side of Hungary; and the state of Asia being satisfactory, he returned to Asia, announcing the truth in favour of his son Mohammed, then a child. But Cardinal Julius Cesari, the instigator of the war between Ladislaus and Mirad, who was dissatisfied with the peace, persuaded Ladislaus and Mirad to break it, and he released them from their oath. Ten weeks after the treaty had been sworn, the Hungarian army entered Turkey. Upon this news Mirad left his solitude, and with forty thousand men crossed the Bosphorus, the Dardanelles being watched by a Venetian fleet. At Varna he met with the enemy, feeble in number, but so presumptuous that they boasted they would expel the Turks from Europe in the course of that year (A.H. 845; A.D. 1444). The Hungarians were en
tirely routed, and saved himself by a hasty flight, but king Ladislaus, the Cardinal Julian, and several other Christians of high rank were killed. During the battle, a copy of the broken treaty, attached to the top of a lance, was carried through the lines of the Osmanlis, to remind them that they were fighting for a just cause. After this victory Mirad renounced the throne a second time, but was again obliged to take the reins of government by a mutiny of the Janizaries, which however he soon quelled. The last years of his reign were gloomy as the preceding one. Cortein and Patras were conquered, and Hunyad, having again invaded Turkey, was routed at Kossova, in A.H. 852 (A.D. 1449). Mirad was less fortunate against the Serbs. Scanderbeg, the prince of Epirus, who maintained himself in his principality, was supported by the Sultan. Mirad, who died in A.H. 855 (A.D. 1451), has been compared with Ducasleian and Charles VII; who both renounced the throne. But these two emperors relied on the power of foreign princes for the confirmation of their throne. He was as unfortunate in the annals of Turkey as well as European history for the conquest of Constantinople. The power of the last Greek emperors was insignificant, but their intrigues against the Sultan and the Turks were of no importance. The mere fact of their existence was a cause that prevented the numerous Greek subjects of the Sultan from obeying the Turkish sultane. The name of Constantinople was pre
ceived as a sign of the power and the greatness of God; the city was the capital of all empire situated on both sides of the Bosphorus; and residing in the pal
cace of the successors of Constantine, the Sultans could consider themselves as the heirs of a thousand years authority exercised by the emperors over the nations of the East.

Sultan Mohammad II., the son of Mured II. (A.H. 855 till 882; A.D. 1451 till 1481), was a youth of twenty-one years, when he succeeded to the throne. His father was called Mustafa the Impostor, and he was most probably that prince Mustafa, son of Bayzid and brother of Mohammed, who had disappeared after the battle of Angora. [Timur.]

In A.H. 907 (A.D. 1453) and the last of the Greek emperors, Constantine Palaeologus, was massacred in the palace of his residence near Athens, which was destroyed by the Turks. At this time, the Sultan was himself the capital of the Turkish, and from this time Turkish history becomes intimately connected with the history of Europe.

Mohammed II. began a series of victories and conquests, by which his empire became one of the most powerful states in the world. Servia, formerly a vassal state, became a Turkish province; the Peloponnesus was conquered, but it was afterwards lost; France Acciajoli, the last duke of Athens, for the friend of Mohammed, was also permitted; Trebizond, the last remnant of Greek independence, was also taken [Trebizond]; Kaffa was captured by the famous grand-vizier Ahmed Kedik, and the khans of Crimea took the title of vassal; his success in the conquest of Turkey were extended by the victories obtained over several petty Juljuk princes, and Europe was alarmed at the insurrections of the Turks into Wallachia, Moldavia, Transylvania, Hungary, and Germany. But more dangerous than all this was the year of 1453, which was taken by Ahmed Kedik, in A.H. 884 (A.D. 1479); Scanderbeg was defeated, and his dominions, Epirus and the Herzegovina, were united with Turkey. Mohammad II. died in A.H. 896 (A.D. 1492) and succeeded in his son Bayzid II. During the reign of Mohammad II. great numbers of Turks settled in Europe, where they received lands which had been taken from the Greeks. Mohammed II. was patient in the early part of his reign; but in the latter years of his life, he grew revengeful, and took every opportunity of oppressing his subjects. He was a very severe and just prince, but his power was weakened by the jealousy of his principal ministers. After his death, the Turkish empire was divided among his sons, but the most important of them was Mustafa III., who ascended the throne in the year 1617. Mustafa was a very able prince, who governed his empire with wisdom and justice. He was succeeded by his son, Ahmad III., who died in 1640. The reign of this prince was more peaceful than that of his predecessors, but he was succeeded by a series of weak and inefficient rulers, who were succeeded by the emperors of the Ottoman empire. The empire of the Ottoman Turks was divided into several provinces, each governed by a vizier or governor. The viziers were chosen by the Sultan, and were responsible to him for the good government of their provinces. The empire of the Ottoman Turks was divided into several provinces, each governed by a vizier or governor. The viziers were chosen by the Sultan, and were responsible to him for the good government of their provinces. The empire of the Ottoman Turks was divided into several provinces, each governed by a vizier or governor. The viziers were chosen by the Sultan, and were responsible to him for the good government of their provinces.
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he was compelled to raise the siege, and in A.H. 940 (A.D. 1533) he concluded peace with Ferdinand, who recognized Zapolya as king of Hungary and prince of Transylvania.

From Hungary Soliman proceeded to Persia, where he died by Shah Thamas, viz. he had protected Sherif-Bey, the khan of Bedlis, who had revolted against the Sultan. This war lasted till A.H. 951 (A.D. 1544); and although the Turkish fleet was defeated, it was in the condition of the Shah not aiding the rebellious subjects of the Sultan.

While one Turkish army was thus occupied against Persia, another, under the command of Seif, made war against the Venetians, who lost several of their islands in the Adriatic, and with a third army Soliman again took the field against Ferdinand of Austria. Zapolya having died in A.H. 1539, Ferdinand seized the kingdom of Hungary from the son, who afterwards (A.H. 948, A.D. 1541) invaded Hungary. In this war Soliman was victorious over the best captains of Ferdinand and his brother, the emperor Charles V.; and Ferdinand was compelled to cede to Soliman the greater part of Hungary, with the capital, Buda or Osten, by a treaty concluded in A.H. 954 (A.D. 1547).

In two years fresh hostilities broke out, and after a long war, during which Hungary and some adjacent parts of Germany were dreadfully ravaged, a peace was concluded in A.H. 962, by which Soliman maintained possession of his conquests, and Ferdinand, then emperor, promised to pay an annual tribute of 30,000 ducats for his part of Hungary. The peace was generally considered to be equal, that of Turkey was disturbed by a civil war between Selim and Bayazid, sons of Soliman, who disputed the future succession to the throne during the lifetime of their father. After the loss of the battle of Koniah, Bayazid with his four sons fled to Persia, and Soliman having declared himself for Selim, the Shah delivered the fugitives to the messengers of the Sultan. Bayazid and his sons were put to death in A.H. 963 (A.D. 1551).

During the reign of Soliman the Turkish navy was the first in the world, and became the scourge of the Mediterranean. Pire, Trogir, and Salih raged the coasts of Italy, Spain, and Africa: they took Reggio, Sorento, Bussa, Oran, and the island of Majorca in A.H. 957 (A.D. 1560). Pire defeated the united fleets of Spain and Italy off Jerba, an island on the coast of Africa within the limits of Tunis. Another Turkish fleet in the Red Sea and in the Persian Gulf was successively commanded by Pir Reis, Murad, and Sidi Ali. Pir Reis sailed along the whole coast of Arabia from Suez to Basrah, and on his way he took the town of Medina. This Pir Reis was the author of the "Babiyie," a map of charts of the greater part of the Mediterranean, which, with some alteration, was used by the use of the astrolabe, and is the author of the "Mishk," the Ocean, a very good description of the Indian Sea. After the victory at Jerba, Soliman resolved upon the conquest of Malat, and a powerful fleet left Constantinople for that purpose in the beginning of the year A.H. 973 (A.D. 1564), but the expedition failed; and after immense losses of men the fleet returned to Constantinople, after a siege of five months. (Malat, p. 347.) During this time the war with Austria was renewed, Soliman, notwithstanding his age, took the command of his army and hastened to Hungary. He laid siege to Szeged, defended by Zvi, and he died there in his camp in the month of Sijef, 974 (September, 1566), before the fortress had fallen into the hands of the besiegers.

Poetry, arts, and science flourished during the reign of Soliman. The body of the ulama received a new organization, and great privileges in matters relating to their property.

Notwithstanding the continual wars and the great liberality of Soliman, the finances were in a flourishing state, and he was only once obliged to raise an extraordinary revenue. He distributed the succession to military offices was regulated, and so was the administration of the extensive dominions of the Sultan in Egypt; several edicts were issued to ameliorate the condition and to determine the taxes of the Rejas; and the criminal code was revised, and enlarged by severe laws. con-
ceiling the life, honour, and property of the Osmanlis, the Turks, and even the slaves. Under Soliman the use of coffee became general in Turkey.

Notwithstanding all this, the decline of the Turkish empire begins with the reign of Soliman the Great. Kochi-Bey, who is sometimes called the Montezouique of the Turks, was the last of the great sultans. The decline to which he brought his empire, was owing to two causes: 1. Soliman, always at the head of his armies, abandoned the direction of state affairs entirely to the divan, over which he seldom presided; and thus the grand vizir acquired too much power; 2. the influence of the hareem gave way to petty intrigues, and continued so during the reign of his successors. 3. the administration of the provinces and of the domains was often farmed to Jews, Greeks, and others, who impoverished the subjects though they filled the imperial treasury. This policy was not always felt; 5. luxury was introduced by the great, who had enriched themselves with the spoil of so many countries, spread through all classes, and found its way into the army. We add, as a sixth cause, that the army became more eager to plunder than to gain victories.

Sultan Selim II., the son of Soliman the Great (A.H. 974 till 982; A.D. 1566 till 1574). Immediately after his accession he quelled a dangerous mutiny of the Janizaries, whereupon he concluded peace with the emperor Maximilian II., by which each remained in possession of his share of Hungary as fixed by the peace of A.H. 970 (A.D. 1562). Turkey was increased by the province of Yemen in Arabia, which was purchased from the Arabs by Selim (A.D. 1570); and by the acquisition of Cyprus, taken from the Venetians in the same year by Lulà Mustapha Pasha, Piale, and Ali-Moezin, in spite of the peace which had been sworn by the emperor; also by the acquisition of Bessarabia, which was taken from the Spaniards in A.H. 982 (A.D. 1574). The Turkish navy, commanded by Ali Moezin, was almost annihilated by Don Juan d' Austria, in the battle of Lepanto, in A.H. 982 (A.D. 1573); but the Sultan, and especially his grand vizir Sokoli, and his admiral Ochiali, displayed such activity in rebuilding new ships, that in two years the Turkish navy was superior to the united fleets of the Christian princes on the consulate of the Mediterranean. By order of Selim, an attempt was made to join the Don and the Wolga by a canal, some imaxes of which are still visible.

Sultan Murad III., or Amurde III., son of Sultan Selim II. (A.H. 982 till 1003; A.D. 1574 till 1585). Although this sultan was governed by favourites and by women, Turkey was enlarged during his reign by some important conquests. A war having broken out with Persia, the Turks, after a victory at Childir, conquered Erivan, Georgia, and Daghestan, and conquered the country. On Sultan's Pasha, the commander of a part of the Turkish army, proceeded northwards, and crossed the Caucasus in order to relieve the Khan of the Crimea, who had been attacked by the Russians. In A.H. 982 (A.D. 1574) he returned to Constantinople, taking by storm some castles on the coast of Bessarabia, and arrived in the capital after having carried the crescent round the Black Sea. The following years of Murad's reign were signalized by a fresh war with Persia, and by dangerous troubles among the Diseases in Mount Lebanon, in Egypt, and in Arabia. Transylvania, Moldavia, and Wallachia refused to pay the annual tribute, and as they were encouraged to resistance by Austrian agents, the Turks invaded the Austrian Territory. War was declared, but Sultan Murad died before it was concluded. Murad III. had a hundred and two children. During his reign, Turkey had diplomatic relations with almost all the nations of Europe. Edward Bertaut included a commercial treaty between England and Turkey. On the death of Murad III. the Turkish empire continued in Europe the present European Turkey, Greece, and the greater part of Hungary; in Asia, all Asia Minor, Armenia, Georgia, Daghestan, the western part of Kurdistan, Mesopotamia, Bagdad, Syria, Cyprus, and the greater part of Arabia; in Africa, Egypt, Algeria, Tunis, and Tripoli. The following were vassal states—the Khan of the Crimea; the principalities of Transylvania, Moldavia, and Wallachia, and the republic of Ragusa. The Byzantine empire under Justinian was of less extent than Turkey at the close of the sixteenth century, and since the time of the Franks and Greeks, his name had inspired such universal terror as that of the Turks.

Sultan Mohammed III., son of Murad III. (A.H. 1003 to 1012; A.D. 1595 to 1603). He secured his succession by putting to death his nineteen brothers, and seven female slaves of his. Mohammed III. was more propitious than his predecessors, with Austria continued during his whole reign; the Austrians were unable to drive the Turks out of Hungary, and the Turks did not succeed in expelling the Austrians. His relations with the other European powers were generally peaceful. Segrano, in the year 1021, was re-occupied by the Turks; Constantine, the Porte, submitted to the Sultan, and was invested with his principality as a vassal of Turkey. Towards the end of the reign of Mohammed, Delt-Husein rebelled in Aam, and was deposed throughbreadcrumb with Austria. Mohammed III. continued to disturb the peace of Austria Minor. The Turkish commanders in Hungary were not less fortunate. The emperor Rudolf II. was assassinated by the prince of the empire; their troops defeated the Turks in several battles, and were the first to set on foot a scheme to conclude the peace of Sivarotok (A.H. 1015; A.D. 1606).

This peace must be considered as the first trace of an international law between Turkey and the European powers. Europeans and Turks had agreed to call him the title of Padishah; the tribute which Austria had paid for her part of Hungary was abolished; and the Sultan promised not to assist the insurgents in Hungary, who had taken arms against the emperor under the pretext of obtaining religious liberty. Peace was concluded by a commercial treaty with the United States of the Netherlands. During his reign a body of Cossacks descended the Don in a fleet of boats, crossed the Black Sea, and surprised the town of Odessa; which was plundered. All commercial transactions with Poland were hostile, but the treaty of Bussa prevented war. Turkey was still a powerful state, but its gradual dissolution became apparent during the reign of a weak prince who was governed by favourites and women.

Sultan Mustafa I., the brother of Ahmed, ascended the throne in A.H. 1026 (A.D. 1617), and descended from it six months, in the beginning of A.H. 1027 (A.D. 1618). The consequence of a revolution in the seraglio. He was confined to his palace, and his successor ascended the throne.

Sultan Osman II., the son of Ahmed I. (A.H. 1027 till 1031; A.D. 1618 till 1622). A short but unhappy reign with Poland was the most remarkable event of the reign of this prince. During this period a revolution in the seraglio took place. In violation of the law which declares that the Sultan shall have no women in his harem except slaves, Osman chose three wives among the daughters of his first officers; he conceived the fantastic plan of making a pilgrimage to Mecca: the Janizaries, being informed of this, rose in open rebellion, and put the question to the Mufi, if it were legal to kill those who gave bad advice to the Sultan: they urged him to innovations. The answer of the Mufi was affirmative; Osman, having refused to hear counsel, was deposed and put in prison, where he was starved, the first example of a Sultan losing his life by the hands of his rebellious subjects. His counsellors were likewise put to death. His uncle, the deposed Mustafà, was delivered from his captivity and proclaimed Sultan.

Sultan Mustafa I., 2 (9th of Rejeb, A.H. 1031 till 4th of Zilhade, 1032; 20th of May 1622, till 30th of August, 1622). The incompetence of this prince had been seen in his first reign; during his second reign he was again seen in spite of the insurrection of the Janizaries; his successor, Husein-Pasha, was a bloody tyrant. He and the Sultan were both deposed.

Sultan Murad IV., or Amurde IV., the brother of Osman II., and the son of Ahmed I. (A.H. 1032 till 1049; A.D. 1622 till 1640). He was a child of twelve when he was raised to the throne. In the first ten years of his reign, he reigned under guardianship of his mother, Mahboub Mosque. During the last seven years of his reign, he evicted...
Sultan Ibrahim I, youngest brother of Murad IV., and son of Ahmed I. (A.H. 1049 till 1058; A.D. 1640 till 1648). The conquest of Constantinople, which resulted in the temporary conquest of a part of Candia, were the most remarkable events of the short reign of Ibrahim I. He spent his time in luxury and debauchery; his passion for women surpassed everything; his Gobierno, which was a pasha, was unbounded. The decline of the power of the Osmanlis became conspicuous in the abuses, violent and unjust measures, which characterized this reign. Ibrahim perished in consequence of a revolt of the Janizaries, whose power was then as dangerous as that of the Austrian soldiers under the Roman emperors; the widow of Ahmed I. was a series of troubles and calamities.

Sultan Mohammed IV., the son of Ibrahim I. (A.H. 1059 till 1060; A.D. 1648 till 1667), was a boy of seven years of age. The simple fact of the Janizaries having preferred a child to a man, proves the turbulent haughtiness of this body and the degenerate character of Ibrahim I. The beginning of the reign of Mohammed IV., who was under the guardianship of his grandmother, Mah-peker, the widow of Ahmed I., was a series of troubles and calamities. An expedition against Candia failed, and in two battles off Chios and at the outer entrance of the Dardanelles the Osmanlis sustained the worst defeat of their army. A revolt of the pages of the Sultan was a dangerous event; the troops in Candia mutinied; a body of the Janizaries ravaged the environs of Constantinople; and the sultan, advised by Kâzî-Hâder-zade, became gradually an army of outlaws, who were permitted till after the greatest efforts of the pashas of Asia. The ministers were frequently changed (from 1648 to 1656, there were fifteen grand-vizis); the grand-vizir Ishph Mustafa Pasha, deposed by Peski on behalf of the sultan, became grand-vizir in A.H. 1656 (A.D. 1666), and under his successor's administration Turkey recovered from her depression.

Bagrat, the vassal prince of Transylvania, having concluded a treaty with Austria, by which he ceded a considerable territory to this power, differences arose on that account between the Sultan and the emperor Leopold I., which led to a war in A.H. 1670 (A.D. 1669). Ahmed Köprüli, the son and heir of Malik, conducted this war with great energy, and the Turkish arms were signalled by the conquest of Neubâul, Leutza, Leverenz, and Novigal. The auxiliaries of the Tartar khans of Persia and Sibi, and of the Cossacks of Moscow, which was conducted by the famous hero of the Dnieper, who had been defeated in a battle with the sultan's army at Pskof, formed the army of the emperor, and their forces met with a decisive blow in the battle of Novgorod. The sultan's army was completely defeated, and the emperor entered Moscow. The vassal prince of Transylvania was sent a prisoner to Constantinople, and the victorious emperor concluded an agreement with the sultan, by which the latter ceded to the imperial power the greater part of the land of the Princes, which was terminated by the treaty of Karlowitz, which was concluded in 1675 (A.H. 1085; A.D. 1676).

The war broke out again in 1678 (A.H. 1087), and lasted till 1683 (A.H. 1086). The Sultan was defeated by the emperor's army, and obliged to cede a large territory to the latter, which was terminated by the treaty of Karlowitz, which was concluded in 1679 (A.H. 1089). The sultan's army was defeated again by the emperor's forces, and the peace concluded by the treaty of Karlowitz, which was concluded in 1683 (A.H. 1090). The sultan's army was defeated again by the emperor's forces, and the peace concluded by the treaty of Karlowitz, which was concluded in 1683 (A.H. 1090).
of general-field-manual; and Sultan Mohammed IV., preceded by the standard of the prophet, left Constantinople and accompanied his army to Hungary (A.H. 1096; A.D. 1685). At Essek he received the homage of king Tokto. Few Austrian troops were in Hungary, and on the 19th of Feb. 1686 (14th of Bahman) he routed an army of 20,000 men, encamped under the walls of Vienna. The heroic resistance of the citizens and the feeble garrison, commanded by Count Starhemberg, saved Vienna from the fate of Scutari. On the 12th of September Khody Mustafa was attacked by an army composed of the Austrian troops, commanded by the duke of Lorraine; of the troops of the empire, commanded by Maximilian-Emanuel, elector of Austria; and under him twenty princes of the empire; and by a body of Polish exiles, commanded by their gallant king, John Sobieski. The Turks were completely defeated; the victory was mainly due to the military talents of the king of Poland. Karî Mustafa, abandoning his camp, fled to Hungary with the remnant of his army—6000 men, 11,000 women, 14,000 girls, and 50,000 children had been carried off by the Turks into slavery. They were pursued by the imperial troops, who, in the course of three years, took the capital and the most important fortresses of Hungary, and routed the Turks at Parkany, at Hansberg, and at Mohacs on the 25th of Ramiânâ, 1686 (4th of August, 1687). The Venetians acceded to the league against Turkey, and settled several bases in Epirus and Greece, and at last Morosini took Athousa from the Turks, and forced them to evacuate Greece.

So much disgrace after so many triumphs made the people despair. The Janizaries revolted, and Mohammed IV. exchanged his throne for that of Khody. Sultan Soliman II. (III.), the brother of Mohammed IV. and son of Ibrahim I. (A.H. 1099 till 1102; A.D. 1687 till 1691), and Sultan Ahmed II., brother of Soliman (III.), and Ahmed (IV.), son of Soliman (II.), made an army of 11,011 till 1695. The Austrians continued their victories; they took Belgrade, and routed the Turks at Slanka-men, whereupon the fortress of Grand-Waradin surrendered to them. The first year of the reign of the Janizaries was the year of the loss and diminution of the empire; the internal state of the empire was deplorable; there was rebellion in all the provinces.

Sultan Mustafa II., the son of Sultan Mohammed IV. (A.H. 1106 till 1109; A.D. 1696 till 1703). The Turks gained some advantages over the Venetians by recovering Chios, and beating their fleet off Chios in A.D. 1695; and the Tartars ravaged Poland as far as Lvov. But in Hungary the Imperialists were still victorious, and a strong body of them crossed the Danube and penetrated as far as the foot of the Balkan. At the same time Peter the Great, eager to have a free communication with the Black Sea, concluded an alliance with Austria against Turkey, and laid siege to Azof. Don handed it over to the Turks in 1108 (A.D. 1696). In the following year the Venetian fleet was defeated by the Turks at Mitylene, but Prince Eugene defeated the grand-vizir in the battle of Tenza. The siege of Azof was impossible. The Porte carrying on the war any longer without ruining the state, and the people were oppressed by excessive taxes, led to the peace of Carlowicz, which was concluded in A.H. 1111 (A.D. 1699). Venice was confirmed in the possession of the Morea as far as the isthmus of Corinth, and of Dalmatia; Russia made only a truce for two years; Poland received Podolia, the Porte renouncing this conquest, and the fortress of Kamnicod Podoliski; Austria received all Hungary, except the banat of Temesvár, and the Austrian empire was confirmed in the country; and as Hungary, ceased to be vassal states of Turkey. This peace was concluded under the mediation of England and the United Provinces of the Netherlands. Since Timur had made Sultan Bayazid I. his vassal in 1489 (1108 A.H.), this was the first time that Turkey had been humbled. However, her long struggle with Austria, Venice, Poland, and Russia was not inglorious, and did honour to the energetic, though often despotic, administration of Hosenî Kopîlî, who directed affairs for several years, first as grand-vizir, and afterwards as grand-vizir. The Osmanî felt the decline of their power with deep regret; but they saw the causes of it in the system of admission. An insurrection was prepared, a well-organized army of rebels massed, and Sultan Mustafa was deposed in A.H. 1115 (A.D. 1703).

Sultan Mustafa III., brother of Mustapha II., and son of Mohammed IV. (A.H. 1115 till 1143; A.D. 1703 till 1730). He was at first unable to quell those disorders which were the cause of his accession, and in fifteen years he had fourteen grand-vizirs. One of them, Ali Chorili, a man of remarkable talents, endeavoured to derive advantage from the war between Peter the Great and the king of Sweden, Charles XII., and it is now known that he offered Charles the sale of the Crimea, for 100,000 pieces of eight, and carriage to the south of Russia. Charles accordingly penetrated into the Ukraine, but his defeat at Pultawa destroyed his plans, and he took refuge in Turkey. [Charles XII.] Sultan Ahmed tried in vain to get rid of the king of Sweden, and to win over Peter the Great to the labours of peace, and preferred music, poetry, and pleasures to the chances of war. He despoiled Ali Chorili; who could not succeed in removing the king of Sweden; but by far greater means—using the intrigues of Charles XII. the Great, who had been obliged to surrender to the Turks with his whole army. The empress Catherine, who was with him in the camp, saved him by bribing the grand-vizir. The peace of the Pruth was concluded in A.H. 1125 (A.D. 1711), and the Czar was allowed to retire to his empire after having ceded the city of Azof. Charles XII. left Turkey in A.D. 1713. The timid policy of the Porte towards Russia was in many respects produced by the desire of profiting from the weakness of Venice, an enemy they did not dare to attack. The Venetians having several times been defeated, the war was easily found, and Venice was attacked in A.H. 1126 (A.D. 1714). Sultan Ahmed led his army into Greece, and the grand-vizir, Damah 'Ali Pasha, conquered the Morea in one campaign. Upon this the emperor Charles VI. concluded a league with his son the grand-vizir, of maintaining the political balance fixed by the peace of Carlowicz, and thus Turkey was involved in that memorable war, the result of which was to lessen her influence in Europe. Defeated by Prince Eugene at Parnawa, in 1716 (A.H. 1126; A.D. 1717), the Turks were disbanded; and as early as A.H. 1130 (A.D. 1718) the Sultan concluded the peace of Passaré, by which he ceded the Ottoman province of Tevsvar, and the western part of Wallachia and Servia to the Porte; he also restored his Venetian possessions, except the Morea, which was ceded to Turkey. Turkey recovered, from this blow by the wise administration of 'Ibrahim Pasha, who was appointed grand-vizir in A.H. 1130 (A.D. 1718), and who held the office till A.H. 1143 (A.D. 1730) 'Ibrahim, far from attacking Peter the Great, who was ready to invade Persia, then governed by Shah Tahmâsp, concluded an alliance with Russia; and in the ensuing war with Persia, which was terminated in A.H. 1144 (A.D. 1726), the victorious Turks acquired a considerable part of north-western Persia, which was afterwards ceded to the Porte by Tahmâsp I. (A.H. 1149; A.D. 1730) Tahmâsp suddenly recommenced hostilities, and renewed the war he had ceded to Turkey. When the news of this invasion reached Constantinople, the Janizaries accused the grand-vizir of negligence; and revolted, in consequence of which an army was immediately dispatched to the Crimea, under the reign of Sultan Ahmed III., European arts and sciences found their way to Constantinople, where the first printing-office was established, under the patronage of the grand-vizir 'Ibrahim, by Ibrahim Basami, a Hungarian renegade, who in the course of twelve years published sixteen works chiefly historical.

Sultan Mahommed I., the son of Mustafa II. (A.H. 1143 till 1154; A.D. 1730 till 1754). The Turkish serser, 'Ali Hekim-zade, defeated the Porte at Taghres Tabriz; but notwithstanding these triumphs the timid divan concluded a peace with Tahmâsp, which, although it was not without advantages for Turkey, was too far from satisfying the nation (A.H. 1147; A.D. 1732). The Sultan was exiled, and the brave 'Ali Hekim-zade was appointed grand-vizir. Shortly after this, Nadir-Khuli Khan usurped the throne of Persia, and renewed the war with the Turks. The Austrian emperor, Joseph, as well as the Topal Osman, were entirely defeated under 'Abdul-Allah Kopîlî, and compelled for peace and to renounce the provinces which had been ceded to them during the reign of Ahmed III. (A.H. 1149; A.D. 1734). Previously to this peace differences had arisen between the Porte and Russia, in consequence of the crimes of the Czars, had received orders from Constantinople to march across the steppe of the Kuban, to cross the Caucasus, and to attack the Persians in Georgia. The nations of the Cas-
War was declared in A.H. 1182 (A.D. 1778): it was glorious for Russia and most disastrous for Turkey. The Russian field-marshall Rumanzow took Bider, Ismail, Kilia, and other towns and districts between the Dnieper and the Dniester, and the whole country between Russia and the Dniester fell into the hands of the Russians. They attacked the Crimea on two sides; they took the famous lines of Peresyp by storm, and overran the peninsula from the north, while an unsuccessful attack on the fortress of Sudak was made by Admiral Elphinstone, who crossed the Cimmerian Bosporus, and took Kerch, Yenikale, and Kaffa in the East (A.H. 1185; A.D. 1771). The Khan Maksud-Ghiray abandoned his capital, Bakje-serai, and fled to Constantinople, and there his younger brother Ghiray was elected in his place. As early as the beginning of the war, a Russian fleet, commanded by Spirito, Alexius Orlov, and Elphinstone, left Kromstadt for the Mediterranean. The direct result of the war, in this field of action, was to be impossible, there being no communication between the Baltic and the Mediterranean; and when at last they could no longer doubt about the fleet being under sail, they requested the Austrian ambassador not to allow the passage of it by Tiaret and the Adriatic. No sooner were the Russians in the Mediterranean than an insurrection, kindled by Russian agents, broke out in Greece and in the Herzegovina, and the Russian commanders proclaimed the independence of the Greek and Albanian people, and declared all the former conquests in Greece, but in A.H. 1184 (A.D. 1770) they destroyed the Turkish fleet in the bay of Chesme, after the battle of Lepanto, the greatest disaster which had befallen the Turkish empire. The effect of this treaty was a truce between the Russian and the Turkish armies, and the congresses at Fokhina and at Bukarest; but the negotiations proved abortive, and the Russian armies remained in the field. The Tartar field-marshal Tugutu, on the 25th of December 1773, declared war against Austria; after which, in A.H. 1187 (24th of December, 1773), Sultan Abdü'l-Hamid I, or Ahmed IV., as he is called by some European historians, took the sole power of Turkey (A.H. 1187 till 1203; A.D. 1773 till 1789). Field-marshall Rumanzow continued his victories: his generals, Kamenski and Warsawzow, defeated the Turks at Basariki and Kossugl, and on the 11th of November, 1773, the Turks at Kulla, and from the passes of the Balkan and besieged the grand-vizir, the Emperor of Egypt. The Porte now yielded to the propositions of Russia, and peace was concluded in the same month (A.H. 1188; A.D. 1774) at Kuchuk-Kainarj. By this peace Russia obtained the great and the wealthy districts of Bessarabia, but with the stipulation not to oppose the Russian occupation of these countries, which were declared independent by the peace of Nissa; Russia also obtained the fortresses of Azof, Kiliburn, Kertch, and Yenikale; the country between the Bos and the Dnieper; the free navigation of the Black Sea, and a free passage through the Bosphorus and the Dardanelles; the co-protestorship over Moldavia and Wallachia; and the protectorship over all the Greek churches within the Turkish empire. The khanat of the Crimea was declared independent, but it soon became a prey to Russia. Three years afterwards the Porte was obliged to cede the town of Kafkaz to Austria. However, by the peace of Kuchuk-Kainarj Turkey was brought to a political dependence on Russia, and, notwithstanding many bloody wars, the Porte has not yet succeeded in shaking off the yoke.

Sultan Abdü'l-Hamid I, a weak and indolent man, was however disposed to recommence war with the empress Catherine II. His finances were exhausted, and to fill the treasury the subjects of the Sultan were forced to sell their goods and silver plate to the French, and the value of the currency fell below the real value of the metal. The necessity of a war became urgent after Catherine had annihilated the independence of the Crimea and united this state with her empire. Immediately her expectations were gratified by the Turkish war, the empress Catherine, in her turn concluded an alliance with Austria. The Porte declared war in A.H. 1186.
1201 (A.D. 1787), long before her preparations were finished. Her armies obtained some advantages against the Austrian. This Sultan was one of the most enlightened men of his nation and of the East. Before his accession, while confined to the seraglio, he studied Turkish and European history, and conceived the plan of establishing a Turkish empire in the Balkans. At last he had a rendezvous with distinguished Turkish statesmen, with Count de Choiseul, the French ambassador, and it is said that he exchanged letters with the king himself, Louis XVI. of France.

He resolved to put himself at the head of his armies, but he was dissuaded from it by the divan, who were afraid of trouble in Constantinople. The war meanwhile was carried on with great loss. The Turks were beaten at Marti- nosti by the combined Austrians and Russians; the Austrians took Belgrade; the Russians, Bender and Ismail; and Turkey would have been overrun, but for the intervention of England, Prussia, and Sweden. Thus peace was concluded (a.h. 1792), with the Emperor Leopold II., the successor of Joseph II., who restored his conquests to Turkey; and with Russia in a.h. 1206 (A.D. 1792) at Jassy. By the peace of Jassy the Porte ceded to Russia the province of the Caucasus, with Kandahar; and the Dniester became the frontier between the two empires. Sultan Selim now began his work of reformation, but during a long period his efforts were checked by troubles in Syria and Egypt: by the rebellion of Pasha of Diyarbekir, who proclaimed himself the power of 'All Pasha of Janina, [Ali Pasha.] The conquest of Egypt by Bonaparte led to a war with France. The grand-vizir, Yousuf Pasha, was routed in the battle of Abukir, and his army was completely destroyed by the French, but the Egyptians were taken by the English, who restored it to the Porte in a.h. 1218 (A.D. 1803). Previously to this, Selim had concluded an alliance with Russia, Naples, and England, in consequence of which a united Turkish and Russian fleet took possession of the Ionian Islands, which, conformably to a treaty concluded between Selim and the emperor Paul, were constituted into a republic, a.h. 1218 (A.D. 1803). This caused a general disturbance of the public on condition of consenting to the incorporation of the kingdom of Georgia with Russia. Peace with France was concluded in a.h. 1217 (A.D. 1802), no change taking place, except that France acquired the free navigation on the Black Sea and the free intercourse with all the coasts of those parts of Turkey then occupied by the Russians, and this right afterwards granted to England and to several other European powers. Having thus secured his political position, Selim at last began his reforms. His administrative division of the empire has been mentioned above. In order to regenerate his army, the discipline of which was entirely slackened, he appointed a commission, from which the troops received a new organization, the 'Nizam Jedid,' by which they were put on a footing similar to that of the European armies also introduced several changes into the system of taxation: he gave a new organization to the diwan; but in order to fill the treasury he debased the money. These reforms were made for the purpose of increasing the jealousy of England and Russia was excited by the increasing influence of the French ambassador, Count Sebastiani; and Selim, as well as the emperor Alexander, having both violated the treaty of Kuchuk Kainarji by arbitrary changes in the domestic affairs of Moldavia and Wallachia, a war broke out between Turkey and Russia, assisted by England (December, 1806). Admiral Duncan forced the passage of the Dardanelles, and was followed by his troops, and the Russian fleet displayed the greatest activity in preparing for resistance, and Admiral Duckworth, fearing that his retreat would be cut off, sailed back to the Mediterranean. Constantinople was invested by the Russians, made an establishment in the Danube. The defeats of the army were considered by the people as a consequence of the 'Nizam Jedid;' they manifested their dissatisfaction, and the Janizaries, who saw their ruin in the new organization, broke out in rebellion. To the number of 15,000 they occupied Persia, and directed their forces against the Seraglio. The Multi joined their party, and by a fetwa declared this Sultan Selim III. had forfeited the throne because he had procreated no heir, and introduced the name of Nizam Jedid. Thus Selim III. was deposed, and confined to the Seraglio.

Sultan Mustafa IV., the son of 'Abdul-l-Hamid, (A.H. 1222 till 1223; A.D. 1807 till 1808). Immediately after his accession Mustafa abolished the system of his predecessor. The Turkish fleet was entirely defeated by the Russians off Lemnos, and terror spread over Constantinople. Mustafa Bairaktar, pasha of Rus; the friend of the deposed Selim, approached the Hafiz Sinan, and demanded the deposition of Mustafa. The murder of Selim, by order of Mustafa IV., was the first consequence of this bold step; but the pasha Rus; the entered Constantinople, and Mustafa was deposed. Sultan Mahmud II., the son of 'Abdul-l-Hamid I., and the brother of Mustafa IV. (A.H. 1223 till 1256; A.D. 1808 till 1840). Before his accession he was instructed for some time by the deposed Sultan Selim III., who taught him the principles of reform necessary for Turkey. He was unprepared for his accession to Mustafa Bairaktar, who, after having been appointed grand-vizir, re-established the Nizam Jedid. The Janizaries again revolted, and they stormed the seraglio and the barracks of the army. Mustafa Bairaktar put to death the deposed Sultan, Mustafa IV., and then blew himself up, together with crowds of the Janizaries, Mahmud over his life to the circumstances of being the only adult son of the grandfather. He put to death the infant son of Mustafa IV., and ordered four pregnant slaves of the deposed Sultan to be drowned in the Bosphorus. Compelled to yield to the claims of the Janizaries, he abolished the Nizam Jedid. Notwithstanding this the troubles continued, and the Janizaries became masters of the empire. The energetic character of Mahmud became conspicuous in the administration of foreign affairs. He concluded peace with Austria (1809) and commenced the war against Russia with great vigour. The Russians had penetrated as far as the passes of the Balkan, but they were forced to retire beyond the Danube; and when they had crossed this river a second time, they were again compelled to hasten back to Wallachia. Internal troubles divided the forces of the Sultan. The Servians, commanded by Cremon George, and supported by Russia, shook off the Turkish yoke: the pashas of Weldan and Damascus, and of the neighboring eyalets of Baghdad, of Latakia, and several others, were in revolt; 'Ali, pasha of Janina, was independent in Epirus, and aimed at the possession of Greece; and Mehmed Ali in Egypt laid the foundation of an independent power against Janissaries under the name of 'Abdul-mumin II. to the brink of ruin. Under these circumstances the Sultan concluded with Russia the peace of Bukarest (A.H. 1227; A.D. 1812), by which the Porte ceded the country east of the Druzh, Besarabia, with some mountainous part of the Danube, and part of the eyalet of Childar in the Caucasus. During the ensuing years the Sultan, principally assisted by his favourites, Berber Bashi and Khafi Effendi, effected those radical reforms of which we have spoken in the beginning of this article, and for which he justly deserves the title of the 'Reformer of Turkey.' The destruction of the power of 'Ali, pasha of Janina, was a great triumph, but the insurrection of the Greeks and the insubordination of the Janizaries were not extinguished. Russian and European powers took the Greeks under their protection. The Turkish navy was destroyed in the battle of Navarino, October 23, 1827, by the combined fleets of England, France, and Russia, which were the largest part of Greece, from which she had hitherto taken her best sailors. This part of Greece was erected into an independent kingdom, and a Bavarian prince, Otho, was placed on the throne. The desire of the Janizaries, that Sultan Mahmud II. should either abandon the government to the turbulent mob, or to exterminate them. To quell a revolt in a.h. 1238 (A.D. 1822), he sacrificed the Multi, his best officers, Khafi Effendi, Berber Bashi, and Khafi Effendi. He considered with favour all preparations for revolts among the Janizaries, and with the downfall of this military body, which was once the bulwark of the empire, begins a new era in the history of Turkey. Serious differences
with Russia on account of Moldavia and Wallachia were settled by the treaty of Al-kemin at A.H. 1242 (a.d. 1829), but Mohammedan authors have subsequently found in it, in finishing the reform of his army, declined any European intervention in the affairs of Greece, which was then still in insurrection. Thus war broke out with Russia in A.H. 1354 (A.D. 1838), but the campaign in the Russians made little progress either in Europe or in Asia; but in the second campaign, field-marshal Djeibitsch defeated the main army of the Turks at Shumla, in the Balkan, took Admuul, the capital of the vilayet of Macedonia, and the capital town of the Ottoman Empire. Thus the combined forces of the Russians, which had previously been of only 33,000 or 34,000, were increased to 60,000 by Russia, and the Russians acquired parts of the eyalents of Childir and Karn towards the Caucasus, and the important fortress of Anapa near the mouth of the Kuban. The Sultan recognised the independence of Greece, Moldavia and Wallachia acquired an independent administration, guaranteed by Russia, which power has now more influence in these two principalities than Turkey; Servia was recognised as a vassal state of the Porte. The Sultan had to pay ten millions of ducats, and the Russians acquired the right of occupying Moldavia, Wallachia, and the town of Silistra, until the payment of this sum; but the emperor recalled his armies after only six months, having received five millions, and remitted the Sultan the rest. No sooner was this peace concluded than troubles arose in Bosnia, Albania, Macedonia, Asia Minor, and Syria; but the differences with Mehmed Afli, pasha of Egypt, were more serious. In 1250, the Sultan Mahmud was humbled by his pasha having founded a power which had only the name of a vassal state, and which was then of greater importance than that of Turkey, and a war with Russia. The Sultan attacked his vassal in A.H. 1247 (a.d. 1831) in Syria, but his armies were defeated; and in the following year Ibrahim-Pasha, the son of Mehmed Ali, advanced as far as Beirut, and defeated a force of 120,000 miles distant from Constantinople. Peace was concluded in A.H. 1248 (a.d. 1833), at Koniah, by which Mehmed Afli, who had held the eyalat of Candia since the war against the Greeks, acquired all Greece, and Ibrahim-Pasha was invested with Adrian as Mutesellim. In this war Constantinople was saved by the intervention of the emperor Nicholas of Russia, and a Russian army was transported by sea to Asia Minor to stop the progress of the victorious Ibrahim. A consequence of the treaty of Hamburg was that A.H. 1249; A.H. 1833) between Russia and Turkey, by which the Porte engaged herself not to allow the passage of the Danubian to any enemy of Russia. In A.H. 1251 (A.D. 1835) a Turkish expedition crossed the Ilyrland (Macedia) and was entirely dependent on Turkey. During these troubles and wars the Sultan continued his reforms, and accelerated the administration of the provinces by depriving the pashas of the right of appointing separate civil governors. He also ordered roads to be constructed, and established a regular post service. Sultan Mahmud II. was interrupted in his peaceful occupations by a new war with Mehmed Ali; but he died before he had heard of the total defeat of his armies by Ibrahim-Pasha in A.H. 1250 (A.D. 1840). Sultan Abdül-Mejid I., the son of Mahmud II., the present Sultan. He was delivered from his dangerous enemy by the invasion of England, Russia, and Austria. Admiral Napier took Beyrut and St. Jean d'Acce (A.H. 1236; A.D. 1840), and in one campaign Ibrahim-Pasha was compelled to evacuate Syria, which was restored to the authority of the Sultan. Mehmed Ali however was recognised as pasha of Egypt with her dependencies, and now pays an annual tribute to the Sultan.

(Hammer, Geschichte des Osmanischen Reiches (the complete work gives a history of the Empire concerning Turkey); Hammer, Des Osmanischen Reiches Staatserfassung und Staats Verwaltung; Knolles, The Turkish History, 6th ed., containing the State of the Ottoman Empire, 1700; charts of the Ottoman Empire, 1740), gives good information about the African provinces and dependencies of Turkey; Thorn- ton, The Turkish Empire; Sade, Travels in Turkey; Ur- ghart, Turkey and its Resources; Napier, The War in Syria; Maragni, Stato Militare dell'Impero Ottomano; D'Ohsson, Tableau Général de l'Empire Ottoman; Tott, Monuments des Empires Turcs. The best map of Turkey is that of Lieutenant-Colonel Weiss, in twenty-three sheets. As to the Turkish sources, comp. TURKISH LANGUAGE AND LITERATURE.)

TURKISH CHRONOLOGY. The Turks, like all the other Mohammedans, have adopted the ann of the Hijra, which begins with the 16th of July, A.D. 622. (Ref). The year of the Hijra contains 12 months of alternately 30 and 29 days, or, more exactly, 354 days, 8 hours, and 48 minutes; and 32 of these years are equal to 33 Mohammedan (lunar) years, 6 days, 8 hours, and 16 minutes. On these facts is founded the following easy rule for finding the Christian year which corresponds to any given Mohammedan year.
The number of centuries contained in the given Mohammedan year is multiplied by 3; to the product are added as many units as the period of 33 years is contained in the number of those years which are in the given Mohammedan year besides the centuries; the sum thus obtained is deducted from the given year; and to the rest is added 621, or the number of full Christian years before the beginning of the Hijra: the sum thus obtained corresponds to the Christian year.

Example: What year of Christ corresponds to the Mohammedan year 1188 (peace of Kuchk Kağırj)?
11 (the number of centuries) × 3 = 33
2 (the units of the period of 33 years contained in 1885) + 33 = 35
1188 (the given year) − 35 = 1153
621 (the number of years before the Hijra)+ 1153 = 1774
This is correct, the peace of Kuchk Kağırj having been obtained in A.D. 1774.

To change a Christian year into a Mohammedan year requires only an inversion of the preceding rule.
Example: What Mohammedan year corresponds to the Christian year 1774?
1774 − 621 = 1153
11 (the number of centuries in 1153) × 3 = 33
1 + 33 = 34
34 + 1153 = 1187
We have seen above that the Mohammedan year corresponding to the Christian year 1774 was 1188; but the result is correct notwithstanding the different results in the two cases; for the beginning of A.D. 1774 falls in the latter part of A.H. 1187, and the beginning of A.H. 1188 and the greater part of this year falls in A.D. 1774. Thus the latter rule is only the complement of the first, and by employing both the reader will always know whether a given Mohammedan year is preceding or following one Christian year, whether it falls in part of one and in part of another Christian year; and he will know the same for a Christian year with regard to a Mohammedan year. If this is true, then the consequence is, that, if a Mohammedan year is in the course of one Christian year, there will be no difference in the result obtained by employing successively both the rules. This is in fact the case, as may be seen by the following example.
The year A.H. 522 begins on the 5th of January, A.D. 1128, and ends on the 25th of December of the same year 1128.
Rule 1—For A.H. 522: 5 × 3 = 15
522 − 15 = 507
507 + 621 = 1128

Rule 2—for A.D. 1128; 1128 − 621 = 507
5 (centuries) × 3 = 15
15 + 507 = 522
from which we may conclude that the year 522 A.H. falls entirely in the course of the year 1128 A.D. To make this more intelligible, we observe that the Mohammedan year being composed of lunar or movable months, its beginning is likewise movable, and in the course of 33 years it goes through all the possible positions, as the year 1128. The above-mentioned two rules will be good till A.D. 1401 (A.D. 1890). The determining of the corresponding days of the two years presents considerable difficulties, and cannot conveniently be given.

TURKISH LANGUAGES AND LITERATURE. The Turkish languages form a particular family, which differ from the Arabic, the Persian, the Mongol, and the Chinese. The principal Turkish languages are the following:
1. Uighur. This language is considered the most antient of...
all the Turkish dialects, and is still spoken in eastern Turkish countries by the Kirghiz, the Kazak, who are nomadic between the Ural and the Chinese frontier.

5. Caucau-Danubian, in several suborder dialects spoken by the Nogais, the Kazak, and other Turkic tribes in southern Russia.

6. Austro-Siberian dialects. They are very numerous, and more or less mixed with Mongol or Samoyed words. They are spoken by the Turkish tribes that live in the middle, eastern, and southern parts of Siberia.

7. Chuvash, spoken by the Chuvashes, who live between the Suza and the Volga, and in some adjacent countries of eastern Russia. The Chuvash differs considerably from the Turkish in the neighboring countries, as it contains a great number of Finnish words. (Sott, De LINGUA TECHNECHORUM DISERTATIO.)

8. Osmanli, or Turkish, commonly called so. This dialect, which is spoken by the Turkish conquerors of the Byzantine empire, can be considered as the antecedent language, and that of the tribe of the Kuyi, from which the Osmanis are descended. It is the richest and most polished of all the Turkish dialects; and its regularity, precision, and elegance are such, that Jasm. estimated it was capable of making a language, it would not form one more perfect than the Turkish. Another principal feature of this language is its dignity, with regard to which Sir William Jones says, *The Turkish language has an admirable dignity. The Persian and Hindostanee languages are suitable for poetry and eloquence, but the Turkish for moral subjects. Turkish is now the diplomatic and official language not only of Turkey, but Egypt, Tunis, and Tripoli, andformerlyof Algiers. The Ottoman having received the civilization from the Arabs and the Persians, and the Koran (which among the Mohammedans is never translated from the Arabic into any other language) being stil the source of theology and legislation, a great many Persians and Turks are educated to study the Koran into the Turkish language. However the ground work is Turkish, and the Turks pronounce the Arabic words in a much softer way than the Arabs, a difference which is principally remarkable in the pronunciation of the gutturals and the long vowels. The Turkish alphabet is composed of thirty-three letters, twenty-eight of which are taken from the Arabic alphabet; four (پ, خ, ی, and گ) from the Persian; and one, the 'Saqir n' (ن) is exclusively Turkish. These letters are written from right to left. Turkish is also, and very frequently, written with Armenian characters, especially by the merchants. There is no article, but the demonstrative pronouns are retained, as (this), the number 'bir' (one) sometimes takes its place. There is no gender. The declension of the nouns is easy: the plural is formed by annexing *ler* or *ler* to the word, and the singular by dropping *ler*. There is neither declension nor gender. The declension of the pronouns is analogous to that of the nouns, but not always exactly the same. There are eight kinds of verbs, viz. active, passive, reciprocal, and personal. The infinitive of all regular verbs is formed by means of the syllables *mek* or *mak*; they become passive by taking the syllable *Il* before *mek* or *mak*. The verbs have six moods—indicative, imperative, subjunctive, active, passive, suppositive; and there are five tenses—present, imperfect, preter imperfect, preter perfect, and future. The different kinds of verbs are formed as follows: *sevemek*, to love; *sewemek*, not to love; *sewedemek*, to be loved; *sewedemek*, not to be loved; *sewedemek*, to make love; *sewedemek*, to make somebody is loved; *sewedemek*, not to make love; *sewedemek*, not to make somebody is loved; *sewedemek*, not to make somebody is loved; *sewedemek*, not to make anybody is loved; &c. There is a considerable number of irregular verbs.

The Turkish construction resembles that of the Latin language, and generally a sentence cannot be perfectly understood till the render comes to the last word. The Turks understand the Latin language as well as the English, and express their ideas the same as the Greek, the German, and the Persian: in respect the Turkish language differs radically from the Arabic.

The Turkish literature is of ancient origin. During the reign of Osman and his successors, a great number of Arabic, Persian, Greek, and Latin works were translated into Turkish. Mohammed II. ordered a translation of the Bible; Soliman I. had the Commentaries of Caesar translated; and Aristotle and Euclid were translated in the commencement of Turkish history. Mustafa III. made a translation of the 'Principe di Machiavel', and of the 'Anti-Machiavel' of Frederic II., king of Prussia. Some of the works of Plutarch, Socrates, and the Spanish, Italian, and Lelande, Cassini, and, in later times, a great number of English, German, and French works on history, geography, medicine, chemistry, mathematics, and the military sciences, have likewise been translated into the Turkish language. The original literature of the Turks is valuable, though less so than the Arabic. Jem, the brother, and Selim and Korkud, the sons of Bayzid II., Soliman II., Ahmed III., and Mustafa IV. translated the Bible into their native tongue; but we did not receive them, as they were transmitted only by a translation down to us. The oldest Turkish poet of renown is Asliyu-Pasha, who lived during the reign of Osman and Urfkan. The reign of Bayzid II. was distinguished by the following poets,—Nejdi, who was considered the first lyric poet of the Turks; Ezkul, who composed upon the subject of the Turkish; Memli, whose *Ode on the Spring*, translated by Sir W. Jones and by baron Hammer, is known as one of the finest specimens of poetry; Afitabi, Muniri, Prince Korkud,
and the female poet Mihr, a native of Amasia. Bakî was the
great poet of Turko-Persia, and the high-king of Rum-i, and died in A.H. 1008 (A.D. 1600); his 'Dîwan', or 'Collection of Poems,' has been translated by Von Hammer under the title 'Bakî's des grössten Turkischen Lyriker Diwan,' Vienna, 1825. Nabi Efendi, Seyed Refat, and his son, the celebrated law-giver, Râghib-Parsha, grand-vizir under Osman III., was equally renowned as a historian and a poet, and his countrymen used to call him 'the Sultan of the poets of Rum.' The number of historians is very great and several of them are highly esteemed for their impartiality, judgment, and the concise beauty of their style. Such are 'Ali, the contempor-
ary of Bakî, whose work, 'Kunhol-Akhbîr' (Mines of History) (a.d. 1633), has been translated into English, and an Italian translation by Rinaldo Carli was published at Venice as early as a.d. 1697. 'Ali Khâlitsh's Geographical of Rum-i and Bosnia has been translated into German by Baron Hammer. From the time of Bayazid II., Turkish history has been written in imitated historians, a list of whom is contained in Hammer's 'Geschichte des Osmanischen Reiches,' vol. viii., p. 691-92. The best of these histories are—Edris, or 'Urîs (died in a.h. 590); and Mustafa Jâhâneba (died in a.h. 940) (a.d. 1533); 'Send-ed-din, who became Mufti (died in a.h. 1077) (a.d. 1669); 'Abdi-Pasha Nîjâni (died in a.h. 1102) (a.d. 1691); Na'ma (died in a.h. 1124) (a.d. 1715), whose history contains period from a.h. 1000 till 1070 (a.d. 1600-70); Rashid the Historian (a.d. 1314) (a.d. 1752); 'Asim, the continuator of Rashid, till a.h. 1141 (a.d. 1728); Subhi continued it till a.h. 1156 (a.d. 1743); 'Izz till a.h. 1163 (a.d. 1753); and Wassif till a.h. 1189 (a.d. 1774). The annals of Na'ma were published at Constantinople in a.h. 1147 (a.d. 1734); those of Rashid in a.h. 1153 (a.d. 1740); those of Subhi in a.h. 1198 (a.d. 1784); those of 'Izz in the same year; and those of Wassif in 1215 (a.d. 1800). The Annals of Na'ma were first translated into French by M. Caussin de Perceval.

Among the numerous Turkish biographers, Latifi de-
serves particular mention. He wrote the lives of about two hundred persons, and of the most illustrious persons who have been translated into German by Clabert (Zürich, 1804, 8vo.). A list of the works published in Turkish, at Constantinople, is contained in Hammer, cited above, vol. viii., p. 583-593; and a continuation of it, which goes down to the year a.h. 1830, in vol. viii., p. 518-523. The 'Wiener Jahrbücher' contain a list of the Turkish works which were published from a.h. 1830 to the present time.

Turkish literature has been enriched by numerous works on morals, divinity, and philosophy. Their philosophy, which originated from the famous school at Bokhara, has a mystical character, and resembles in many points the speculative doctrines of Schelling, especially with regard to the mind as the seat of knowledge and the development of the soul, and the intellectual re-creation of the world, a doctrine which has likewise been professed by Hegel.

(Toderini, Letteratura Turca; Hammer, Encyclopädische Uebersicht der Wissenschaften des Orients; Hammer, Geschichte der Osmanischen Dichtkunst, 4 vols. 8vo.; the Turkoni Türkischen Grammas of Jacobs, of Jatbort, of Holt, and of C. in the Dictionary of Kieffer and of Bianchi, as well as the great Arabic, Persian, and Turkish Dictionary of Meminski.)

TURKEY, COMMERCE OF. The trade between Eng-
land and Turkey was for a long period carried on by a chartered company, the 'London Company of the East India Company,' endowed with exclusive privileges. The members consisted chiefly of eminent London merchants, and retail dealers were ex-
cluded. Their charter stated that they had, at their own
great costs and charges, found out and opened a trade in the heretofore in the most remote and any man now
known to be commenced and frequently carried on.' The fine for admission into the Turkey Com-
pany was at first 25l. for persons under twenty-five years of age, and 50l. for those above that age. No
manufactures could be exported to Turkey from England, but those belonging to the woody of Adam Smith, it may be said that the company was 'a strict and oppressive monopoly.' In 1753 the chief abuses were either mitigated or abolished by 26 Geo. II., c. 18. The regulations respecting age and residence were done away with, the fines for concession reduced, and goods allowed to be imported or exported at any of the ports.

The growth of the trade with Turkey occasioned the estab-
lishment of an English ambassador there, before any political interest existed between the two countries.
The Turkey Company contributed to maintain an ambassador, and two or three consuls, for which they were authorised to levy certain charges on the trade. ('Wealth of Nations,' book v., c. 1.) It was not until 1817 that the company
finally surrendered its privileges.

The total declared value of British and Irish produce and manufactures exported to Turkey for the ten years ending in 1826, and the value of cotton-goods and cotton-yarn exported separately, is absolutely given, for the purpose of allowing the very large pro-
portion which they bear to the total exports:

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Exports</th>
<th>Cotton Manufactures</th>
<th>Cotton Yarn</th>
</tr>
</thead>
<tbody>
<tr>
<td>1831</td>
<td>888,864</td>
<td>588,808</td>
<td></td>
</tr>
<tr>
<td>1832</td>
<td>913,319</td>
<td>633,440</td>
<td></td>
</tr>
<tr>
<td>1833</td>
<td>1,019,064</td>
<td>752,685</td>
<td></td>
</tr>
<tr>
<td>1834</td>
<td>1,341,100</td>
<td>1,000,000</td>
<td></td>
</tr>
<tr>
<td>1835</td>
<td>1,531,069</td>
<td>1,531,069</td>
<td></td>
</tr>
<tr>
<td>1836</td>
<td>1,744,421</td>
<td>1,415,839</td>
<td></td>
</tr>
<tr>
<td>1837</td>
<td>1,393,013</td>
<td>772,065</td>
<td></td>
</tr>
<tr>
<td>1838</td>
<td>1,268,591</td>
<td>850,000</td>
<td>150,000</td>
</tr>
<tr>
<td>1839</td>
<td>1,178,712</td>
<td>838,106</td>
<td></td>
</tr>
<tr>
<td>1840</td>
<td>1,185,589</td>
<td>743,114</td>
<td></td>
</tr>
<tr>
<td>1841</td>
<td>1,223,261</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It will be seen that in 1838 the exports of cotton manu-
factures and cotton-yarn amounted to 1,424,343., or per cent of the total exports, leaving only 342,707. as the value of all other commodities exported. In the same year only four other countries, Brazil, the United States, Russia, and the East Indies, and only Italy, exported a larger quantity of cotton goods. The value of the principal articles exported in 1840 was as follows:—Refined sugar, 65,000.; iron and steel, wrought and unwrought, 36,000.; woolens, 25,000.; machinery and milled, 9000.; cotton goods, 9000.; hardware and cutlery, 8400.; earthenware, 8100.; tin, unwrought, 7800.; tin-ware and tin-plates, 6300.; haberdashery, 4500.; and linens, 2900. The above year presents a fair average of the general course of trade. These official returns, however, do not show the real con-
sumption of English goods in Turkey; but simply the value of goods shipped to the different parts of Turkey Proper, excluding Syria and Palestine, and from which the exports of Brit-
ish goods, chiefly cottons, amounted to about 250,000. yearly.

Mr. Cobden, M.P. for Stockport, and an extensive manu-
facturer, visited Turkey in 1837, for the purpose of ascer-
taining, amongst other things, the statistics of the trade with England, and ascertained that two-thirds of the cotton goods
went forward to Persia, and only one-third remains for con-
sumption in Turkey. He estimated the value of British products annually imported into Constantinople for home consumption at 450,000., British goods exported, at 350,000., from Smyrna, at 60,000.:. imports at Salomiki, 40,000.:. im-
ports at Smyr., 80,000.:. and at other places, 50,000. The total is 650,000., and this is the value of British products actually consumed in the country of its destination, Persia. The trade was formerly carried on through other channels, by Aleppo, previous to 1790; and afterwards by Bombay for the southern parts, and by the German and Russian fairs for the northern parts. The routes direct and the coast routes are by Constantinople and Trebizond, and nine-tenths of the English goods for Persia are now sent through these two places. ('Letter of R. Cobden, Esq., in 'Taits Magazine,'
Feb. 1841.) Besides British products, coffee, indigo, spices, and other foreign and colonial commodities, are shipped from England to Turkey. The English trade with Turkey and the Levant employs about 21,000 tons inwards, and 38,000 tons outwards. The foreign trade in Turkey is in the hands of English, French, Italian, and Greek hucksters.

The principal articles which Turkey exports to England are raisins, figs, valonia, raw silk, opium, madder-root, sheep’s wool, lamb-skins, cotton-wool, and occasionally wheat. The quantities imported in 1840, and the largest and smallest quantities of the under-mentioned products, imported in any year from 1831 to 1839 inclusive, were as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1840</td>
<td>Balsam wood</td>
<td>5,433</td>
</tr>
<tr>
<td>1841</td>
<td>Bitumen</td>
<td>1,763</td>
</tr>
<tr>
<td>1842</td>
<td>Opium</td>
<td>50,746</td>
</tr>
<tr>
<td>1843</td>
<td>Silk</td>
<td>725,189</td>
</tr>
<tr>
<td>1844</td>
<td>Sheep’s wool</td>
<td>655,064</td>
</tr>
<tr>
<td>1845</td>
<td>Cotton-wool</td>
<td>403,578</td>
</tr>
<tr>
<td>1846</td>
<td>Valonia</td>
<td>143,095</td>
</tr>
</tbody>
</table>

Carpets, leather, and rhubarb are not mentioned in the official tables. Our own looms supply us with carpets; the so-called Turkish leather is made in England; and Turkey does not furnish us with rhubarb. (Rhumars.)

The quantity of tobacco imported from Turkey is small, averaging 225,000 lbs. in 1835-6; and in two following years, it was imported; and in 1840 only 2000 lbs. It is sold under the name of Syrian tobacco, but the imports direct from Syria are much smaller. The late Sultan established monopolies of valonia, figs, grain, oil-cakes, and other articles usually grown with the cotton crops were disposed of at Constantinople to the highest bidder, who compelled the cultivator to sell them at almost any price he pleased to offer. This necessarily discouraged commerce. Great hopes are entertained that the treaty between Great Britain and Turkey, signed August, 1838, which came into operation March 1st, 1839, will industriously and give a powerful impulse to commerce. This treaty engages the Porte to abolish all monopolies of agricultural produce or of any other articles whatsoever, as well as permits from the local governors either for the purchase of any article or its removal from one place to another when purchased. The policy of the Porte in respect to importation had always been liberal, and the above treaty gives the same facilities to the internal and export trade. English merchants trading within the boundaries sometimes are allowed to purchase or sell all kinds of merchandise. Other powers are entitled to establish their trade with Turkey on the same basis as that laid down in the British treaty. The duties on all commodities imported or exported, and they are to be subject to a senatorial revision on the demand of either party.

TURKEY BERRIES. [Rhumars.]

TURKY BUZZARD, Vultur aura, Linn.; genus Cathartes, III.

Under the name of Vultur aura, two species at least have been confounded, one the V. aura, and the other the Urdbo, Vultur atratus; the former is figured by Wilson, pl. 79, f. 1, and the same is in the same plate, f. 2. Mr. Swainson thus defines the genus Cathartes:

Nostrils long, longitudinal. Wings with the third quill equal to the fourth, and longest. Habits, with one exception, of the wild. Typical species.

The following subgenera are arranged by Mr. Swainson under this genus:

Sarcophaeus [Cassiodr.;] and Cathartes.

The subgenus Cathartes is thus characterised:

Head and part of the neck naked, but without caruncles. Bill and general construction weaker than in Sarcophaeus: species C. auro, C. californianus, and C. atratus. Mr. Swainson describes his Vultur aura as a ‘grey-brown vulture, with the quilv white,’ and he gives the following synonyms:—Teoploëta a. aurana, Her-land, Mex.; Urdbo of the Brazilians, Maggr., Willoughby, Ray; Buteo specie gallo-parono, Catesb.; Vultur gal- lenis, Pallas; Vultur cloror, Swayne; Vultur gal- lenis, Briss.; Vultur pullus, capite impleit, cute crusit rugosae aperturas nasales laxatus, Brown. The habitat is stated to be the warmer parts of America. Then follows an account of the habits from Jacquin, and the following

408 Description.—Body black, shining with purple as green; the tides crocoo-caruleus, the fact使用的 eo-

TUR Field Press. The history of the Buzzard is long and varied.

Here the species are confined. We will now trace the history of the Buzzard. The passage in Willoughby referred to by Linnaeus is as follows:—

'The Buzzard is sometimes called Urdbo; by the Dutch, Eurn Menschenchte, Margrav.; by the Mexicans, Toxophaeus Ximenes; by Nieremberg and others, Aura.'

It is a rapacious bird: of the tiges of a kite, according to Linnaeus, and the largest eagle or eagle according to Ximenes: having whistling feet like a hawk, a long tail, and wings longer than it. The feathers of the whole body are black, with a little tawny-colour here and there mingled. It hath a small head, almost of the shape of the tail, and is covered with a somber brown skin. In the top of the head the skin is, as it were, divided longways, and on the left side of the head, beneath the eye, is a colour, above the eye of a silver, also at the top; elsewhere of a reddish-brown. In the right side of the head about the eye, above and beneath, it is of a saffron-colour, as also in the top: elsewhere of a delayed yellow or whistit. It hath a pretty long bill, hooked at the end, sharp, and covered over from the head half-way with a skin from saffron-colour tending to blue. In the middle of the bill, above, is one hole of the nostrils, large and situate transversely. The end of the bill, that bare and wants the skin, is white. It hath elegant eyes, almost of the same colour as a ruby, the eyelids of a saffron colour. The tongue carinated and indented round with sharp teeth. Its flesh stinks like carrion. For they feed upon dead carcasses; and in the Captains of the ships, none is so content as a Buzzard, for any one kills a beast, they come flying presently in great numbers. It is an ill-looked bird, always lean, and never satisfied; Ximenes makes it to be a kind of raven, but the ear or skin covering the basis of the bill is glided to be long to the rapiest kind; the bare head, and tip of the bill only hooked, determine it to be of the family of vultures. It feeds (saith Ximenes) upon dead flesh and man’s dung. They are so voracious that they will eat at night on trees and rocks, in the monach they have laid up in the streets, sit watching and watching the streets on high places, and when they spy any filth, garbage, or dead thing, they catch it up and devour it. Where they build or hatch their young is hitherto unknown, although they be most frequent in almost every corner of New Spain. Yet Acosta saith that their young ones are white, and that growing up they change and come to be as black as ravens. They fly always very high, and in a multitude of numbers. They are seen constantly in flocks, and sit upon trees, and feed joyfully in company upon dead carcasses without any strife or quarrelling; and when the rest see any one not able to move or help herself, they help her as much as they can, and bring her to the earth; for being wont to fly at no time. If any one pursues them, they empty themselves presently, that they may be more light to fly away; with like haste eating up what they have swallowed. The sabes of their feathers burned take away hairs so they come not again; which faculty is also attributed to the dung of pismires and the blood of bats. Their skin half-burnt heals wounds if it be applied, and the flesh withal eaten; which is also won to help those that are sick to the French pox. The heart dried in the sun smells like musk. The dung dried and taken in any convenient vehicle to the weight of a drachm is profitable to melancholy persons. The barbarous persons say that wherever they bring this dung, they can turn stones into pebble-stones, which promote transpiration. But the most probable opinion is, that they exclude your young under-ground, and take them out when they feel them, and again cover them in the earth. (1678.)abile, as we see, had been busy here.
This is from the end of the bill to that of the tail, two feet long, and twice as much from the end of one wing to that of the other extended. The head and an inch in the neck are bare and without feathers; the bill is strongly hooked, covered with a thin membrane, like that of turkeys, with which the most part of the bill is covered likewise; this skin on the upper part of the neck is crumpled or wrinkled. It is black, long, and crooked at the point, where is whitish and sharp; the tail broad and nine inches long; the toes four, three before and one behind; that in the middle before is more than an inch long, covered with ash-coloured scales, and armed with brown claws; its all over of a dark brown colour, except the under side of the wings and tail, which is of a light brown or grey. It flies exactly like a kite, and preys on nothing living; but when dead it devours everything; this bird is very serviceable, as they are to be found everywhere. At the first landing of the English on Jamaica, by the bareness and colour of the skin on the head, they took this bird to be a turkey, and killed several of them in several places in such, but soon found themselves deceived with their sinking and lean bodies, which they almost always have. The figure of Hernandez does not agree with this, neither does his description agree with his figure. Sir Hans Sloane then quitted the same idea, and the same bird is found resident in the bird above noticed, and Ximenus, who states that it maintains itself principally upon snakes, 'rattones,' and lizards, which it takes, and that it resists the force of the winds wonderfully, keeping itself against them without motion.

Catesby (1771), who gives the same synonyms, figures the 'Buteo specie gallopavo, Turkey-buzzard,' and thus describes it:

'This bird weighs four pounds and a half. The head and part of the neck red, bald, and fleshy like that of a turkey, beset thinly with black hairs; the bill is two inches and a half long, half-covered with flesh, the end white, and hooded by a large transverse semi-circular scale on the sides of the upper mandible; the nostrils are remarkably large and open, situated at an unusual distance from the eyes; the feathers of the whole body have a mixture of brown, purple, and green; the legs are short, of a fleshly colour; their toes are long, shaped like those of duellins-fowls; their claws black, and not so hooked as those of hawks.

'Their food is carrion; in search after which they are always soaring in the air. They continue a long time on the wing, and with an easy swimming motion mount and sail, without any visible motion of their wings. A dead carcasse will attract together great numbers of them; and it is impossible to guess the size of the flock of buzzards sometimes presides at the banquet, and makes them keep their distance while he satisfies himself.

'These birds have a wonderful sagacity in smelling; no scented place, there being no such place, in the fields from all quarters of the air, wheeling about, and gradually descending and drawing nigh their prey, till at length they fall upon it. They are generally thought not to prey on anything living, though I have known them kill lambs, and snakes are their usual food. Their custom is to roost many of them together on tall dead pine or cypress trees, and in the morning continue several hours on their roost, with their wings spread open, that the air, as I believe, may give the greater influence to purify the air on these occasions. They are little apprehensive of danger, and will suffer a near approach, especially when eating. (Carolina.)

Browne (Jamaica, 1789), in the index to the work, refers Vultur aura to the 'Carion Crow' of Sloane, the 'Turkey-buzzard' of Catesby, with the following description:

'This bird is rather smaller than a turkey-poult, which it resembles very much both in the form and appearance of the head; the nose are very large, elongated, and lined with a loose red skin that covers all the upper parts of the beak. We know no creature that has the sense of smelling so exquisite as this: it generally flies along the roads, but very little ascending, on one side and the other as it moves against the wind; and it soon discovers by the subtle excitation where any carrion lies. It is of service to the country in general by preventing the smell of carrion from spreading in the woods, so that such creatures as die among the bushes, and the slops that are generally thrown carelessly into the streets, &c., and the legislative body of the island were so sensible of this, that they have carefully provided for its safety, as a bird of prey, by the special preservation of the islands. This bird is of a very alkaline nature, and stink much in a few minutes after they are killed. They are no great breeders.'

The bird described by Sloane, Catesby, and Browne is still to be seen in Jamaica enjoying the immunity which its disgusting but serviceable habits have procured it, which has made it so familiar; and this bird we believe to be the true Vultur aura. Both Sloane and Browne speak of its powerful sense of smelling, and we have printed in Italics a few words from the description of the latter, which would indicate that smell has at least as much to do with the discovery of the prey as sight, notwithstanding some strong opinions to the contrary. (Birds, vol. iv., p. 423.) With respect to the importance of this discovery to the scientific information of the olfactory nerves in this species, and this information is afforded by Professor Owen, who, in 1837, laid before the Zoological Society of London the following dissection of two heads of 'John Crow,' which he supposes to be the Vultur aura, or Turkey Buzzard. Professor Owen dissected the olfactory nerves in these heads, and also in a Turkey, which seemed to him to be a good subject for comparison, being in size and in the relative magnitude of the parts, which might be supposed to be as low as in the Vulture, on the supposition that this bird is as independent of assistance from smell in finding its food as the experiments of Avicenn appear to prove. (Avicenn, lib. ii. cap. xxv.).

Professor Owen, a striking difference between the Turkey-Vulture and the Turkey in this part of their organization. The olfactory nerves in the Vulture arise by two oval ganglions on the anterior aspect of the hemispheres from which they are continued in a series of transverse canals of unequal vertical diameter, and are distributed over well-developed superior and middle spongy bones, the latter being twice the dimensions of the former. The nose is also supplied by a part of the superior spongy bone of the fifth pair, which ascends from the orbit, passes into the nose, crossing obliquely over the outer side of the olfactory nerve, extending between the superior spongy bone and the membrane covering the middle spongy bone, then descending, and, after supplying the inferior and anterior spongy bone, escaping from the nasal cavity to supply the parts covering the upper mandible. This olfactory branch of the fifth pair is about one-fourth the size of the true olfactory nerve.

In the Turkey the olfactory branch of the fifth nerve is about the same size as in the Vulture, and is superior in size to the true olfactory nerve, which is only about one-sixth the size of the fifth pair. In the Turkey the nerve does not form a ganglion at its commencement, but is continued as a small round chord from the anterior apex of each hemisphere, and is ramified on a small middle spongy bone, diverging from the dorsal region of the turbinate, and ascending over a superior turbinate bone, as in the Vulture. Indeed the difference in the development of the nasal cavity is well marked in the different forms of the head in these two species. In the Vulture there is a space between the upper parts of the orbits, in which the olfactory ganglions and nerves are situated; and the nasal cavity, anterior to these, is of a much greater breadth and also longer, as well as exhibiting internally a greater extent of pituitary surface. In this bird the olfactory nerves are compressed within a narrow interorbital space, which would not admit of the lodgment of ganglions; the olfactory nerves, after passing through this space, then diverge to the nasal cavity.

In the Goose the olfactory nerves are developed to the same size as in the Vulture, and expand upon superior spongy bones of similar form, but placed wider apart, and which supply the middle spongy bones, which are longer, but not so broad as in the Turkey. The olfactory branch of the 5th pair is double the size of that in the Vulture or Turkey; it gives, however, not a greater proportion of filament to the nose than in those birds, but is merely expanded upon the olfactory nerves, and is not so well calcified.

Professor Owen concludes by observing that the above notes show that the Vulture has a well-developed organ of smell, but whether it is so much more so, or in what degree it assists, anatomy is not so well calu-
The Turkey-buzzard is a solitary bird, or, at most, goes in pairs. It may at once be recognised from a long distance, by its lofty, soaring, and most elegant flight. It is well known to be a true carrion-feeder. On the west coast of Patagonia, among the thickly-wooded islets and broken land, it lives exclusively on what the sea throws up, and on the carcasses of dead seals. Wherever these animals are congregated on the rocks, there the vultures may be seen. The Gallinazo (Cathartes atratus) has a different range from the last species, as it never occurs to the southward of lat. 41°. There appears to have existed a tradition that these birds, at the time of the conquest, were not to be found at Monte Video, but that they subsequently followed the inhabitants from the more northern districts. At the present day they are numerous in the valley of the Colorado, which is three hundred miles due south of Monte Video. It seems probable that this additional migration has happened since the time of Azara. The Gallinazo generally prefers a humid climate, or rather the neighbourhood of fresh water: hence it is extremely abundant in Brazil and La Plata, while it is never found on the desert and arid plains of Northern Patagonia, excepting near some streams. These birds frequent the whole Pampas to the foot of the Cordillera, but I never saw or heard of one in Chile: in Peru they are preserved as scavengers. These vultures certainly may be called gregarious, for they seem to have pleasure in society, and are not solely brought together by the attraction of a common prey. On a fine day a flock may often be observed at a great height, each bird wheeling round and round without closing its wings, in the most graceful evolutions. This is clearly done for sport-sake, or perhaps is connected with their matrimonial alliances.

Midification, &c.—Nuttall remarks that the Turkey-buzzard has not been known to breed north of New Jersey in any of the Atlantic States; and he says that they seek out the swampy solitudes, and, without forming any nest, deposit from two to four eggs in the stump of a hollow tree or log, on the mere fragments of rotten wood with which it is ordinarily strewn. Occasionally, in the Southern States, they have, he tells us, been known to make choice of the ruined chimney of a deserted house for this purpose. The eggs, which are described as being larger than those of a turkey, are yellowish-white, blotched irregularly with dark brown or blackish spots, at the larger end chiefly. The male often sits at the female's sitting; and, if not materially disturbed, they will continue to occupy the same place for several years in succession. The young, which are covered with a whitish down, will, like their parents, eject the filthy contents of their stomachs over those who molest them (Archbold, 'Avian ornithology of the United States and of Canada').

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TURKISTAN (a name formed upon the same principle as Afghanistan, Beluchistan, and others) means the 'country of the Turk,' and is used to designate a region peopled by the tribes of that race, or in which it is at least the domi-
nant race. The name has been applied to different times or different regions: sometimes it has been de
cnated a narrower, sometimes a more extensive range of country. At present its recognised limits are nearly as follows:—
Lake Sir-i-kol, the principal source of the Amu-daria (Oxus), has been ascertained, by Lieut. Wood, to be situated in 37° 27' N. lat. and 73° 40' E. long. Due south of this lake the summit ridge of the mountains which divide the affluents of the Amu from those of the Indus appears to be situated nearly in 37° N. lat. The southern boundary of Turkestan is formed by a line passing through this point to the south of west along the summit range to the pass of Khwak (35° 37' 70° E.), thence to the pass of Akrolest, north of Bamiian, and thence to the north of west between Meimian and Hera, till it reaches the frontier of Persian Khorasan. This line is prolonged to the eastward along the summit ridge of the Murz-tag and Kara-korum moun-
tains to the eastern termination of the latter on the high plain of Chag-Thang, north of the summit of the Shams-
yak, or northern branch of the Indus; the direction of the frontier of Turkestan to the eastward of this point and the longitude of its eastern termination are uncertain.

The western frontier of Turkestan south-east of the Caspian is vague and unsetled: it stretches among the hills at the base of the Elbore Mountains, passing through Muzdaran, a station 38 miles from Meshid (36° 17' 30' N., 58° 35' E.) on the road to Sherihan (36° 31' N.), and thence wind
ing through the upland valley of the Apshur and the valley of the Gurgan to the Caspian about 20 miles
north-west of Astrabad (36° 51' N., 54° 25' E.). North-
ward of the mouth of the Gurgan, the eastern shore of the Caspian, and the course of the Ural River from Urga
(31° 11' 49' N., 51° 22' 7' E.) to its mouth below Gouric
(47° 6' 37' N., 51° 38' 50' W.), form a precise and well-de
defined boundary on the west. The northern frontier of Turkestan is defined by the Russian chain of posts extend-
ing from the mouth of the Irm to Krasnovodsk and the Iritish.

From Krasnovodsk the eastern frontier extends in a
direction along the Chinese provinces of Tartagatay and Guida-lii to the south-west angle of the latter [Sovcar], and thence eastwards along the summit ridge of the Tien-shan Mountains to the meridian of the lake called Sir-i-kol. The further extension of this frontier, till it meets the southern boundary-line, is, like the eastern extension of the latter, entirely unknown.

The attempt to picture the physical con-
formation of the region contained within these limits, it will be advisable to begin at the lake Sir-i-kol (visited by Lieut. Wood) on the high table-land of Pamir, near the southern frontier of Turkestan. The lake is of a crescent form, having an eastward extension to the extent of an aver-
age breadth of one mile. By the boating-point of water it appears to be 15,000 feet above the level of the sea. It is bordered by hills on three sides; those on the south rise to the estimated height of 3500 feet above the level of the lake. The Amu-daria in its western extremity first in a south-west direction till it reaches the parallel of 36° 50', a little east of the meridian of 71°; then to the north-west till it reaches the parallel of 37° 50', a degree farther west; and again south-west to Hazrat Imam, a little more to the north than Sir-i-kol, in longitude 69°. The northern boundary of the Amu is here, according to a statement in the Asiatic Journal (November, 1838), about 500 feet above the level of the sea, and here are the lowest fords on the river. As far as the meridian of 75° 40', the parallel of 35°, the Cau-
tain-range which extends south-west from Sir-i-kol do not sink lower than 13,000 feet above the level of the sea. Twenty-five miles west of the lake the bed of the Amu is 1200 feet below its level; 35 miles further west it is only 10,000 feet above the sea. The village of Kohat, on the banks of a southern affluent of the Amu, 60 or 70 miles west of this latter point, is 8100 feet above the sea. The crest of the pass east of Talishkan is 6900 feet above the sea.

These elevations indicate that the general level of the land south of the Amu above its lowest fords immedi-
ately attains a high level; it is in an elevate plain which appears to have been traversed and inundated by humerus waves which have swept its surface; many of its streams have cut their way down which flow the Kokecha and Kunduz rivers (and their affluents), the two principal tributaries of the Upper Oxus, which join it, the former about 30 miles east of Hazrat
Imam; the latter about as far west of that place. In the low ridges at the eastern terminus of Sir-i-kol, and along the north of the east to Yarkand has its rise; and Lieut. Wood was informed that from the sources of the Yarkand and Amu rivers the country sloped down on every side except to the south-east. The high ground north of the basin of the mouth of the Kokecha is at a greater distance than that on its south, and does not rise so high. At Kushi how-
ever, 2° farther north, Sir A. Burnes saw mountains covered with snow in an elevated position 150 miles above the sea, which would be nearly in the meridian of the mouth of the Kokecha. Their summits must have been about 18,000 feet above the sea; they continued in sight nearly at the same dis-
tance for about seven hours, and they ran in a connected chain like a trap formation—an expression which, of course, must be understood to imply only their form, not the ingredients of their rocks.

Lieut. Wood was informed that the Sir-i-kol (or Xinxait) had its rise on the north side of the ridge of hills extending westward to the north side of the Sir-i-kol, opposite Lasar, which is about 70 miles south-west of the lake. The Zer-aftshan, which flows by Samarcand and Bokhara, is said to have its sources not far distan from those of the Sir-i-kol. The Zer-aftshan (38° 52' N.) the high land seen by Burnes appears to stretch to the north-east, to beyond the meridian of Samarcand (about 67° E.). North of the Zer-aftshan the high land appears to continue as far west as the meridian of Bokhara (61° 59' E.); at least Meyendorf speaks of a great mountain which retains snow on its summit during the greater part of the year, and is visible from Bokhara, or lying north of that town. Above the meridian of 68° E., and the parallell of 14° N., the Sir-i-kol, which flows to that point in a direction a little north of west from its source, turns to the north. The high land comes nearly close up to the east bank of the river in this part of its course, but does not appear to continue further north, at least within the limits of Turkestan. The part of the lake called Iski-kol from the Balkash lake (about 42° N.). In our state of imperfect information, Yarkand (according to Halletier, 38° 10' N., 76° 18' E.) and Kashgar (39° 29' N., 75° 59' E.), which appear to be high land, are on the east, and are evidently on a much lower level than the country to the west of them, may be assumed as the eastern arm of the high table-land of Pamir. From Kashgar to Kokand (according to Sir A. Burnes, 66° 13' 50' N., 66° 15' 30' E.) the road lies up the Kashgar river to its source, and through the pass of the Terek to the valley of the Sir-deria. Mir-Izzet-Ullah was informed that a road conducted in winter from the Terek pass to Sir-i-kol (whether the lake is named by Lieut. Wood or by the 8th Rajputana) in the winter (the Yarkand road is uncertain) in two or three days, in summer the road was said to be impassable on account of torrents fed by the melted snow. Mir-Izzet-Ullah did...
not experience, even at the highest part of the Terek pass, any of the painful symptoms he had felt on passing the high range of Karkortak. He accounted for his relief to Wood, that the high table-land of Pamir slopes down to the north towards Kokand.

At the western base of this enormous table-land is the broad valley of the Oxus: at its eastern base is the plain which extends from the high table-land of the Tschan Shan on the north, as far as lake Nor; and north of it is the comparatively low country which slopes from the plains of Songaria westward to lake Aral and the Caspian. Along the natural division between Turkestan and Persia is described in the order in which they are here enumerated.

Under the designation Plain of the Oxus is embraced the level tract extending from the base of the mountains east of Kursch (68° E. long.) to the river Khovar (44° Lat. N.). This tract, which also includes the Aral (about 44° Lat. N.), is of the south of Bakh (about 364° Lat. N.). From the junction of the river of Kunduz with the Amu Deria, the latter river maintains a generally north-west direction till it loses itself in the sea or lake called Aral. The junction of the rivers is placed by Lieut. Wood about 37° N. lat. and 68° E. long.; the mouths of the Amu Deria are placed by Zimmermann, from numerous but not very specific routes, almost 40° north of the route of a straight line; and, as is well known, the junction of the Kunduz the Amu receives no affluent of any magnitude; the rivers of Kulum, Balk, Herat, and Meshes, Kurschi and Bokhara, are either absorbed by the dry desert or lose them in the intermission. The {34} near the junction of Aral at Jan-Kila, a short way above its junction with the Kolesha. The stream was here divided into three channels. The northern channel was 200 yards wide and had a velocity of 4 miles an hour; the centre one was about 60 yards wide, with a current of about 3 miles, and the water of the southern channel was almost stagnant.

A man on foot could not have forded the river here; and fewer than three horses abreast could with difficulty stem the current. At the forry between Balk and Kurcha, near Burns the Amu about 800 yards across, with an average depth of 20 feet, and a current of 34 miles an hour. At Charjuj, on the road from Bokhara to Meshed, he found the river 650 yards broad, and in some places 25 and 20 feet deep. Dr. Lord has stated that the elevation of Kunduz (nearly the same as that of Hazrat Imam) is 498 feet above the sea; and a barometrical levelling by Russian officers, in the winter of 1823, gives the height of lake Aral above the Caspian 117 feet, and consequently its height above the Black Sea, according to the trigonometical levelling of Fuss, Savich, and Sabler, 33 feet. From the banks of the Amu to the Elluzor on the south-west, and to the 41st degree of N. Lat. between the terminations of the Elluzor and the Caspian, on a level average of nearly 600 feet above the latter, occupying the whole breadth of the Oxus, is known as Khorassan. This vast plain, with the elevation of which, towards its southern extremity, is at Balkh 1718 feet above the level of the sea, and at Kholm 1437. At Bokhara its elevation is 2383 feet, and is formed of Mesheh, the soil produced by the water from the boiling-point of water (2052 feet), would lead to the inference that Shermuks and the ford on the Murgha, between the Amu and Meshed on the road from Bokhara, are at least as much elevated above the sea as the latter city.

The northern boundary of this plain is formed by a ridge of high broken ground north of Bokhara, which extends from the eastern mountains to the Amu above Khiwa; west of the Amu it is bounded to the north by the Aral and by the abrupt termination of the Oxus; a high table-land rising precipitously from the banks of the Aral and the Caspian, to an average level of nearly 600 feet above the latter, occupying the whole breadth of the Oxus, is known as Khorassan. The semi-circular course of the plain is formed by the fall of the water in the lower Attek, all point to the inference that the central plain maintains a considerable elevation from Shermuks to the base of the Oxus, that the plain of the Oxus extends from the basin of the Oxus to the Caspian extends a very little way to the eastward, and that there is no reason to believe that the Amu ever did or could send a branch to the Caspian since the surface of our globe assumes its present configuration.

In describing the superb series of ridges and huge tracts extending from the western shores of the Aral to the Caspian, and the Russian and Chinese frontiers, better known as the Steppes of the Kirghiz, we begin at the Russian frontier. From Orensk to Urgash (from 564° to 514° E. long., about 61° lat. N.), the Aral stretches out west, nearly east and west, and in that distance its bed sinks from an elevation of 502 feet to one of about 200 feet above the level of the sea. From Urgash to Gurtew, near the Caspian, is about 780 miles through the Songaria and Turkestan deserts. In this part of the course the river sinks to an elevation of 140 feet above the sea at Kalmukhov, and nearly 82 feet below it at Gurtew. The steppe on the south bank of the Oxus borders on the Caspian sea. The Amu sinks gradually to an average elevation of 500 to 800 feet Mount Airuk, 224 miles south-east of Orensk, the highest summit of the Mongorg hills, rises 800 to 1000 feet above the level of the steppe. From this culmination point the ground slopes, still in a south-east direction, gradually down to the level of the Aral, a distance of 300 miles. To the south-west the ground sinks gradually to the level of the Ust-urt, which appears to be a prolongation of the Oxus, broken by a few barrows. The steppes which flows south-west to the Caspian, the Uil, which flows west till it is lost in the sands east of the Lower Ural, the Khobda and Ilek, which flow to the north and west, and the more or less saline waters to the east of Urgash and Orensk, all join, and flow to the sea, at the point of junction of the Aral and the Caspian.

The eastern base of the Mongorj range is washed by the Irgiz, which, rising in an undulating plain south of the northern border of the Tofol and Ulenta, flows to the south and lose itself in a chain of lakes called Ak-sakal, about 60 miles north-east of the north-eastern corner of lake Aral. From the sources of the Irgiz and Tofol, about 60° E. long., to the junction of the Irtish and Murghab, which, coming from the north joins the Irgiz near its termination in Ak-sakal. The course of the upper rivulets of the Tungur appears to form the western termination of a belt of sandy country, extending parallel to the course of the Irgiz, between Ust-Bukh, Timsins and Omsk, from the high lands between the Nowsican and Tarbugatai, about 85° N. long., to the meridian of 6° E. long. From its outlying hills on the north, about 100 miles to the north of Urgash, the banks of the Irgiz, which in this high land must have a horizontal breadth of nearly 180 miles. Its central ridges reach an estimated elevation of at least 5000 to 6000 feet above the sea. To the north it extends the Iskum, which joins the Irgiz, the Irgiz (south-west of the Ishim), the Selenta, Ulenia, Chanderi, and other rivers (east of that river) which lose themselves in the steppes lakes before they reach the Irgiz. To the south this high land sends forth the Aimga, the Jurgutu, and some other rivers which till into the lake Balbakan on the Chinese frontier; and the Sari-su (its sources appear to be about 47° N. lat. and 72° E. long.) and the Kongur, its sources appear to be about 49° N. lat. and 65° E. long., which meet about 47° N. lat. and 67° E. long., and from their point of junction flow south-west till they are lost in small lakes about 40 and 50 miles from the Sir-Derz (about 45° N. lat. and 66° E. long.), which are about 47° N. lat. and 67° E. long., and from their point of junction flow south-west till they are lost in small lakes about 69° E. long. In this longitude their northern base is about 46 miles south of the Tshui, and their horizontal breadth about 54 miles. The Sir-Derz flows at their southern base at 69° N. lat., then these rivers lose their termination to the north till it reaches within a degree of lati-
tude of the lakes in which the Taghui terminates; hence
it bends away from the lake Aral in 61° 11' E. long.
Less than 5° to the east of the shores of the Aral; the most 413
northerly branch joins that lake not far from its north-east
angle, about 46° N. lat., and the most southerly near its
western part, at about 44° N. lat. At this last point the
Arals are sometimes united by a narrow strip of water
between the upper valley of the Sir-Deria and the
valley of Samarqand, and the hills which extend from
their western termination to the Amu, form the extreme
south of the region represented by the upper valley of
the Sir-Deria. The waters of the Arals and the river which
terminate in these plains has a general slope from the
level of the lake Balkash to the Aral. Humboldt estimates
the elevation of lake Balkash as not more than 800 feet above
the sea, but as this estimate was made at the time when very
exaggerated notions were entertained of the depression of
the Caspian Sea, perhaps 1000 feet will be nearer the truth.
The Aral, it has been seen, is probably about 90 feet above
the level of the Black Sea.

Very little is known of that extensive range of country
which lies east of the great elevation of Pamir, and has
been called by recent geographers Chinese Turkistan.
The only quantities of geographers to the north of the
junction of the range with Pamir to its junction with the
high desert plain of the Gobi—from the meridian of 71°
or 72° E. long. to that of 89° E., and the high land of Tibet
and Mongolia generally a kind of plateau, extending to
the eastern boundary. The accounts of travellers seem to
establish that both Kashig and Yarkand stand on a plain
much depressed below the level of the highlands to the
north, south, and west of them. Kashig, according to
Hallendayan, is in 39° 27' N. lat. and 73° 56' E. long.;
Yarkand in 38° 10' N. lat. and 76° 18' E. long. A river
flows past Kashig, formed by two streams, one of which
comes from the pass of Karkorun on the road to Lahul,
the other from the moist plains from the south of the
Kashgar. A river also flows past Yarkand, formed by the
junction of two streams, one of which comes from the
Terek pass, on the road to Kokand; the other from the lake
on the plain of Pamir, situated between the Terek pass and
Sir-Kol. Ush is situated among the hills at the base of the
Thian-shan, in 41° 3' N. lat. and 78° E. long.; Khotan, at
the base of the high land of Tibet, about 37° N. lat. and
80° 10' E. long. The rivers of Yarkand and Kashig unite
about 45° 30' E. long., opposite to Karkorun, and after
gathering a considerable quantity of water, the union
rivers from Ushii and Khotan. The united stream flows
eastward to the Lop-Nor (41° N. lat., 89° E. long.),
receiving on its way affluents on its north bank from Kucha
and the lake which it appears to be associated with, called
the Charjui (42° 10' N. lat., 67° 10' E. long.). Almost all
that is known of the structure of this region is inference
from the direction of its watercourses. The river formed
by the union of the rivers of Khotan, Yarkand, Kashig,
and Ush flows close to the hills at the base of Thian-shan.
East of Khotan the country is represented as a sand-waste,
and the same account is given of the country east of Lop-Nor.
It would appear from these statements that the river flows in
a generally deep valley between the mountain-range of
Thian-shan and an extension to the south-west of the
high desert plain of the Gobi. The accounts of the
geologists imply that the country between Lop-Nor and the
upper Hoang-ho attains to a considerable elevation.

A region of the earth's surface which extends from
52° to 80° E. long., and from near 36° to 55° N. lat.,
and which varies from an elevation of more than 18,000
feet above sea level on the south side, to about 800 feet
below it, must necessarily present a great variety of climate
and geological structure, and, in consequence of that
variety, an equal diversity of vegetable and animal life.
So small a region between 75° to 80° E. long., and 60° to
52° N. lat. with so little provision made accessible to scientific research, and the investigations of
the few scientific travellers who have visited it have been
distorted by so many impediments, that our information
on these points is meagre in the extreme.

The passes of the great mountain-range south of Tur-
kiar appear to have generally a silted structure. On the
upper Kokehs, Wood found unstratified black and white
limestone, in which is a deposit of lapis-lazuli. Lower
down the stream, and flows into the river Arals, there are
some places consisting solely of an iron-ore; and still far-
ther down thick masses of conglomerate rested on thin
horizontal strata of sandstone. On the Amu, to the south
of this place, where the river is called the Kizir, and
Mir Izzet Ullah that there are deposits of oriental jade north of
the Karakorum pass. The rocks on the Khulum river, and
generally behind Balh, are sandstone and limestone. The
hills which Burnes saw at a distance from Kushti in the
Kara-korum range, were dark and brown, and were
formed of sandstone, with small veins of very hard iron
rock. The western termination of the mountain-range
north of Bokhara, the prevailing rocks are hornblende,
siliceous schist, and greenstone. A bad kind of turquoise
is found in this range to the west. Mir Izzet Ullah, on his route from Kushti to Kokand, found
that coal was sufficiently abundant to be used by the
natives as fuel. The hills which separate the oasis of
Bokhara on the north from the sandy tract south of the
Sir-Deria are in the eastern part of the desert, and are
covered above as south of the Irshid and parallel to its
course, greenstone appears to be the prevailing rock; but
isolated hills of granite, generally red, are frequent. Immense
quantities of coal are found on the margin of the
highland to the south. Large pieces of mica and red, and precious stones called by some copper-
gemeralds, occur at the western termination of this high
land. The prevailing rock at Mount Airuk is greenstone;
occasionally with mica, and abundant pieces of iron
appear. Towards the upper Urals, red sandstone,
lying on the Ilek, and in some other places, under beds of
murla, predominates. The prevailing stone from Mount
Airuk to the north bank of the Sir-Deria and the termina-
tion of the Ust-Ural is a calcareous tuff. The immense
plain between the Pamir and the Elborz, that to the east of
lake Aral between the termination of Pamir and the high
land south of the Irshid, which lies south of the Russian
province of the Urals, is described by the geographers as
communicales with the plain east of the Aral by the
depression between the Urals and the high land south of the
Irshid, have all a surface alternating from clay to sand.
The Kirghiz steppes abound with salt lakes, and the
greatest part of them is covered with deposits of muriate or
sulphate of soda. A large subterranean deposit of salt occurs
in the valley of the Ilek. There are numerous salt lakes on the west
bank of the lower Urals, of which the Indus lake, nearly
approaching to the Caspian Sea, is the most important.

The thermometer (Fahr.) ranged at Jerm on the upper
Kokeha, in the month of January, 1838, from 48° to 10°.
The line of perpetual snow in the neighbourhood of Sir-
Nor, is about 10,000 feet above the sea, and at Mount
Airuk (7000 to 10,000 feet above the sea), the seed-time
is in April, the harvest in July. During winter and spring
a strong wind blows steadily down the valley from the
north-east, which is unfavourable to vegetation. On the
6th of April, 1838, not a leaf of the mulberry-trees was
open at Khulum; the plum-trees had blossomed at Kunduz
a month earlier. The harvest at Balkh is fifty days later
than at Bokhara, and it is a fortnight later at Balkh and
Bokhara. Burnes observed (17th to 27th June, 1831) that the
thermometer rose to 103° in the day and fell to 60° at night.
Meyendorf mentions that the fruit-trees begin to blossom at
Balh in April and May. The summer is extremely
heat, in the middle of July, there are often very heavy
storms in May and June. In March, from April, the summer
heat is overwhelming; that there are two or three weeks of heavy rains in October;
that in January the ice is sometimes three or four inches in
thickness, and the snow some six feet deep. The prevailing wind during the whole time he remained
in the valley of the Oxus was from the north. Between
Astabad and a point in the desert 200 miles to the north,
Conolly found the thermometer range (April 25 to May 19)
at 100°. Between Kuch and the Caspian was interrupted in summer by the great heat.
Snow lies on the Usht-Urt in the winter; the Aral is frozen so that the
Kirghiz can travel by the water to the town of Buchara
dora to the mouths of the Amu. The Amu too is sometimes
frozen as high up as Chajju (west of Bokhara), so
TUR

Along the Russian
more inclement than the latitude
and elevation of the country would lead one to expect.
The most violent storms come from the north-west.
Between Kunduz and Sir-i-kol, at an elevation of from
8000 to 10,000 feet above the sea, a kind of dwarf fir
occurs in the valleys. The same dwarf fir appears to have
been seen by Mir Izzet Ullah, between Kashgar and
Kokand. From 10,000 to 12,000 feet the red willow and
white poplar are met with. Fruit-bearing trees of the
plum genus are found at Langer Kish, 10,800 feet above
that caravans can cross on the ice.
frontier the

weather

TUR

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is

small species of boa on the road between

Orenburg and

Bokhara.

In Turkistan, the predominant race, as its name implies, n
the Turk. The Kirghiz, properly so called, inhabit the lar*
table-land of Pamir and its bordering mountain* and valleys.
They are nomad es, and have a bad reputation er*c
Tbey art t
in that region for their thieving propensities.
people of low stature, with Mongolian countenance
though speaking a Turkish dialect, which differ* htt't
from that of the Uzbeks of Kunduz. The tribes calM
Kirghiz by the Russians, who roam the steppe* from thi
the sea. Above 12,000 feet the red willow alone occurs, north declivity of Pamir and southern shore of the Aral to
but that hardy plant flourishes as high up as Sir-i-kol. the Russian frontier, and from the Caspian to the Chnw«r
Groves of tolerably-sized firs occur in the ravines of the frontier, are divided into the three great hordes. That
Khulm river, south of Kunduz ; but there are no timber- which ranges the country on the south-east acknovlecUra
trees on the Hindu Kush. The asafcetida plant and the furze the designation Kirghiz, and appears to resemble ru mo*
of Tartary are the characteristic plants of the mountains respects the highlanders of Pamir. The horde on ibt
south of Balkh. The grass on the pastures around the Siberian frontier and that which roams from the Ural man
Sir-i-kol, and on the high lands west of that lake and
to the Ust-urt affect the name of Kassak (Cossack). Th»
south of the Amu, is in general very luxuriant.
little
men of the Middle Horde have less of the Mongolian features
wheat is raised in Wakhan. Large quantities of wheat and than the Kirghiz, and those of the Little Hordci a* it is esilH.
other grains are reared round Hazret Imam and Kunduz
still less.
The Turkoman tribes range the deserts uomc
and apricots, plums, and other fruits in great abundance the Amu and Caspian, from the Ust-urt to the frootirn U
and of excellent quality at Kunduz, Kulm, and Balkh. Persia and Balkh these tribes appear, from their linesThe almond and pistachio nut are natives of the secondary ments as well as from their language, to be more free froo
ranges on the north face of the Hindu Kush. The great any mixture of Mongol blood than those previously menplain on both sides of the Amu is in most places a barren tioned. The Turkish clans possessed of political power in
waste, or thinly covered with straggling furze. Wherever Khiva, Bokhara, Kunduz, and Kokand are called Uzbek!
there is water, however, its clay soil is easily rendered fer- in their lineaments they bear a considerable resemblanotile by irrigation. In the oases of Khulm, Balkh, Serrukhs,
to the Kirghiz, differing from them mainly in those pec*Mcrve, Kurshi, Bokhara, and Khiva, and on the banks of liarities which distinguish a people long civilised froa
the Gurgan, most kinds of fruit, vegetables, and grain are one which has scarcely emerged from savage life. A
brought to perfection. The traces of antient culture in number of tribes of alien lineage and language live interthe delta of the Sir, and on the banks of the Turgai, Nura, mingled with the Turkish clans. The Afghans, Jews, Hindtn
and Ishim, show that they too must have been fertile when and other colonists, present no uncommon feature in Asiatic
inhabited by a settled and industrious race. The mouths society. But the Persian Tajiks, or agricultural settlers, a»£
of the rivers which fall into the Caspian and Aral, and the the Sartis, or mercantile classes of the same race, whs
borders of the salt lakes in the Kirghiz steppe, which preponderate in Bokhara and some other towns, are rereceive considerable rivers, are choked up with gigantic markable as vestiges of an earlier population which pov
reeds and other aquatic plants. The characteristic plant sessed the country previous to the arrival of the Turks. It
of these steppes is the saclisaul. It is found north of the the cities west of Pamir these Persian tribes are said so u
Mongojar range, but stunted and in small quantities. It preponderate in number, that their Turkish masters ha<»
abounds on the Ust-urt and in the delta of the Sir-devia. come to use their language. In the cities east of Pbjsu:
In the sands it is a shrub, in clayey soils it assumes the on the other hand, the Turkish population would appev
appearance of a tree. It is a dry desert plant, but in- to preponderate. The race which, under the name r<
valuable to the wanderers of the steppe on account of Sian-push-Kaffirs, has engaged so much of the attention v(
the slowness with which it consumes, and the length of travellers in Afghanistan, appear to occupy several of tht
time which it remains burning. On the upper Ishim there valleys north and south of the Upper Amu. Their lanis a considerable extent of forest land.
guage, from the scanty vocabularies that have been colThe most important animal on the highlands of Pamir lected, affords no corroboration to their claims of a Greens
is the yak, or kash-gow, a diminutive species of the ox. It is
origin ; and their blue eyes and their local position poral
to the inhabitants of Tibet and Pamir what the rein-deer is to the inference that they may be relics of the race called
to the Laplander. The gigantic argali, or mountain-sheep, Usiun (and sometimes ' the white race') by the early Cbinete
and the markhor, a large species of goat, are also abun- historians. The predominant religion among all thn*
dant in the high reckons. The only other quadrupeds met tribes is the Mohammedan ; but some -of the hill Kirghiz
by Lieutenant Wood at the sources of the Amu were are said still to adhere to Shamanism and Lieutenant
wolves, foxes, and hares. He saw only one bird there, ' a Wood, on his journey to the 8ir-i-kol, observed many
fine black eagle, which came sailing over the mountain, curious traces of lingering impressions from
the creed pf
flapping his wings as if they were too heavy for his body.' the Guebres.
Kagles are numerous among the inferior ranges; large
The political divisions of Turkistan are
1, the stepp*flocks of the hooded crow frequent the hills in summer, of the Kassaks and Kirghiz; 2, the plain or the Turcoman*
and come down to the plains about Kunduz in winter. The between the Amu and the Caspian 3, the territory subject
hjuse-sparrows arc numerous in Kunduz and Talikhan. to the khan of Khiva ; 4, the territory subject to the mir
I^arge flocks of partridges are found on the plains of the of Bokhara; 5, the territory subject to the khan of K<s
Amu and among the mountains at least as high as Jerm. khand ; 0, the territory subject to the mir or Kunduz : and
Deer frequent the jungle on the river about Hazrat Imam, 7, the territory west of Pamir, incorporated into the Clunex
and antelopes roam in large flocks over the plain of the empire.
Amu. The pheasant appears to be indigenous in these
1. Levchin estimates the population of the Kirjrhir aRd
regions.
In the northern parts of the Kirghiz steppe, the Kassaks at 400,000 tents or families
of these 75,000 brsaiirn, a kind of antelope, is the most remarkable animal
long to the Great Horde they encamp on the rivers Sara;
a species of small eayle, called berkut, which is trained for su and Tshui, on the middle course of the Sir-deria,
ai>4
the chase and much esteemed, frequents the north-west around the lakes on the west side of the
Chinese province «•?
region.
The steppe would seem to be the native country Songaria. The Middle Horde numbers 165.000 tents: it*
of the muridse, which are found there in almost every pos- families encamp on the streams and lakes
no*th of thf
sible variety.
The wild-bear inhabits the reedy margins sources of the Turgai and Sara-stt. The tents of the LiltV
rivers
of the lakes and
and a tiger, supposed to be the Horde amount to 100,000, which are scattered over
;
the
same as that of Bengal, frequents the delta of the Sir- delta of the Sir-deria and the country west of the
Tama,
deria.
The amphibia of the steppes are characterised by between the Russian frontier and the southern termination
dry, warty, and sometimes almost thorny skins, by large of the Ust-urt. The auls, or
groups of tents, among all these
heads and bellies. The Upper Turgai swarms with snakes, hordes, are held together merely by the ties
of a closer
many of them of a white colour. There is an astonish- relationship. Two classes are recognised by the
Kirfhu
ing quantity of water-snakes in the lower delta of the and Kassaks, the white and the black
Kost (or race"): the
Ural. The naturalist to Meyendorf s expedition found a former comprehends the nobles,
the latter the lower

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The nobles exercise a slight degree of personal influence in their respective euls; and this, and occasional unions of several, are the only traces of political organization among the hordes, except along the Chinese and Russian frontiers, where an uncertain deference is paid to the conquerors. The Turcomans are in most of the same state of political organization as the Kassaks. Their numbers have been variously estimated, some carrying them as high as 366,000 families or tents; but this estimate includes a number of tribes other than those called Kassaks by their Khans. The Khan of Khiva extends as far south as a station on the Murgháb, twelve miles above Merv; and the Turcomans of Sherrukhs, on the road to Meshed, are in some measure dependent on the whole Khans. This Khan is to be acknowledged as far as the Caspian. To the north and east his direct power does not appear to pass the delta of the Amu; but his roving predatory bands are met with at no great distance from the Russian station at Mangishásh, in the country of the Little Horde, and on the road east of the Amu which leads from Bokhara to the Russian frontier. The Uzbeks are the dominant tribe at Khiva: Mohammed Rahim, their present ruler, appears to hold the sceptre legally and in fact, but it is highly his personal energy. He encourages agriculture within his possessions and trade to them; the predatory excursions which he encourages are either directed against those who have nothing to do with him, or, as they are often the case in his last quarter with Russian government, the merchants seeking a new route which would lead them past Khiva. The population of Khiva proper is estimated at 300,000 inhabitants, but the tribes reduced to a more or less permanent residence would be much more numerous. 4. The territories of the mir of Bokhara reach to the north to the hilly range which extends from the mountains south of Kokand to the Amu; on the east they appear to terminate between the Kuraránd and Urtupá, on the frontier station of Kokand; to the south and west they include the oases of Kursí, Bálk, and the town of Charúj, on the west bank of the Amu. The government of Bokhara is at present the oldest recognised sovereignty in Turkestan. It has perfect degree of submission must be much more extensive; and the Kassaks being a predatory race, the mir of Bokhara has from the beginning been mainly dependent on its transit trade. The traces of former cultivation which abound in so many places, are proofs of the extent to which this transit trade was once carried. The present lawless and unsettled state of the greater part of Turkistan is the consequence of the decline of this trade, not its cause. These now deserted sites continued to flourish in the times of Tamerlane and Tshinglis-khan (Gengis Khan); they have become waste and desolate since the breaking up of the route by sea from Europe to India and China. There is however still a considerable trade carried on in these regions, which is increasing with the extension and connection of the railway from Bokhara to the Caspian. In Bokhara, the seat of the oldest and best consolidated government in Turkistan, is the principal centre of this commerce. This to part owing to its position, in part to the favourable treatment of merchants; the duties extended in Bokhara are raised at the rate of 15 per cent.; in Kabul they are fifty, and in all surrounding states higher. Hence the shawls of Kashmir sent to Persia and Turkey pass to Meshed by the route of Bokhara, to avoid the extravagant duties levied on them in the more direct way by Kunduz and Herat. The Lolani traders pass annually from Bokhara to the Indus by the way of Kabul in the month of November, and return by the same route in the month of May. The brokers of Shkarpur, the great money-agents of Central and Western Asia, have branches at Bokhara and at Astrakhan. Many natives of Bokhara have become naturalized subjects of Russia, in order to transact the business of their towns in that country with more advantage. According to a recent survey, nine-tenths of the sales and purchases effected by the merchants of Bokhara in Russia are transacted at the fair of Nishné-Navgord, the rest at the trading towns along the frontier. The caravans from Bokhara to Russia proceed by way of Khiva to the Lower Oxus. An attempt to introduce the practice of travelling direct by the east of the Lake Aral to Orenburg occasioned such hostile demonstrations from the Khan of Khiva as made the plan impracticable. The trade between Bokhara and Russia is more extensive and valuable than that from the south of Hindu-Kush. Next in importance to the trade with Russia is that carried on with Kazgir. A caravan is annually dispatched by way of Kazgir, where the interchange of commodities with the Chinese
is effected. A branch of this trade goes up the valley of the Upper Oxus to Kashgar. A portion of the goods received from the Indus, from China, and from Russia is forwarded thence to Bukhara, and thus by the way of Khiva is sent to Bokhara. Not the least important part of the commerce which finds its way through Khiva is that of Bokhara, which, as mentioned above, is compelled to take that route. Khiva has however a commerce of its own with Caspian and Astrakhan, and by way of Merv with Meshed. Kokand is an entrepôt of the trade between Bokhara and Kashgar, but it is also visited by caravans from Petrovsk, Semipalatinsk, and Ust-Kamenogorsk on the Russian side. To Kunduz has the direct line of commerce from Bokhara to the Indus, and the difficulty of the road across the high land of Pamir makes merchants prefer the northern pass of Terek in winter and in East and West Turkistan, Kashgar, and Yarkand, lying at the intersection of the great lines of traffic which connect Russia with Tibet and Kashmir, and China with West Turkistan and Tibet, and being moreover situated in productive countries, are the centres of an active and lucrative trade. Even the Kirghiz and Kassaks of the northern steppes of Turkistan have a commerce not altogether to be despised. Levchen says, with singular modesty for a Russian, 'They are in their commercial dealings as much for that country as for France and England.' It is entirely a barter trade. The Kirghiz and Kassaks exchange camels, oxen, horses, sheep, goats, wool, hides, horns, and fur, for grain, salt, cotton, and wine. Their principal dealings are with the Russians and Chinese, with the former at Uralsk, Orenburg, Troitzk, Omsk, Semipalatinsk, Ust-Kamenogorsk, and some intermediate frontier forts, from the middle of June to the beginning of November; with the latter at Amur, Telemba, and Talbagat. They also visit Khiva, Bukhara, Kolkand, and Tashkend to exchange their raw material for grain and cloth; and passing caravans keep up a petty traffic with the tribes there. Their incursions into the desert, their occasional forays, and the commercial relations of the tribesmen make the desert itself the scene of their speculations. The statements of the amount and value of the goods exchanged in Turkistan in the course of a year are vague and conjectural, and the extent and the lines of traffic can alone be indicated. But it is evidently a busy and increasing trade; will increase with the prosperity and stability of the institutions of Russia, China, British India, and (what is to be hoped for) Persia; and will be the cause, not the consequence, of introducing peace and the ascendancy of law into Turkistan.

The history of Turkistan may be briefly told: it is not unimportant or uninteresting, but materials are wanting. The first distinct approach to a steady light thrown upon it is in Arrian's history of Alexander's expedition. The conqueror crossed Western Turkistan from the western terminus of the Oxus with his Median hordes, by the sites of Balkh, Kundi, and Samarcand, to the south-west curve of the Sir-darja, and appears to have found the region at least as populous and wealthy as at present, and occupied by a number of petty states virtually independent. After the death of Alexander the Greek dynasty of Arianus et Aquilaeus has ruled the country as far north as the Aral till about 120 years before the commencement of the Christian era. [BACTRIA.] The Greek power north of Hindu-kush was then subverted by invasions from the East, to whom the convenient and unmeaning name of Scythians has been given. Whatever they were, the Parthian kings appear to have succeeded in overthrowing their empire about the time of the birth of our Saviour. The religion of the fire-worshippers, if not previously predominant in these countries, must under the auspices of the Parthian kings have struck deep roots throughout the whole region now called Turkistan; for even at this day traces of it are everywhere to be met with. The early historians of the Tartars and Mongols speak of a large country reaching the country around Lop-Nor the Mongol tribes are succeeded by a race with long or 'horse-face' faces. There was, about two centuries before our era, the frontier of the Tartar tribes to the south-east; and the north-eastern hordes appear to have extended to the Upper Kerol. It is impossible to say whether Turkish tribes took any part in the overthrow of the Greek dynasty in Bactria; but Mohammedan tradition led to the conclusion that the hereditary strife between Iran and Turan dates from beyond the Hindu-kush. The Lop-Nor continues till the present day as a limit to the south-east frontier of the Turkish race. Northward they were obliged at an early period in the Christian era to confine their territory to the plains of the Oxus. To this young Justinian found the most powerful of the Turkish tribes seated around the Altai, and Turkish hordes had pushed their encampments as far west as the Caspian. The Caliphs succeeded in driving them back, and a thousand years passed before they found their way from Iran extending beyond Samarcand, and for a time they kept it there. The conquests of the Mongol monarchs who overthrew the Caliphate broke down this frontier, and opened the way to successive incursions of nomade hordes until the sixteenth century, when the Turkish tribes would appear to have predominated in the armies. At least it is only upon such an assumption that the statements of the historian could be explained of the bold and daring Turks and Mongols making up the Turkish race. All the Turkish tribes who have played a conspicuous part in history embraced at an early period the Mohammedan religion; their dialects have in consequence been more or less modified to suit this change, and the tribes, whose names have been accepted by their children, are those common to all Mohammedan states. In the tribes of Turkistan, the Kassaks, who occupy the north-western steppes, are probably the oldest settlers. The little and hinder hordes may be a sought that appeared in the sixteenth century. The descendants of the Osmanli dynasty were probably the lords destined to be the masters of Persia in the eleventh and twelfth centuries crossed the Amux and invaded Persia; the name is common to those who still inhabit Turkistan with many tribes in Persia and the Ottoman empire. The traditions of the Osmanli dynasty have been perpetuated in the twelve centuries that have gone by, and the name of the Tartars who have been the rulers in the north for three centuries is to be found in every part of the Tartar empire. The names of the Tartars and Mongols so appear to have been much the same, that their ancestors were at the same time the history took notice of them. [Moorscroft's Travels in the Himalayan Provinces, 1st Journey to Bukhara; Wood's Journey to the Sources of the Oxus; Conolly's Journey to India; Frase's Journey in Khurasan; Meyendorf, Voyage d'Observation à Bokhara; Muraviev, Voyages d'Anda Khiva; Levchen, Introduction des Turcs en Tartarie et en Turkestan; Klaproth's Asia Polyglotta; Naumann, Die Malays and Mirzane, in Klaproth's Magasin Asiatique; Zimmerman, Memoires sur la Turquie et la Turkestan; Maitri, Histoire Générale de la Chine; Humboldt, Fragments Asiatiques; Leduc and Desaix, Atlas de la Russie; Tschapek, Beitraege zur Topographie des Russischen Reiches; Ritschel's Kulturgeschichte der Brahminen, 4 vol; Backer's Provinzen des Mittelmeeres; Buschung, vol. viii.) TURKS. [TURKISH; TURKISTAN.]

TURKISH. [TURK.]

TURKISH. [TURK.]

TURKMAN. [TURK.]

TURMERIC. [CURCUMA.]

TURNEL'S BLUE. Perrigrinum of Iron.—Professor Turner gives an account of this variety of Prussian blue, nearly as follows:—It is formed by the action of potassium (red prussiate of potash) on a protosulphate of iron. It results from the substitution of three equivalents of iron for three equivalents of potassium. The same blue precipitate may be obtained by adding to
a preparation of iron in the mixture of yellow prussiate of potash, chlorides of soda, and hydrochloric acid. The tint of this blue is lighter and more delicate than that of Prussian blue. It is occasionally used by the calico-printer, who mixes it with perochloride of tin, and prints the mixture, with a prepared tin plate, in imitation of silver, or gold cloth, raising the blue colour afterwards by passing the cloth through a solution of chloride of lime, containing an excess of lime. The chief object of this operation is to destroy the black matter, when much chloride of lime is printed upon the cloth, but it has the effect incidentally of precipitating the blue pigment and peroxide of tin together on the cloth, by neutralising the chloride of the perchloride of tin. This blue is believed to exist the action of alkalis longer than ordinary Prussian blue. 

TURNEBUS, ADRIAN, one of the most celebrated French scholars of the sixteenth century. His French name was Turneau, and some writers, as Dempster and Mackenzie, have maintained that this is only a French translation of the English name Turnbull, and thaturnebus was the son of a Scotchman who had settled in Normandy. The common account however is that he was born in 1562, at Louvain, in the year 1581, he proceeded to Paris to be educated. His uncommon talents, combined with his indefatigable diligence, soon raised him above all his fellow-students, and he is said in many cases to have obtained a degree before his masters. After the completion of his studies he was for some time engaged in teaching the ancient languages at Toulouse, until in 1574 he was appointed professor of Greek at the great school, whither his name and that of A. Morelus attracted students from all parts of Europe. In 1582 he undertook in conjunction with William Morel the management of the Royal Printing Establishment of Paris for Greek books, and after the lapse of three years he resigned this see for that of Royal Professor. Notwithstanding the many brilliant offers that were made to him in several foreign countries, he remained at Paris until his death, on the 12th of June, 1665.

His death was a sad blow to science, and in his lifetime enjoyed such a universal and truly European reputation as Turnebus. He was a man of a different, modest, and very amiable character, and no one knew him who helped becoming attached to him. Henry Stephens is reported to have said: 'Turnebus pleases everybody because he does not please himself.' In his learned controversies however with Ramus and Bodinus, he is sometimes as severe as he was naturally gentle. As a scholar he was not inferior to and in many cases preferred to his great contemporaries; he could not abstain from devoting a few hours to his studies. His works consist of philological dissertations, some of which are polemical, critical commentaries on various ancient and modern writers, and translations and adaptations of Greek and Latin. His criticisms are generally masterly, but, like most great critics, he was too fond of making conjectural emendations. His Latin translations are among the most elegant and correct that have been made. His Greek translation of Cicero's essay 'De Fato' is a proof of his thorough knowledge of the Greek language. Most of his works, all of which appeared separately and at different times, were collected and published after his death by his second son, Stephen Turnebus, under the title, "Adriani Turnebi Opera;' Strassburg, 1600, 3 vols. fol. Besides the works contained in this collection, he wrote several others, the best of which are his 'Aversaria,' consisting of 3 vols. fol. of the articles of a school dictionary, and a translation of Adriaon Turnebus. The first edition of the first two volumes appeared at Paris in 1564. It was several times reprinted, but the best edition is that of 1599, fol. (Nicholson, Memoires, vol. 39; Teisser, Elogies des Savans; compare Mackenzie, Scotch Writers; Saxius, Onomast.)

TURNER, WILLIAM, a physician, naturalist, and divine, was born at Moseley, in 1604, and was educated at Cambridge. He studied at Cambridge, and having taken a very decided part in the great religious questions that were discussed, he made himself obnoxious to the dominant party, and was thrown into prison. After his release from prison he removed to London, where he died in 1688, when he returned to his own country. His studies at Cambridge had been more particularly directed to physic and divinity, but on the Continent he became acquainted with Conrad Gesner at Zürich and Luculli at Bologna, and acquired a taste for natural history. During the reign of Edward VI. he was made physician to the protector Somerset, and was afterwards made a prebendary of York, dean of Wells, and a canon of Windsor. He was afterwards obliged to fly from England on the accession of Mary, where he remained till the reign of Elizabeth, when he again returned, and was presented with all his original benefices.

Turner is said to have published several works on botany, but his greatest work on this subject, and on which his reputation as a botanist rests, is 'Herball,' the first book of which was published in black letter, small folio, with wood cuts, in London, in 1551. A second book was published at Colchester, in 1562, and the whole work was reprinted at the same place in 1568. This work is arranged alphabetically, and contains much laborious research and acerb criticism with regard to the plants then known. Although he appears to have collected plants himself, he has described but few new ones in this work. The medical properties of the plants are treated of, especially those which were unknown to the antients. Subjoined to this book is one on haths, in which the author speaks of the properties of various springs in England, Germany, and Italy. His other writings connected with medicine were, a work on the vines used in England, and another on the properties of treacle. In 1564 Dr. Turner made an attempt to publish a volume on the birds made mention of by Pliny and Aristotle, entitled 'Avium preclamaturum, quorum apud Plini et Aristotelem mentio est, Historia.' In Gesner's 'Great Animal History,' Turner is mentioned as the author of the British fishes by Dr. Turner. These works afford abundant evidence of his powers as a sound critic and accurate observer in the science of zoology.

Dr. Turner published several works on controversial divinity; also a collation of the translation of the Bitho into English, with the Hebrew, Greek, and Latin copies. He also translated several works on science and divinity from the Latin into English.

His fondness for a warm climate led him to their cultivation, and he had botanic gardens at Wells and Kew. He died July 7, 1568, leaving a large family. Turner was one of the earliest pioneers of natural science in Great Britain, and had it not been for the stormy period in which he lived, and the shortness of his life, he evidently possessed a genius that could have placed his possessor foremost in the ranks of the cultivators of natural history.

'TURNER, Anthony. An Account of a Journey to Tibet,' was a native of Gloucestershire, and born about the year 1759. Having entered the service of the East India Company, he gained the confidence of Warren Hastings, and was sent by him on a congress. After returning to England, he resided in France, and in 1792 distinguished himself at the siege of Seringapatam, and was subsequently sent ambassador to the sultan of Mysore. He returned to England soon afterwards with a large fortune. He was seized with apoplexy on the night of the 21st of December, 1801, in an obscur street in London, and, having no papers about him to intimate his name or place of abode, was carried to the workhouse in Holborn. When discovered by his friends, it was deemed unsafe to remove him, and he died in the workhouse on the 2nd of January, 1802, in his 43rd year. Turner was a Fellow of the Royal Society, and a member of the Asiatic Society of Bengal. Besides the account of his embassy (which is still a standard work), he contributed to the 'Transactions' of the Asiatic Society an account of his interview with the Tesho Lama, and an account of Poongieneer (a native priest in the employment of the Company) journey to Tibet in 1789 (which was published in 1800). He was also the author of an account of the yak of Tartary, in vol. iv. The account of his interview with the Tesho Lama was reprinted as a small pamphlet at Oxford in 1798. The account of the yak of Tartary was translated into French by J. Castex, and into German by M. C. Sprengel.

TURNER'S YELLOW. Caserl Yellow: Patent Yellow.——This is an oxichloride of lead, which may be prepared by different processes: when the lead is precipitated upon a solution of common salt, there are formed soda, which remains dissolved, and a white compound, which is hydrated oxichloride of lead; and this, when heated, loses water, and becomes a yellow

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One of the species, the *T. triquetra*, the Ketmia-flowered *Turnera*, was once stated to have grown in Japan, but this wants confirmation. None of the species are used medicinally, but they are propagated in gardens. They are mostly small plants with inconspicuous flowers generally of a yellow colour, and having very much of the habit and character of the species of *Malvaceae* from which their petals are small and obovate.

**TURNERIA.** [Turneraee.]

**TURNERACEAE.** the name of a natural order of plants belonging to Lindley's parietose group of polyptetalous Exogens. It possesses an inferior calyx, often coloured, having 5 equal lobes imbricated in activation; 5 petals, which are inserted into the tube of the calyx, equal and twisted in activation; 5 stamens, which are also inserted into the calyx below the point of insertion of the petals, with which they alternate with oblong 2-celled anthers; a superior ovary 1-celled with 3 parietal placenta, indefinite ovules, 3 or 6 styles, which cohere more or less together; a 3-valved capsule, the valves bearing the placenta in the middle, and opening from about as far as the middle of the capsule; seeds with a reticulated testa and a membranous aril, and a slightly-curved embryo lying in the midst of fleshy albumen, and having the radicle turned towards the hilum. This order has only two genera; all the species are herbaceous plants, in some instances having a tendency to become shrubs. Sometimes the whole plant is covered with pubescence; but it has not, like that of allied orders, any stinging property. The leaves are alternate and simple, without stipules, and occasionally have 2 glands at the apex of the petiole. The petals are generally of a yellow colour, and sometimes blue. The flowers are axillary and solitary. The pedicel is either free or coheres to the pedirole; is articulate, and furnished with two bracteae at its base.

**Turnera bicapitata.**

This order consists of two genera, *Cassieae*, and *Malvaceae*, and *Pisoniaceae*, especially with the last. The species of this order are exclusively natives of the West Indies and South America.

The genus *Turnera*, which is the type of the order, was named in honour of Dr. Turner. [Turner, William.] It is known by possessing a calyx tuberously funneled-shaped; 3 simple styles, which are cleft at the apex into a number of stigmas, and a capsule opening from the apex to the middle. Don, in his edition of Miller's *Dictionary of Plants*, enumerated 40 species of *Turnera*, all of which are found in South America and the West Indian Islands.
other puppet is then brought against the centre of the other end, and the puppet wedged firmly in its place: over the lathe, and at right angles to it, is a long flexible wooden pole or staff, whence the name 'lathe' of an end, fixed firmly overhead; the other, which must be just over the end of the work nearest to the left-hand puppet, has a cord or catgut attached to it, which passes once or twice round the work, and is fastened at the lower end to a treacle: the depression of the treacle and counterpole of the pole gives an alternate rotary motion to the work. The tool is held upon the top of a fixed piece, between the two puppets and close to the work, called a rest, but can only be applied during the fall of the treacle; and thus a great loss of time is occasioned. On this account pole lathes are now but little used; it still however may be seen in the shops of some of the Spitalfields bobbin-turners, who work in elder and other soft woods, and require great velocity and an easy saving of motion, greater Beg, to the extreme left of the work for the cord to work in; and if it is required to use that part, the band is afterwards shifted to a finished part.

The bandsman has one great difficulty to overcome in turning soft wood; the tool requires to be held firmly yet tightly almost on the top of the work, and the superfine material must be shaved off; while the softness of the wood and the velocity with which it moves causes the tool to readily spoil by the least unsteadiness of hand. So, too, turning the tool is held opposite or nearly opposite to the centre of the work, and the superfine material is scraped away with very little comparative danger of accident.

A modification of the primitive pole-lathe is used by some workmen in making a thin shaper of a vessel, in which it can be arrested at any point of its rotation. In the turning of watch-cases it is necessary to work close up to the handle, or pendant; and as the lathe or pole has a constant tendency to carry the work back from the tool, the workman, by regulating the pressure of his foot upon the treacle, can do so with the greatest nicety without the danger that attends such work in a lathe with a foot or fly wheel, with a movement in the cutting direction of rotation.

The middle of the mandril is made thick and formed into a pulley, around which the cord is twice coiled, and then fastened to the treacle, which moves on centres fixed in the back ends of the feet of the lathe frame. The nose of the mandril is tapped with a hollow screw, to receive the chucks upon which the work is fixed.

Some case-makers, the French in particular, make use of a large turning-tool instead of a lathe; it consists of an iron bar upon which slide three puppets, two to support the mandril with its back screw, and the other the rest; a long steel bow worked by the left hand serves instead of the pole and treacle. When in use the turning-tool is held in a vice, and can be put out of the way when not wanted; it is easily, costs but little, and wherever many vessels are employed effects a great saving of room. Tools of this sort, from six inches to two feet long and upwards, are in use among jewelers, goldsmiths, watch and clock makers, and many other artisans; and others without any mandril, in which the work is held between two points, as in the pole-lathe.

One of this latter sort may be converted into a very useful lathe for small work at a trilling expense, and still answer as a turning-tool if required. Take out the cylinder of the puppet to the left hand, which should be movable and fastened by a screw, and upon the end just above the point fit a small brass pulley with three or four grooves, the largest, about two inches in diameter, and drill a hole in the face of the pulley, to take a steel pin about an inch long; fasten a wheel of twelve or eighteen inches diameter at a short distance from the lathe opposite the pulley, and connect it with the latter by means of a catgut band; the wheel may be turned either by hand or by a treacle: a carrier, such as is described afterwards, Fig. 6, is to be fastened upon the end of the work, as in Fig. 6, and the steel pin in the pulley will carry it round.

The Potter's wheel is the simplest description of rotatory lathe, but it differs from other lathes in being vertical instead of horizontal. C, Fig. 1, is an iron crank, upon the lower end of which is fixed a heavy foot-wheel. F; the lower end of the crank works upon a centre, P, fixed on the floor; the upper in a collar, B, fastened to the work-bench, A, and supports the turnboard or chuck, D, upon which the clay to be worked is placed: motion is given to the crank by means of a treacle placed at the back, and connected with the throw of the crank by a hook or rod. For large work the wheel is provided with a winch and bevel gear, and is turned by a boy. The clay is made up ready for the turner in lumps sufficient for one vessel; taking one of the lumps, he throws it, with force enough to make it adhere firmly, upon the face of the turntable, and causing the wheel to revolve very quickly at first, he fashions the clay to the requisite shape almost entirely with his hands. An upright stick or rod, R, is fixed into the bench at a little distance from the edge of the turnboard, and upon it are fixed small pointers or guides to show the required height of the vessel, and the place of any hollow, rim, or moulding. The potter uses but few tools except scrapers to remove any pieces that adhere to the surface in the course of turning, to give the surface of the vessel a close and smooth texture, and fill up pores, and also to mark any small mouldings that cannot be managed by the fingers. When the work is finished, a piece of thin wire is used to separate it from the turnboard.

Foot-lathe.—Fig. 2 is the front-view of a foot-lathe of excellent construction, adapted to all ordinary work, where in metals, ivory, or wood. The body of the mandril is made of wrought-iron, the point and working-collar of steel; the nose is cut with a coarse screw to carry the chucks. The headstock, H.1, is of cast-iron, with a conical steel ring let into the front puppet within which the mandril works. A steel-pointed screw in the back of the headstock keeps the mandril steadily in its place. The beds are of cast-iron, V-shaped, as it is called, shown in the end view, Fig. 3, which also shows the manner in which the headstock is fitted upon and between the beds, to which it is firmly fastened by two screws, A A, Fig. 2. The crank, C, is of wrought-iron, supported at each end by a screw, B, Fig. 2, C. 3, in the standard of the lathe. The fly or foot wheel, F, has four or five grooves on its edge, and gives motion to the mandril by means of a catgut band, which connects it with the smaller part of the mandril pulley, P. The object of having several grooves upon the wheel and pulley is to allow of the speed of the lathe being regulated according to the sort of work to be turned: these grooves are turned with wide blades, but the Gut, when in the largest groove of the foot-wheel, fits the smallest on the pulley, and so on with the rest; but this arrangement only modifies what is called the quick motion, and it is frequently necessary that the mandril should
move more slowly than the crank, for which purpose a large pulley is placed upon the mandril, and a small one upon the crank, and the two are connected by a band. The ends of the band should be fastened by a hook and eye, which is much more convenient than the splice, and allows one band to be removed and another substituted at pleasure. The treddle is formed of a long iron bar suspended between two points at the back of the frame, D, Fig. 2 & 3, and carries two shorter transverse bars at right angles, passing under the throws of the crank, and being connected with them by the hooks, E R: the front ends of these two pieces are screwed to the treadling-board, W. The standards of the lathe are prevented from altering their position by a rod passing close to the ground, and screwed to each standard at Q.

The front-head, G, is of cast-iron fitted on to the beds in the head-box, and the head-stock, except that, instead of two screws beneath, it has only one in the centre, with a jointed lever attached, to allow of its being easily shifted and fastened at any part of the beds. The point of the cylinder, J, to support one end of the work, must be exactly opposite to the centre of the mandril. There are several methods of arranging the cylinder and its screw, but the following is the best with which we are acquainted, and obviates the necessity of having two cylinders, one with a conical point, the other with a sunk centre, to suit different work, as is commonly the case. The cylinder is turned with a point at one end and a sunk centre at the other, and accurately fitted by grinding, so that either end may be outwards as required: a gun-metal box is fixed at the back, and tapped to receive the screw J, which is turned by a winch-handle, and presses the cylinder forward against the work. K is a small screw with a binding-piece or saddle breast, which rests upon a file laid on one side of the cylinder, and prevents the latter from shaking during turning. The rest, R, has a jointed lever binding screw, like the front-head, and several T's or tops to suit different purposes, with a small screw to hold them steadily in the socket. This completes the lathe itself, but many adaptations are necessary before it is in order for work: of these the principal are the chucks used to connect the work with the lathe. The screw-chuck is a circular plate of metal with a boss at the back, tapped to screw upon the nose of the mandril: the face is turned perfectly true, and in the centre is a coarse conical screw to hold any large piece of wood to be turned; a hole being made in the centre of the work, it is screwed tight up against the face, and no further adjustment required. The hollow-chuck is a strong iron chuck about an inch in diameter, with a square hole in the centre to receive drills and other similar tools. In drilling, a mark being made with a punch where the hole is to be, the work is held against the end of the drill, and the front-head being brought up to the back of the work, the cylinder is pressed forward, as the drill proceeds, by turning the screw, J. If the work is to be drilled quite through, a guard is placed upon the cylinder with a hollow in the centre to receive the point of the drill.

The universal chuck is a circular disc of metal, as large as the beds of the lathe will admit, with three narrow slots cast in it, extending nearly from the centre to the circumference: the bit is turned perfectly true when on the mandril, and the work being laid upon the face of the chuck, is fixed to it by screws which pass through the slits, into nuts at the back of the plate: this is an exceedingly useful chuck, and at the same time simple and cheap. The description of the chuck is of the last described, and the face in like manner must be turned perfectly true to the mandril upon which it is to be used. Instead of three slits it has but two, in a straight line with each other, and extending nearly the whole diameter; the opening of these slits is wider at the back than front, and they must be filed up with the greatest accuracy, that their sides may be perfectly straight and parallel with each other: with these slits lies a spindle, having a bearing in the centre and one at each extremity, with a right-hand screw upon one end and a corresponding left-hand screw upon the other; these screws move two steel studs which fit accurately within the slits, and have projecting heads about an inch square, that move steadily and smoothly along the face of the chuck: the concentricity of the chuck depends upon these heads being perfectly square and equi-distant from the centre: upon the heads are fitted two other square pieces, having their sides hollowed out in curves of different diameters varying from two to eight or ten inches, and which can be placed with either of their sides towards the centre, to fit the circumference of the work to be held between them.

This is an exceedingly valuable chuck, as the work can be placed in it without the trouble of fitting, is always perfectly concentric, and can be removed and replaced without danger of altering its position; but the most excellent workmanship is required to make it accurately, and it is consequently very expensive.

All the chucks that we have described are adapted principally for work which does not require supporting at both ends, or, in other words, for work in air, but a piece of wood is to be turned, a chuck is used having a piece of steel with three points standing out upon its face, the centre of one end of the work is pressed against the middle point, and the other end is supported by the cylinder of the front-head.

The carrier is used in metal-work for the same purpose as the three-point chuck for wood, and perhaps no convenience for connecting the work with the mandril is in such constant requisition as the centre-chuck. When supported it is supported between the hollow end of the cylinder and the front puppet (S, Fig. 4) and the nose of the mandril, which is similarly shaped for the purpose: if, on the contrary, the ends are hollow, the cylinder is reversed and the point-chuck, Fig. 5, screwed upon the mandril. The carrier, C, Fig. 4, is fixed upon the end of the work by its screw, as shown on a larger scale in the side view Fig. 6.

and motion is given to the work by the driver H, Figs. 4 and 5, either screwed upon the nose of the mandril or attached to the point-chuck. Like the concentric chuck the carrier allows the work to be taken out of the lathe and replaced without disarrangement.

Wood and ivory turners make use, principally, of box and other wood chucks altered at the instant to suit their purpose: sometimes an iron ring is used to prevent it splitting. One chuck however requires notice, called the split or ring-chuck, Fig. 7: a piece of wood is tapped and screwed on to the mandril and then turned conical: it is afterwards drilled down to the centre of the bottom, and two slits cut with a saw at right angles to each other, from the point of the chuck to the nose of the mandril; the work, when in the chuck, is held in its place by the ring on the outside. This chuck is very useful for finishing off small tubes, mouth-pieces, or other work which would be split or broken by being forced into a common chuck, and has besides the advantage of being cheap.

Setting the work true to the lathe in common chucks is
very troublesome to young turners; the proper method is to knock the work pretty firmly into the chuck with a mallet or hammer, the left hand pressing against the back of the pulley to prevent the blow injuring the mandril eccentric; or, very mandril gently round with the left hand, and tap the work at the most prominent parts until it runs as true as the shape of the material will allow.

When greater accuracy is required, as in the case of the wood being but just large enough, or still more when work already turned is to be again put in the lathe, place the rest near the front of the work, hold a piece of chalk opposite the outer edge of the work, turn the lathe gently round, and mark the parts which are prominent: at first it requires considerable care and patience, but after a little practice it becomes exceedingly easy. When the work gets loose in turning, a little chalk rubbed round the inside of the chuck will generally make it hold.

The tools used in turning are so various, that a description of them would fill pages; if indeed many of them could be described at all: we shall only mention a few most commonly in use. For soft wood scarcely any are required besides gouges or round chisels with circular points, to rough out the work, varying from a quarter of an inch to an inch and a half wide, and chisels with an oblique cutting edge, sharpened by being ground and rubbed at a very acute angle on each side. To give the workman power to remove the wood, and carry it at the same time, without losing hold of which we mentioned when describing the pole-lathe, the tools are set in very long handles, the ends of which the turner holds between the upper part of his arm and his waist.

For hard wood, ivory, and bone, similar gouges and chisels are used; but they are smaller, and sharpened at a less acute angle; most of the work, as in gold, silver, and light brass-work, is performed by gravers with straight, oblique, and curved faces, to suit different sorts or parts of the work. These are sharpened by an angle on the under side only, and the cutting-edge is applied nearly opposite to the centre of the work. For inside work, drills placed in handles are used to make the first opening, which is afterwards enlarged by other tools of almost every conceivable shape, according to the form of the work—straight, oblique, double-angular, semicircular, curved, and hollow; but with this general characteristic, that the stalk is made narrower than the cutting part of the tool, to allow of undercutting or making the hollow within larger than the opening through which the point of the tool is introduced. These drills and tools are generally used with a hook held upon the rest in the left hand, in the bend of which the tool is placed; this allows much more freedom for the workman's hand than if the rest were set across the work, and does not exclude the light.

The principal tools used for turning iron are the hook-tool, Fig. 8. E is the cutting-edge; the heel, H, is placed finally upon the top of the rest and the tool held with both hands, the end of the handle resting against the turner's shoulder: this tool is admirably adapted for removing the rough outside of the work. From the cutting-edge and strength in an unusual degree. For finishing the work, gravers of different sizes and shapes are used, similar to those for hard wood, gold, silver, brass, and ivory, but stronger and sharpened at a more obtuse angle.

Screw-tools are very important appendages to a lathe, and, with the engineer, in constant use: they are filled up with several teeth exactly the shape of the spaces between the intended threads, and used in the following manner—the first is the thread of S, B, Fig. 9, the form of which is a circle, and the shape, the workman holds the tool in his right hand upon the top of the rest; then clamping the rest with his left hand, he places the thumb across the tool, and gives the point of the screw-tool to the rest as it revolves; this he repeats until a few threads are cut near the point, which answer as guides for the next, and so on till the screw is complete. The tool must be held firmly, that it does not get out of the thread and so spoil the screw; but the pressure must be light, particularly if the screw is of any length, or it will warp and become untrue. To produce a left-hand screw, the thread must be begun at the upper end, instead of the point. For inside screws the teeth are cut on the side, instead of the front, of the tool; taps however are much more generally used, except where the thread is to be cut to the bottom of a cavity, or the screw is of unusual dimensions. Engineers and others cut screws of all sorts and sizes with extraordinary facility, but to do so requires a steady hand and considerable practice.

A circular saw is often fitted to a lathe, particularly for ivory turning: the saw is placed upon a spindle against a projecting collar, and held in its place by a washer and nut: the spindle is held between the mandril and front puppet, and over it is a small table, with a slit to allow the upper part of the saw to pass through: this table is mounted upon a frame fixed to the beds of the lathe in the same manner as the rest, and can be raised or lowered according to the depth that the saw is wanted to cut. A parallel rule is fitted upon the table by the side of the saw to regulate the width of the pieces cut off. Angular pieces are cut by interposing a piece of wood of the required angle between the work and the rule, and passing them along the latter together: a jointed rule is used for the same purpose, with a screw to fix it at any angle less than a right angle.

In the lathe, as previously described, the tool is held in the hand, and is consequently subject to any unsteadiness in the workman; to get rid of this imperfection in certain cases, and so arrange that the tool could be withdrawn at pleasure and replaced in the same position, and always be steady, a was invented, consisting of a box or framework, and the invention of the slide-rest, which is now attached to all but the most ordinary kind of lathes. The principle of the slide-rest is that the tool is fastened to a plate, moved in the required direction by means of screws, instead of being held in the hand.

There are various modes of construction, but Fig. 9 is of very simple, usual, and convenient form. T is the place for the tool, which is held down by the screw above: the tools are long square pieces of steel reaching beyond the edges of the plate upon which they are fixed, and which in common-sized rests is from 4 to 6 inches high. This plate has two small slips or dove-tails screwed on to its under surface and fitting the sides of the plate S, which has a screw along its centre, working in a nut in the upper plate, so that by turning the winch-handle, the end of which is seen at S, the tool can be moved backward or forward along the plate S, which is about twice the length of the upper or tool plate, as seen in the lower slide, also marked S, at a right angle to the upper.

Beneath the plate S is a circular piece C, divided by a line into two unequal portions; the upper and thicker portion is screwed to the plate S, the lower is in fact only a circular fillet upon the plate below: in the centre of the latter is fixed an accurately-turned pin fitting into a corresponding hole in the former, which turns upon it as a centre, and can be set at any required angle to the lower plate (which is graduated for the purpose) and fixed in its position by two binding screws, shown in the figure, for each pair of beds, and circular plate, counterparts of those above, and the whole is mounted on a plate P, which fits on the beds of the latter in the same manner as the simple rest and front puppet, Fig. 2.

The manner in which the lathe is used will now be described. To produce a perfectly flat surface, when the work is fixed upon the mandril, set the lower slide at a right angle with the beds of the lathe and the upper one exactly across it; set the point of the tool to the centre or outside of the
work, according to circumstances; set the lathe in motion, turn the winch of the upper slide till the tool cuts deep enough, and then as the lathe revolves draw the tool gradually across the surface by means of the winch of the lower slide; this must be repeated with the body, or other roughing tool till a regular surface is obtained; a graver is then substituted for the roughing tool, and the same movements of the rest are repeated until a smooth surface is produced. In turning cylinders the lower slide must be parallel, and the upper at a right angle to the bed. For concave the lower slide must be set obliquely, according to the angle required. Hollow and spherical surfaces may be cut with the slide-rest with equal accuracy as rectangular figures. By an adaptation to the common slide-rest, by which the lower slide is made to act upon the other, or by one constructed for the purpose.

The slide-rest is of great value in producing any number of pieces of work of exactly the same form, of opposite forms and fitting each other, or in any given proportions; each slide-screw is fitted with a small circular graduated plate and sometimes also with a micrometer screw and plate, so that the greatest nicety can be observed. It is however only in conjunction with the power-lathe, so called as being moved by steam or other power not manual, that the full value of the slide-rest is exhibited. The beds, headstock, and slide-rest of the power-lathe, Fig. 10, are made in the same manner as in the foot-lathe, but stronger; the mandril works in bearings to allow the end B to project beyond the back puppet and carry a toothed wheel; between the beds and along their whole length is a screw E, which works in a nut attached to the under part of the rest; on the end of the screw is placed another toothed-wheel D, which is turned by the mandril-wheel B by means of the connecting wheel C. By varying the size of the wheels B and D, the rest can be made to move through any required space along the beds of the lathe at each revolution of the mandril. The spindle of the connecting wheel C fits in a curved groove to accommodate it to the different sized wheels used on the mandril and rest-screw; when the rest is required to move in the opposite direction, two connecting wheels are used. The size of these connecting wheels, having no influence on the relative rates of B and D, may be varied according to circumstances.

It is requisite in turning large heavy work that the lathe should run very slowly; this is effected by the spindle and wheels being placed over the mandril. The proper place for the spindle is at the back of and parallel with the mandril, but it is sometimes placed over it, and we have availed ourselves of this fact, that the whole of the machine may be exhibited in a front view. The pulley, instead of being fixed upon the mandril, as in the foot-lathe, is mounted upon a metal tube or cannon which fits and turns smoothly upon the mandril. The large toothed-wheel in front of the pulley is fixed to the mandril, the smaller to the cannon: the nut A runs upon a thread cut on the mandril, because the pulley to move with the latter where the lathe is to be driven at the ordinary rate; none of the toothed-wheels are then in action. When a slow motion is required, the nut A is unscrewed and the driving spindle moved forward in its bearings till the four toothed-wheels are engaged; the band then drives the pulley round, independently of the mandril, and the toothed-wheel upon the cannon moves the larger upon the spindle, which gives motion to the mandril by means of the two other toothed-wheels. If the two smaller wheels be four inches diameter and the two larger twelve inches, the mandril will revolve with only one ninth of the speed that it did before. For turning a cylinder the slide-rest and tool must be set in the same manner as to the foot-lathe; and the wheels B, C, D arranged for a very slow motion of the rest along the beds: the lathe, in fact, in motion, will require no more attention until a fine spiral line is cut, enveloping the cylinder along its whole length; the rest has then to be shifted to where it started from, or by a simple contrivance be made to work its way back again, the tool being set out a little deeper each time until the surface is completed.

Screw-cutting with the power-lathe is a simple and beautiful operation: the point of the tool is made exactly the shape of one of the spaces between the intended threads and having the same rake or inclination; at each revolutions of the mandril the rest must move through the distance from one thread to the next. The circumference of the screw has no effect upon any of the arrangement but the inclination of the tool. When the screw is required to be double or treble-threaded, that is, having two or three intervening spirals upon the same stem, the rest must be moved forward a proportionate distance at the commencement of the second and third threads.

By a slight adaptation, the lower slide of the rest may be connected with the gearing of the mandril, for turning oblique, convex and concave work.

Fig. 11. Fig. 12.

P F is the drilling-frame, for working drills and cutters, fixed in the rest; the two uprights are fixed firmly to the bed of the lathe, and the two shorter perpendicular pieces standing on centres close to the top of the uprights, each pair being kept steady by connecting rods, which are omitted in the diagram to prevent confusion. The upper rod is made to revolve by a band passing round the mandril-pulley and pulley G; and the lower or swinging rod is moved by means of another band passing round the pulleys H and I, which can be shifted along their respective rods to suit the position of the rest. The drill or cutter is placed in the rest, and is driven by a third band from the pulley I. The swinging of the lower rod and pulley I, accommodates the different positions of the rise and traversing of the slide, and the band is kept tight by a cord and weight at the back acting upon the swinging frame. A brass or gun-metal dividing-plate, with several circles of holes, is fixed on the mandril in front of the large wheel. The mandril may be fixed at any number of holes in a plate; the drill-stock, Fig. 11, is placed in the slide-rest and connected with the pulley I, as before described; and the mandril is kept at rest by a pointer, which is attached to a spring and fixed to the head-stock, and falls into the various holes of the dividing-plate.

By drawing the drill-frame to or from the centre of the work, holes may be drilled in straight lines across the centre, and, by shifting the dividing-plate, in circles; by the combination of the two movements the holes may be placed in curves and spirals in any direction. By giving motion to the mandril, and connecting it with the last screw-rod by a chain, or with the upper surfaces of plates, cylinders, or cones. The points of the drills must be of the exact shape of the intended grooves. By these means many operations may be performed with ease and accuracy, which it is almost impossible to manage in any other way.

The cutting of toothed wheels is one of the most valuable applications of the lathe. The mandril is kept stationary, as for drilling, by the dividing-plate and pointer; a circular cutter, C, Fig. 12, is fixed in the rest, the
same manner as the drill-stock, but with the spindle perpendicular to the beds; in forming the cutter, a piece of steel from one to two inches thick and the face desired of such
exact shape of a space between two intended teeth; deep notches are then cut all round, which give it the appearance of a very coarse circular saw. The wheel to be cut is fixed on the table, the side facing the rear of the
parallel, obliquely, or at right angles to the beds, according as the wheel to be cut is spur, bevel, or crown; the cutter is set in motion by a band from the swinging frame, the wheel, or the sliding division of the rear of the table, and across the edge of the wheel, the dividing-plate is then shifted one or more divisions, according to the number of teeth in the wheel, another notch is cut, and the first tooth finished: this is repeated as many times as there are teeth in the wheel.

The circular cutter may be employed in many other ways, such as cutting grooves and flutes, which, except for sudden curves, it performs better and much more rapidly than the drill. For cutting straight grooves both the drill and cutter are entirely superseded by the planing-machine, a modern invention of the greatest importance. It supplies what was one of the greatest wants of the engineer, and might appropriately be called the straight-lathe. A large iron table from two to twelve feet long, full of holes, by means of which the work is bolted down, is made to traverse backward and forward by an endless band, or other contrivance, set in motion by a hand-winch, or steam or other powers. If the table, at some distance from the cutter, is mounted a tool-carriage, which traverses by means of a screw along the width of the table in the same manner as the slide-rest, only the tool is reversed instead of horizontal; the work is thus brought to the tool cut straight line every time it passes under it, and by moving the tool after every cut a uniform surface is produced. In this manner the largest work is brought to a regular surface in a comparatively short space of time, and metal plates are applied to many purposes of a size which was never before attempted. The bed of a billiard-table is now frequently made of one piece of iron, planed by these machines with the greatest accuracy.

For cutting the edges of a piece of ivory in a cylindrical work, two small pincers carrying centres are screwed to the table to support the work, and the parts where the grooves are required are brought under the tool by means of a division-plate fixed to one of the pincers; a revolving cutter may be used instead of a fixed tool for cutting long pinions and terminating flutes. The whole arrangement of this powerful engine, will be seen, is precisely similar to the straight-line lathe, as shown in Fig. 13.

Excursive Turning.—In enumerating the different chucks, we purposely omitted the excursive and oval, as they give their names to the respective kinds of turning for which they are used, and may therefore be considered as really a form of the centre. For cutting flat work, the excursive chuck is replaced by the click-plate. Fig. 13 represents a single excursive chuck: P is a strong plate which screws on the nose of the mandril, and is termed perfectly true on the face; two dovetailed pieces are screwed upon near the edges, between which the slide, S, works by means of a screw fixed to its under surface, and working in a nut in the centre of the ground-plate; upon the slide is fitted a circular plate, which turns upon a centre, and has its edge cut into a number of teeth according to the size of the chuck; C is a chuck with one or two teeth fitting between the teeth of the wheel, and held in its place by a spring under the other end; sometimes the great advantage of this arrangement is, that a division may be taken by the screw without altering the place of the chuck; the nose, N, for ear-

rying the work, is fixed to the upper plate. The double excursive chuck is made in the same manner, but it has a second slide, at right angles to the first, on the back of the ground plate. The two slides are necessary for some sorts of work, but much may be done with one slide only. In common turning the use of the excursive chuck is limited to the cutting of the sides of the figure and of the centre of the mandril; thus circular holes may be cut in any part of a plate, the edge may be hollowed out by any number of curves of the same or different radii, and polygonal holes with curvilinear sides may be produced with the greatest neatness. The following description of the method of producing three simple figures will give a general idea of the application of the chuck. To produce Fig. 14, set the slide so that the click-plate runs concentric with the mandril, cut the outer circle which forms the four curves on the ends of the arms; screw the slide out the length of the radius of the circle; draw the tool nearer to the centre, and cut one of the segments upon the edge; move the click-plate one-quarter round, and cut the second segment, and so on for the other two.

For Fig. 15, mark a circle the full size of the intended figure; draw out the slide half the diameter of the circle as before; draw the tool farther from the centre until it will cut one of the three curves forming the sides of the figure; then turn the click-plate one-third round for each of the other two sides; screw the slide half-way back; draw the tool nearer to the centre; move the click-wheel one-sixth for the first of the smaller segments, and screwed for each of the others.

Fig. 16 represents a pattern cut with the rest parallel to the side, instead of the face of the work, and is much used by ivory and hardwood turners to ornament their work; the material being turned of the size of the base. We shall describe one diameter and half, the longest of the smaller circles cut with a flat-faced tool; the slide is then returned to its place, and the second circle cut is the same manner, but concentric with the base; the third is produced by drawing the slide out the same distance in the opposite direction, and so on, producing a pillar of small circular discs placed in a zigzag direction, or it may be varied by turning the click-wheel one-sixth or so for each disc after the first, without altering the excentricity; they will then be arranged spirally. In ornamental turning the excursive chuck is most used for cutting patterns upon the surface of the work without altering its general outline. Thus, in ornamenting ivory, the circular curves are laid in an infinite variety of positions upon the face and edges of the work; and a very pleasing effect is produced by the assemblage of prominences caused by the intersection of the circles, which must be cut with tools sharpened at a very acute angle, and generally double-angular or V-shaped.

The ivory-turner generally uses a small instrument called an excursive cutter; it is formed like the drill-stock, Fig. 11, and moved by a bow; the cutting point can be fixed at different distances from the centre by means of a groove and screw. In conjunction with a click-plate upon the mandril, the cutter answers many of the purposes of the single excursive, and possesses the great advantage—that it can be used to ornament the sides, edges, or curves of work, while the excursive cutter, without several troublesome adaptations, will only work upon a flat surface; besides, in using the cutter the lathe is stationary, and the work is therefore much less. With the single-slide excursive chuck and the mandril at rest, the cutter will produce patterns which would otherwise require the double excursive, such as cutting circles in straight line not intersecting the centre of the mandril.

Geometric Turning.—When the work revolves on the lathe, and the excursive cutter is driven by a band in connection with the mandril, in the same manner as the drill-stock in Fig. 10, a great variety of very complicated and beautiful epicycloidal and other curves may be cut, without which the cutter require an elaborate and exceedingly
expensive chuck. This geometric chuck is an eccentric, together with the arrangement for giving motion to the work upon the chuck, and independent of the mandril; fixed to the headstock and concentric with the mandril is a toothed wheel which, as the chuck revolves, drives another and smaller wheel on its under surface: this latter is another toothed wheel which causes the click-plate and work to revolve. The patterns may be infinitely varied by altering the relative sizes of the wheels; and by introducing an extra wheel, and so causing the work and chuck to revolve in opposite directions the same time; and lastly by changing the position of the tool. The number of different curves that can be produced by these changes and the great dissimilarity to each other can hardly be conceived. In the article *Tropical Curves*, in this work, are many well-executed specimens of curves cut by the geometric chuck. Suardi's geometric pen produces the same effect by different means; but the latter is merely for tracing, not cutting, and is therefore inapplicable to the lathe. [Fig. 17. Fig. 18. Fig. 19.]

screws on to the mandril, nearly to the circumference; two small studs are cast upon the back of the slide, which are made to work easily in the two slits, and stand up just above the face of the ground-plate; when the slide is in its place, two rectangular rubbers with straight polished faces are screwed to the studs, and stand out at the back of the ground-plate at right angles to the slits, as seen in Fig. 19. The ring being fixed in its place upon the headstock, the chuck is screwed upon the mandril, the rubbers clamping the ring, which must be kept perfectly smooth and well oiled; the eccentricity of the ring, acting upon the rubbers, draws the slide out of the centre in opposite directions alternately, and upon the tool being applied an oval will be described upon the face of the work, having the shorter diameter in proportion to the distance of the tool from the centre, and the longer to the eccentricity of the ring.

For ornamental work the oval chuck is provided with a click and sometimes a micrometer plate, like the eccentric chuck, for placing the slides in different directions; and frequently the oval and eccentric are combined in one chuck (with a stop to fix the oval slide when not in use): by this compound chuck, ovals may be laid in eccentric circles upon the face of the work, and form a pleasing variety when mixed with circular eccentric work or engine-turning.

Rose-engine Turning.—Of all the different sorts of ornamental turning this is by far the best adapted for embellishing small articles, and accordingly it has for a long time been in very general use for gold, silver, and gilt work: it is besides applied to the production of ground ovals, rosettes, ornaments on copper, steel, and wood rollers for printing machines, calico, leather, and paper; and many other sorts of ornamental work. Considering the great variety of articles to which it is applied, it is surprising how few, even amongst workmen, are acquainted with the machine by which it is performed; and general as has been its employment for these forty or fifty years, there is no English work with which we are acquainted that contains a good description of it.

The origin of the rose-engine, like that of many other machines, is entirely unknown: the French, who are very expert in the use of it, and applied it to the arts long before it was at all generally known here, lay claim to its invention, but a similar machine was in existence in England at or before the time of Sir Isaac Newton; and we have seen some specimens of its work upon wood which were stated upon credible authority to have passed through his hands.

It is not however so much our province to search for its history as to explain its structure and application. An instead of an inch thick and having two patterns or waves upon its rim. The rosettes are of two sorts, fixed and shifting. The fixed, are screwed to a collar turned upon the mandril itself; the moveable, are fixed upon the cannon, (Fig. 20) these latter rosettes are drawn in section to exhibit the cannon; the plate M is fixed to the cannon, and the rosettes are prevented from turning by a soft metal, as best calculated to produce the smoothness of motion necessary to give that brilliant polish upon which the effect of engine-turning upon gold or silver so much depends. Upon the mandril are mounted the pattern guides, or rosettes, circular plates of gum-metal or brass, each about half an inch thick, having two patterns or waves upon its rim. The rosettes are of two sorts, fixed and shifting. The fixed, are screwed to a collar turned upon the mandril itself; the moveable, are fixed upon the cannon, (Fig. 20) these latter rosettes are drawn in section to exhibit the cannon; the plate M is fixed to the cannon, and the rosettes are prevented from turning by a
feather which fits into a notch in each of the rosettes: a nut at the end of the cannon screws all tight against the plate.

The plate D is put on the mandril at the back of the cannon plate M, but independent of both; behind this is another plate P, fitted on to the mandril and turning with it; at the back of this plate is a nut, which is tightened until the cannon requires some little force to turn it upon the mandril with the hand. On the large plate P, is a spring-click, which falls into notches cut in the plate D, which itself carries an endless screw working in a half thread cut on the edge of the cannon plate M.

On each side of the mandril frame, and parallel with it, is a strong bar, the ends of which are marked B in Fig. 21, supported upon pillars screwed firmly to the bench, and connected by curved bars passing beneath the rosettes.

There is a carriage for holding the rubber R, by means of the two screws in the top of the carriage: the rubber is a small bar of steel, three or four inches long, and the breadth of the rosettes; the ends are filed away above and below, producing a more or less blunt curve with a straight face against the rosette, and are hardened and well polished.

Screwed into the bottom of the headstock is a strong arm, h, Figs. 20, 21, with a square hole near the bottom, to receive a smaller arm pierced with holes; one end of this latter is attached to a strong spring S, and by placing a pin in one or other of the holes in the small arm, the spring may be made either to press or pull the arm A with less or greater force.

The rubber-carriage T being moved along the bar B, till the end of the rubber is exactly opposite the face of the rosette to be employed, and fixed there by the back-screw, the spring set to pull the arm h, and the side screws in the standards A turned back until the face of the rosette rests upon the rubber R, the engine at each revolution will produce a copy of the indentations upon the face of the rosette, but of course varying in the proportion of their lengths according to the distance of the tool from the centre.

The engine is moved by a hand-winch with a band passing round a foot-wheel, and another connecting a small pulley on the crank with the mandril-pulley E in the same manner as the shutter-motion of the foot-lathe, Fig. 2.

The slide-rest, though in principle nearly the same as that represented in Fig. 9, has several adaptations well worthy of attention. In the first place, it is of the greatest consequence that the height of the tool should be precisely the same as the centre of the work, or the pattern will appear twisted; and, as the bed or bench of the engine is of wood, metal injuring the smoothness of the work by a tremulous motion that always accompanies it, and the rest not always fixed in the same spot, some means of adjustment is found necessary. In rests of the very best construction it is provided in the following manner: the tail-piece or foundation-plate of the rest F, Figs. 20, 22, has a hollow cylinder C, fixed in the middle of one end, just beneath the triangular bar B, and standing up level with the sides of the stock A. The bar B, which has a piece at each end fitting into dovetails in the sides of A, has a cylindrical piece which is4 mounted into the hollow cylinder C, and can be raised or lowered at pleasure by a ring or

\[ N \text{ nut N, working upon the outside of C; the rest being placed in the required position, and fixed to the bench by the screw S, Fig. 20; the capstan-headed screws, Fig. 22, which hold B in its place, are loosed, the tool centred by means of the nut N, and the two side screws again tightened. The stock A moves round upon the cylinder C, and can be fixed at any required angle by the binding nut O.} \]

The top of the rest, which traverses along the bar B, by means of a series of rubber pads, passes through a kind of a longitudinal plate, the index-plate and winch-handle S, is composed of two parts, the ground-plate, Fig. 23, and another plate, Fig. 24, which carries the tool-slide. The upper plate moves round a centre by means of an endless screw fixed to the lower plate, and working into the edge of the former; w, which has a hollow half thread to receive it. When cutting, the tool must of necessity be some little distance in advance of the front of the rest, and when the upper plate moves upon a centre-pin, fixed in the lower plate, the point of the tool, being beyond the centre, is thrown out of its position in a direction opposite to the traversing of the plate. This is avoided by the following simple but ingenious arrangement: upon the front of the plate-plate, 23, and close to the edge, is fixed a segment of a circle, the centre of which is shown by a dot beyond the edge (about three-eighths of an inch from it); the segment is conical, the larger side upwards; in the under part of the traversing-plate, 24, is a cavity which fits accurately upon the segment. If the front of the rest is placed three-eighths of an inch from the work, the point of the tool will not be moved from its place, though the plate be made to traverse through its utmost range. By this means another advantage is gained, namely, that the upper plate, with the tool-slide and its appurtenances, may be instantaneously removed from off the ground-plate, by merely loosening a small screw at the back of the endless screw, which presses the latter into the thread: this is very convenient, either for getting a better view of the work in case of any irregularity or doubt, and also in clearing away chips, which frequently get under the plate and impede its action.

We have now described all the parts of the engine necessary for concentric circular face turning; but the engine is also capable of turning the sides and edges of work, for which purpose it is provided with a separate set of waves cut upon the sides of the rosettes, some of which are made of larger diameter than others for that purpose. The rubbers are shaped at the side to correspond, the mandril has an endway-motion within its bearings, and is acted upon in either direction by the lever spring G, Fig. 20, which has its fulcrum upon the bench: its upper end is forked; and fits a groove in the mandril, and the lower held by an arm and pin.

For side-work the slide-rest is placed parallel with the bench as in common turning.

The excentric and oval chucks are equally applicable to the rose-engine, and need no further description.

The square, or straight-line chuck, the contrary, is peculiar to the rose-engine, and forms a very material part of it; the object of it is to lay the patterns in a straight, instead of a circular direction. Engines are made for this especial purpose, and a very excellent description of one, under the name of ' machine carré, ' may be found in the ' Manuel du Tourneur.'

Fig. 23 represents the straight-line chuck; the square frame A, A, is fastened to the two arms of the headstock, shown in Fig. 21, by bolts and nuts, or wedges; B, B, is a slide, connected with the nose of the mandril either by a chain or, what is better, a rack and pinion; on the face of the slide are click and screw-plates, and a nose to receive the chucks, as in the excentric and oval chucks.

This chuck, with the slide-rest set parallel to its face, is an exact representation, on a small scale, of the planing-machine before mentioned.

The patterns produced by the straight-line chuck offer
the simplest means of explaining the manner in which they are compounded from the simple waves on the rosettes.

We mentioned several sets of notches in the plate D, Fig. 20, to receive the tooth of the click on plate P; the distance of the notches apart is in proportion to the rosette; if it have eighteen waves, the notches used must be one-thousandth with the click alone, and so forth for all, and so for rosettes. A, Fig. 26, is the wave of which the patterns B, C, and D, are composed. B is produced by taking one division of the slide-rest screw after each wave is cut.

Fig. 26.

After cutting the first wave of C, take one notch with the click and two divisions of the slide-rest screw for each succeeding wave. For D, place the click in a set of notches three times as close to each other as those used for C, and for each wave take one notch and one division of the rest-screw, reversing the direction of the click at every third wave. For the last two patterns a rosette with only half the number of waves is cut.

E is produced by laying the second wave upon the first, but alternating; this is done by taking the click without moving the rest-screw; one division on the screw for the third, and the click only for the fourth; then take two divisions on the screw for the fifth, proceeded as before.

For F place the click in a set of notches of double fineness; take one notch and one division of the screw for the second wave, two notches only for the third, and one notch and one division for the fourth.

These specimens will serve to show the immense number of patterns which may be produced with twenty or thirty rosettes and their combinations. Many curious patterns are produced by using two rosettes, one fixed to the mandril, the other on the cannon: the former, not being affected by the click, will always lay the waves in the same position, while the latter may be shifted as above described, and by having one of the screw to advance and recede, the relative quantity of the two waves may be varied at pleasure.

For cutting copper or steel plates, or wood blocks, the tool is sharpened with two acute angles, one in turning gold and silver work the quantity of metal taken off is required to be so minute that the two faces of the tool must be rubbed to such an obtuse angle as to appear almost straight; for this purpose a small machine is used with an arm, against which the tool is held, that can be fixed at the required angle by a graduated quadrant: some of these sharpening tools are rubbed upon the oil-stone, others are screwed to the bench and the oil-stone rubbed upon a flat surface, with a small hole in the centre through which the point of the tool is advanced against a guide. The tool after being thus sharpened has the edge rubbed upon copper or Turkey-stone, and afterwards polished upon a piece of buff-leather charged with cork.

Close to the side of the tool in the rest is placed a stop, or touche, as it is called, to regulate the depth of the cut: the touche has a very small face highly polished, which is worked in advance of the tool, and can be drawn in or out by the sliding piece and screw S, Fig. 24. This touche is used with all irregularly-shaped work; but when the surface is perfectly flat, as it must to produce superior work upon plates and blocks, the tool-slide is kept put to the required distance by a screw pin and stop. It is for turning watch-cases, lockets, and other raised or domed work, either circular or oval, that the screw S and false centre C, Fig. 23, come into operation. The work being fixed on a chuck with centre, and set perfectly true to the mandril, the rest must be placed as before directed, so that the centre of the segment and quadrant is on the face of the work. The screw S, Fig. 23, is then turned back until the tool is at a right angle to the part to be cut; a plain circle or thread is cut round the outer edge of the work, and a rosette being brought into action the first wave is cut round close to the thread; the marking of the click and rest-screw depends of course upon the purpose for which the design is intended. But after each alteration of the latter the quadrant and screw must be turned till the tool is at a right angle as before.

The number of adaptations, on account of the various and irregular shapes of the different pieces of work to be produced, would take up too much space to describe. We shall only mention one for holding small cylinders, such as pencil-cases, on the straight line chuck: the work is placed on a steel mandril which is light, and with a small screw and a rubber over which slides, to prevent the work shifting its position. This mandril is held upright in a chuck, which has a small dividing plate and screw with a square hole at the top, and a pointed screw at the bottom. The tool is set exactly opposite the centre of the work, and the divisions are taken by turning the mandril of the chuck instead of the rest-screw.

Cutting the rosettes, which every engine-turner ought to do for himself, is an operation of considerable nicety, as the waves are generally very shallow, and it is necessary to make them work easily, and the slightest fault in a wave will be repeated through the whole work. They are generally placed upon a lathe, and the indentations cut out for the mandril, in a set of notches of the correct length and depth of the wave. Sometimes a straight cutter is used, which passes through a square hole in the centre of a piece of iron that swivels in a fork-shaped stock, and can be set out to any required radius and fixed by a screw. The face of the cutter is angular, and is always drawn by the rest-screw across the width of the rosette; a little only is cut out at a time, and the rosette is gone over several times until the waves meet each other, or are cut up. This is a slow process, but when carefully conducted produces a beautifully smooth rosette. The waves produced by both of these methods are divided from each other by a sharp line, which, except for rosettes of the highest description, must be rubbed down with great care, either by polishing or working very gently in the engine against a rough rubber. Rosettes of few waves are copied, or engine-turned, by means of an original guide placed upon the nose of the engine.

In 'The London Journal of Arts and Sciences, vol. 1, 1820,' is a full description, with engravings, of two very superior machines for engine-turning, invented by Messrs. Perkins and Heath, in which the rosettes are disposed on the mandril; so that they may be turned on a cam, which produces one wave only; but, by means of toothed wheels, as many of these waves as are requisite are introduced during each revolution of the mandril. The engine-turner may in this way, by a variety of patterns, with the greatest advantage of all the other parts of the outer parts of each other, not being subject, as is the case with rosettes, to irregularities of workmanship or partial insertions.

To this circumstance, among others, is owing the extraordinary beauty and regularity of the patterns cut by Messrs. Perkins and Co. on Bank-note and other plates, specimens of which are worthy of the most attentive consideration of the engine-turner. These gentlemen also introduced a system of transferring the patterns cut upon a steel roller, afterwards hardened, to any requisite number of steel plates: thus the patterns are reversed, producing white lines on a coloured ground, as in letter-press printing. Sometimes, after part of the pattern is thus transferred, the remainder is cut upon the plate itself, producing the effect of a mixture of copper-plate and letter-press printing upon the same plate.

Work of this description is generally cut with a diamond, as a steel tool is liable to break, or get dull, and destroy the uniformity of the effect.

We have enumerated the principle sorts of turning, and described the numerous implements, machines, and many ingenious and useful machines and tools which we have necessarily left unnoticed, and we refer our readers, for further information, to the 'Manuel du Tournear, par L. Berzner,' the 'Traité de l'Outillage d'Artifce,' par C. Trantactiont, et de la perfection, par C. Plummer, fol., Lyon, 1791, and our 'Transactions of the Society of...
In the wild state it is a native of Great Britain, and is less frequent in this island than in many other of the British isles. It has a cauculent, orbicular, depressed fleshy root, with the radical leaves scabrous and lyrate, whilst those of the stem are nearly entire and smooth. When we have variously fertilised and nourished roots belonging to the soil, and always bears yellow flowers. By cultivation the size of the plant, especially the root, is sometimes enormously increased. The young leaves and buds of the turnip are cultivated and eaten under the name of 'turnip-tops.' The root is often eaten when still in its green variety, and starch and sugar are deposited. The root of the turnip contains a large proportion of water. Dr. Lyon Playfair, in a late analysis of the food of cattle, made at the request of the Royal Agricultural Society, gives the following as the ingredients in 100 parts of turnips:—

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>89</td>
</tr>
<tr>
<td>Unoxidised matters (starch and sugar)</td>
<td>9</td>
</tr>
<tr>
<td>Albumen</td>
<td></td>
</tr>
<tr>
<td>Inorganic matter</td>
<td>1</td>
</tr>
</tbody>
</table>

There are several sorts of turnips known to agriculturists, which belong to the varieties *Brassica rapa depressa* and *B. oleracea*. In Scotland the latter is cultivated and eaten under the name of *Brassica campestris* and *Brassica napus*. The turnip is sometimes cultivated in the kitchen-garden, but its qualities for culinary purposes when grown are never so good as when obtained from open fields. The Swedish turnip, so well known in agriculture, is the produce of *Brassica campestris* and is a variety of that species known under the name of *B. c. Rutauba*.

**TURNIP-FLY.** A name popularly applied to the *Haltica oleracea*, a little insect belonging to the order Coleoptera, which annoys the farmer by destroying his crop of turnips, when in the early stages of their growth. The species of the genus *Haltica* are remarkable for their power of leaping, which is effected by means of the peculiar formation of their very thick hind legs. They are among the smallest of beetles, and are variously coloured with green, brown, or yellow, often brightly shining. Some destroy the cabbage, others flax, others tobacco, or hops; but the greatest evil arises from the power they possess of leaping, for these little creatures, which, though small in size, are many in number. They love sunshine, warmth, and fine weather, and eat away the surface of the young leaves of the plant with wonderful rapidity. Formerly it was usual to cut the roots in which the egg has been laid and attached by its parent, but does little or no mischief to the growth of the plant. It is the beetle which destroys the first smooth leaves or cotyledons of the turnip. It scents out the turnip crop from a great distance, and flies towards it even against the wind. It feeds by night, and during the day retires under the cotyledon. The parent insects are to be seen in the earliest fine days of February, and do not disappear before the end of October. They are not a pestish much feared until the latter end of September. There are five or six broods of these in a summer. Besides the *Haltica nemorum*, which is of a shining black, with a yellow stripe down each elytron, the *Haltica simila* and *H. flavina* are also destructive to turnips.

The destruction caused by these insects may be conceived when, so long ago as 1786, Mr. Young stated that the turnip crop destroyed in Devonshire alone was valued at £50,000; consequently, many entomologists have directed their attention both to the inquiry into the habits of the animal and the finding a remedy for the mischief it causes. Admireable essays on the subject have been published in the *Transactions of the Royal Agricultural Society of London*, and in the 'Journal of the Agricultural Society of England,' by Mr. J. Curtis, which may be consulted with advantage by the farmer.

Among the remedies which have been proposed are fumigation, watering with weak brine, steeping the seed in brine, applying lime and soot to the land, and the application of wormwood decoction and road-dust. The last has been greatly recommended in Germany, and there is an essay on the subject in the *Transactions of the Royal Agricultural Society of Vienna.* But English authors question its efficacy, and as yet it is very doubtful whether we have discovered any remedy which can check this mischief. 

**TURNIPS.** *Brassica rapa.* This well-known plant is cultivated for its bulbous roots both in the garden and the field. As a culinary root it has been prized from the earliest times, and many varieties have been cultivated for the table; but it is that of a larger kind, called *L. napius* in the fields, which form so important a part of the most improved systems of agriculture on all light soils, that the success of the farmer is, in general, proportioned to the fertility of turnip land. The foundation of all the best systems of cropping, by supplying the manure required for the subsequent crop, and, at the same time, clearing the land of all noxious weeds, by the numerous ploughings, stirrings, and hoeings which they require.

Turnips were first raised upon land which had already borne a crop that was reaped early in summer, and on flax which had been worked and cleared early, so as to leave a sufficient interval between the turnip and the time of sowing winter corn to have a tolerable crop of turnips. These turnips however, which are still cultivated by the name of stubble or eddy turnips, never grow so large as those which have been sown earlier on land well prepared and highly manured.

The regular cultivation of turnips on a large scale was originally introduced from Flanders into Norfolk and other counties of Scotland and the north of England about a century after. It was long confined to one or two individuals, who cultivated turnips very successfully; but at last it spread, and was greatly improved by those who adopted the Norfolk system. The usual mode of sowing turnips both in Flanders and in Norfolk was broadcast, and, as the labourers in both countries became very expert in hoeing them out at regular distances; this mode was long preferred. In fact the cultivation of turnips in rows is scarcely practised at all in Flanders, and, notwithstanding its evident superiority in respect to quantity of produce and economy of labour, it cannot be said to be yet universally adopted in Norfolk and the neighbouring counties; so slowly does every agricultural improvement spread among the great mass of farmers. All farmers however, who have any, practice the system of cultivation which was adopted the Northumberland plan, of which a short account will be found in the agriculture of that county in this work. But there are some particulars not mentioned there which are worthy of notice, and which may be highly beneficial to our farmers. The great object on poor light lands, especially those which have lately been brought into cultivation, is to raise a crop of turnips; for when once this is obtained, and the land has been improved by the folding of sheep upon it, there is no great difficulty in maintaining the fertility thus produced by judicious management and frequent green crops. Great improvement in poor soils has been effected by the introduction of ground bones as a manure, which have the peculiar property of favoring the growth of the turnip, and have consequently been used on poor light sands and gravels to a great extent, and with unrivaled success, without much help from farm-yard manure. It has however been found that a much greater profit is obtained from the land by uniting the regular application of farm-yard dung with that of the bone-dust. For this purpose the best farmers prepare their land, where they intend to sow turnips, early in autumn, by giving it as complete a cultivation as they can before winter; and they put on it a good coat of manure, and plough it in. In the beginning of summer another ploughing is given, with repeated harrowings, to destroy the weeds which are very numerous when the land has been thoroughly drained, the seed may be drilled in rows from 2 feet to 30 inches apart, with bones or any equivalent artificial manure on the flat surface. The turnip-seed can scarcely be too heavy either if they were on the top of a ridge, and the intervals can be readily ...
stirred by the plough or any other instrument adapted to the purpose. The manure, which has had time to incor-
porate with the soil and impart to it the various gaseous
products of its decomposition, is in the bed to be
ploughed with the roots and seed, as if were, on the bone-dust: a more rapid growth is en-
sured, which is the best preservative against the fly; and
experience has proved that this is a much more certain
way of preventing the growth of turnips than the old method of putting all the manure imme-
diately under the seed in the rows, where it often remains
inert if dry weather comes on soon after the seed is sow.
The manure, if put when the ground is moist or, very early
in spring, depends on the means of the farm: if ten cubic
yards of short dung can be afforded per acre, the crop
of turnips will amply repay it, and twenty bushels of bone-
dust or less per acre will be sufficient. The drill
may be safely ploughed in before winter, which
would be very improper in a light soil if used in summer.
This will be rotten after the turnips are sown, and all the expense of forming dunhills and
propagating them over, is saved. There is no danger of the
manure being wasted; for whatever weeds may be pro-
duced will be ploughed in and returned to the soil.
All the nutritious parts of the decomposing dung will be ab-
sorbed by the turnip plant, and consequently turned to good.
Where farm-yard manure is scarce, half the above quantity
may be used, and a fair crop of turnips may still be expected.
We have ourselves followed this method with abundant manure, also with half the usual quantity, the success
being always in proportion to the quantity of farm-yard manure.
The early vegetation of the seed is essential to a good
crop of turnips. In its young and tender state it is liable to
frosts, and injury by insects. Its growth is the result of
altica lenorum), which appears always in great quan-
ties, if there is any continuance of dry weather. The
more frequently turnips are sown on the same ground the
more liable is the crop to the fly, but where the ground has
been ploughed and burned there is seldom any loss from this cause.
Many remedies have been proposed for this evil, and some
with great confidence. It appears that the fly remains in the
stands of the ground, and that it is hatchet when exposed to
the light and heat of the sun. The time
at which it begins to attack the seed-leaves of the turnip
coincides with their vegetation, and it has therefore been
proposed to remove them with some appearance of reason, to let the
insects have the start of the turnips, by leaving the land some
time undisturbed before the seed is sown, and carefully
cleaning it so that the insect shall find no food, and conse-
quently die. This is supposed to require 10 or 12 days to
elapse, before the ground has been ploughed and raked; and in this
state, it is asserted that the ravages of the fly are thus entirely
prevented. However this may be, it is generally found that
in moist weather the fly does comparatively little harm.
Here the vegetation is rapid; and once it has put forth its rough leaves, is considered safe.
Whatever therefore accelerates the vegetation, will secure
the growth of the turnip. Hence the advantage of dunging
the soil before winter, by which means it is enriched uni-
formly, and a great portion of the manure, having become
soluble, absorbs moisture from the atmosphere. In very dry
seasons, if water is at hand, it is well worth while to water
the newly-sown rows by means of a common water-corn;
and if some advantage is to be taken of a late frost, the
effect will be astonishing. By means of two leathers how
two rows may readily be watered at once; and if the pond
steam be not above half a mile off, a vast extent of
ground may thus be watered in one day. Nothing brings
on vegetation so fast as diluted liquid manure, care being
taken that it be not too strong. The best time for water-
ing is in the evening or early in the morning; and if in a
fine summer's night, the water-corn be used before the
light, there would be no great inconvenience to the horse
or his driver. It sometimes happens in soils rather compac-
t, that a crust is formed on the surface which has been
hardened by frost, and this impedes the vegetation by
excluding the air necessary to its formation; in this case
no better remedy can be applied than watering, which
softens the crust and lets the young plant through.
As soon as the turnip-plant has put forth its rough leaves, the
interior of the rows should be covered with a
plough drawn up by one horse. The plough can be made
to go within an inch or two of the plants, throwing
the earth from the row into the interval: a small haule, which
can be set to any required width, is then drawn between
the rows to contain and turn in the earth, and the turf is
thoroughly mixed with the manure, and the
is greatly increased the absorption of moisture and vigour
the young plants. They may now be thinned out in the
rows by means of a hoe about 12 inches broad, which will
hoe out all the superfluous plants leaving little tufts a foot
or more apart. In some cases the turf is thinned entirely, and the
is left for the growth of only one healthy plant in each. Thus
the turnips are left at a proper distance, and, having ample room, will
cover the rows. A horse-hoe is now drawn between
the rows to even the earth, and prevent the stumps of
shoots from the ground, or, in wet weather,
will cover the rows, and prevent the earth from
the turnips from the row, so that the young plants will have
to help its growth. The fibres which draw the nourishment
strike in the soil below, and spread between the rows
wherever they meet with a loose and mellow earth.
In order to have a heavy crop, especially of Swedish
turnips, or rutabaga, it is advisable to sow the seed early
that is, in the beginning or middle of May. They will then
have the advantage of the summer showers, and be beat
the reach of the fly in a very few days, and when the
weather is threatened they may be covered up in their
roots, and the fibres, having struck deep, will
suffer any check. The only inconvenience of sowing early
is that many of the plants are apt to run to seed. This
a small danger is the crop which is used.
A well-grown turnip seed has been raised from fine seeds which have stood
in the soil, there is little danger of the plants running to
seed in the first summer; but, as is often the case, if small
imperfect roots are taken, or those which run to seed in autumn, then the plants will have a tendency to produce seed and
bulbs. The white Norfolk turnip and its varieties should
be sown about midsummer to have a good and heavy crop
before winter. The distance at which they may be left in
the ground for thickening, which may vary the various
has a wide spreading top or not. The best crops of
swedes and common field turnips are generally those when
the tops are vigorous and moderately spreading. A
large bulb will more than a large
in the leaves, the bulbs are seldom large.
It may be considered as a general rule, that the most
advantageous mode of consuming turnips is to draw them
and cut them in slices in the field, to be there consumed
by the fattening cattle, with corn or oil-cake, as well as
is regularly given. When the crop of turnips is abundant,
part of them may be stored for the cattle in the
or fattling-stalls, and for the milch-cows and before
they have plenty of turnips, and no hay whatever need be
less if for the horses: and even they will thrive well
Swedish turnips and straw with a small quantity of oil-
cake and turnip. The straw from the field all the winter,
which greatly deteriorates them. In those
before Christmas, they should be taken up, with the
tops on and set close together, covered with the tops on a piece
of grass or in some dry spot. They will thus be quite suf-
ciently protected from the frost; or the tops may be cut
off within an inch of the crown of the root, and they may be
stored in long clamps five feet wide and four feet high,
sloped like the roof of a house and covered with straw and
oil-cake. By this means they will keep through the winter,
which is desired.
It is advantageous to have different varieties of swedes,
which will come to perfection in succession; and it is
useful to sow some at different times for this purpose.
The small turnip, with its rapid growth is called the
nimble turnip, may be sown as late as the end of
August, and in mild seasons will produce tolerable
in winter and early in spring. The frost will not injure a
small turnip so readily as one which is come to perfection
and is not apt to do so. The tops of which are called
like the yellow Aberdeen and the green round turnip,
harsher than others, and will stand the winter well in a light
and dry soil.
There are so many varieties cultivated, that it is difficult
to enumerate them. The Swedish turnips may be classed
according to the colour and size of their tops and the shape
of the bulb. The best have but little stem rising from
the bulb; and a flower spike, generally, with a
leaf of leaves. The substance of the turnip
is of a bright yellow and has a strong smell, especially
in its winter growth.
when they have been kept some time. No frost will hurt them, if they are kept dry; but alternate rain and frost will do them harm. When they are dried, there is no fear that the air should have free access; and for this purpose it has been recommended to place them between hurdles set upright and to slightly thatch them with straw to keep out the rain. This will keep the roots of the round turnip sound than when put in clamps covered with straw and earth.

Of the field turnip there are numerous varieties. The common Norfolk turnip is round and flat, the bulb being large and fairly round, and having no tups except from the slender root which proceeds from the centre of the bulb. There is a subvariety which is reddish at the insertion of the leaves, and another of a green hue: the latter is the hardest. The globe turnip takes its name from the shape of the bulb, and is used in the same way as the round one. It is larger and of greater size; like the last it is either entirely white or red or green near the crown. It is on the whole the most productive and hardy. The tankard turnip rises high out of the ground, and approaches in shape to the mangel wurzel. It grows to the greatest size; but it is apt to become spongy if left long on the ground, and its weight is not in proportion to its bulk. There are red tankards and green tankards, as well as white. The green round turnip is considered very hardy, and is usually stored late to be consumed after the winter. The yellow Aberdeen, although somewhat less, is compact, and stands the winter well: it is a very useful variety.

New use of the Norfolk turnip. For the uninitiated, the more mentioned come the smaller turnips of quicker growth, which have mostly been taken from the garden. They should not be sown early, as they are very apt to run to seed in dry weather; but in a moist climate, they will remain of a small size and may be in perfection in three months. Thus they may be made to fill up the interval between the early eye or Trifolium, fed off in spring, and the wheat sown in autumn.

Those who are possessed of a good variety will do well to raise their own seed, as that which is bought cannot always be depended upon for this purpose; the best-shaped middle-sized bulbs should be chosen, the leaves being cut off below an inch from the crown. They should be planted in a mellow soil, in rows three feet wide, and a foot from bulb to bulb in the rows, about March or April. When the pods are well filled with seeds, and these are round and hard, the seed should be cut close to the root and carefully laid under a shed to dry. The seed will ripen there without shedding, and when the pods are quite dry, the seed is easily beat out with a stick or light flail. Birds are so fond of it, that a constant watch must be kept, and every seed thus striking the roads and lanes, it is necessary to guard against them. Turnip-seed is often raised in the gardens of cutters, whose children keep off the birds, and it is a branch of industry which every farmer should encourage. He can raise it where his labour thereon is paid for; but he should also guard against such seeds he wants, while the cutter is well paid for his trouble. This is perhaps the most convenient mode of raising the seed on a large farm. If the seed is kept in a dry granary, it will be good for several years. It is however best to use fresh seed, as it always germinates sooner. The seed is seldom steeped, but generally drilled in the rows by a drill-barrow or more perfect sowing-machine. The best farmers, even on land well manured and in good heart, sow with the seed some artificial manure, as bones, rape-cake, or rich drid compost, to accelerate the first growth of the plants. Machines which sow the seed and manure in drills at the same time may be had at most of the manufacturers of improved agricultural implements.

TUR. [Pericrete, vol. xvii. p. 442.]

TURPIKE ROADS. [Roads.]

TURPIKE TRUSTS. Turnpike-roads are a peculiar species of highways, for they were founded by the authority of Acts of Parliament under the management of trustees or commissioners, who are invested with certain powers for the construction, management, and repair of such roads.

By various Acts, there have been Acts of Parliament called General Turnpike Acts, the provisions of which extend and apply to all existing and subsequent local acts. The subsisting enactments upon this subject are contained in a series of Acts, collectively known as General Turnpike Acts; 4 Geo. IV., c. 16, c. 33, c. 65; 6 Geo. IV., c. 69, & 8 Geo. IV., c. 24; 9 Geo. IV., c. 77; 1 & 2 Wm. IV., c. 25; & 2 & 3 Wm. IV., c. 124; & 3 & 4 Wm. IV., c. 50; & 3 & 4 Wm. IV., c. 61, and 5 & 6 Wm. IV., c. 15, &c. The General Turnpike Act (5 & 6 Wm. IV., c. 50) also contains certain provisions applicable to turnpike-roads; but, by the 113th section, does not extend to them except where expressly mentioned.

The trustees of the roads consist of persons nominated for that purpose in the local Acts, who must be persons possessed of a certain property qualification, and of the justices of peace of the county or counties through which the roads pass; but all persons who are contractors or otherwise personally interested in the roads are disqualified from being trustees. (3 Geo. IV., c. 126, ss. 61, 62, et seq.) They are exempt from personal liability for acts done in pursuance of their powers, and may sue and be sued in the name of the committee, or as 8 Geo. IV., c. 24, ss. 2 & 3; 3 & 4 Geo. IV., c. 126, s. 74.

Every local turnpike act contains a reference to a plan of the road intended to be made, altered, or repaired; and by the general turnpike acts the trustees of any such roads are empowered to make, divert, alter, improve, and fence roads, to carry them through private or waste grounds; so as the road shall not exceed 60 feet in breadth, and to make compensation to the owners; but in so doing they shall not pull down dwelling-houses or buildings, or to deviate more than 100 yards from the plan under the local act, or to take gardens, &c., without the consent of the owners. Trustees are also enabled to purchase lands for the purposes of their road, and to secure the same by various clauses providing for the cases of contracts with persons incapacitated, of persons refusing to treat, of doubtful or disputed titles, and of lands subject to mortgage. They are not only empowered to construct new roads, to stop up old ones, and to sell the land and soil of them, or any other lands or tenements not wanted for the purposes of the roads; (3 Geo. IV., c. 126, ss. 81, 88, 89, 90, 91, 112); 14 Geo. IV., c. 99, 100, 101, 102, 103, 69; and 7 and 8 Geo. IV., c. 24, ss. 7, 8, 9, 10, 11, 12, 13, 14, 15, 18; and 9 Geo. IV., c. 77, s. 9.) Thus it appears that while in the case of other highways the property in the soil is in general in the owner of the adjoining land, subdivision in the case of the public ways under the turnpike act, the case of turnpike-roads the fee-simple of the road is vested in the trustees.

For the purpose of providing the necessary funds for making and maintaining the roads under their charge, the trustees are usually empowered to receive monies by way of subscription, upon which interest is payable to the subscribers out of the produce of the tolls which the trustees are by the local acts empowered to levy upon persons using the road, or upon those who are captured upon their mortgage upon the mortgage of the tolls. (3 Geo. IV., c. 126, s. 81.)

Under the common law, whenever a highway was out of repair, the inhabitants of the parish were bound, by actual expense, to repair it in good faith; but the Highway Acts, officers were appointed for the superintendence and management of highways, actual labour was allowed to be compounded for in money, and a power was given to raise funds by assessment for effecting repairs or improvements. By the conversion of highways into turnpike-roads the management of them is, as above stated, transferred to trustees, with peculiar powers to raise money for their maintenance; but it is not true, as has sometimes been supposed, that turnpike acts have the effect of relieving parishes and townships from the common-law liability to repair the highways. The obligation to maintain all public roads (with the exception of those which are to be repaired raionis generis, or clavaler, for the benefit of the owner and in the nature of a public tax. The repairing by parishes and townships of some part, and by counties of other parts, are merely modes which the law has provided for discharging that obligation, the raising of money for the public burden which those districts have to pay, and which is imposed for the benefit of the community; and tolls are an additional tax for the same purpose." (4 B. and Adol., 1073.)

The enactments of the General Highway Act (5 & 6 Wm. IV., c. 50, s. 84), relating to summary proceedings before justices to compel repairs of highways, expressly extend the jurisdiction of the justices to turnpike officers, servants, and such persons as are appointed to have the benefit of and while the liability to statute labour existed, it was exiguous as well in respect of turnpike-roads as other highways.
wants; but the obligation of statute labour seems to be now imposed by 5 & 6 W. IV., c. 50, of the statutes under which statute labour was compounded for. By the 3 Geo. IV., c. 126, s. 110, it is enacted that when a parish is indicted for non-repair of a turnpike-road, the court is to apportion the fine between the parishioners, provided it does not endanger the securities of the creditors who have advanced money on the credit of the tolls.

Trustees of turnpike-roads have power to enter into contracts, making or altering 4 roads, bridges, &c., and also to compound with persons or corporations liable by tenure or otherwise to the repair of any such roads or bridges; it being provided however that any alterations or improvements made in such roads or bridges are not to prejudice the rights and interests of any person or corporation. (3 Geo. IV., c. 126, ss. 106, 158; & 4 Geo. IV., c. 96, ss. 68, 78; & 7 & 8 Geo. IV., c. 24, s. 17.)

Certain powers are also given to trustees to take from the beds of rivers, common or waste lands, and also from lands belonging to individuals, upon giving satisfaction for damage, materials for the making and repair of roads. (3 Geo. IV., c. 126, s. 97, et seq.)

The amounts of toll exigible on any turnpike-road are regulated by the table of tolls which is contained in the local act by which the trust is constituted, and no tolls can be charged except as given by such an unambiguous language in the Act. Under the General Turnpike Act, 1815, &c., a number of tolls or carriages attending her Majesty or the royal family, or for horses or cattle carrying materials for roads and bridges, or manure (except lime, where a toll on it is authorized by the Act), for agricultural wheeled vehicles not sold or for sale, or for horses or cattle going to or from plough, pasture, watering, or being shod, &c., or from persons going to or returning from church, or from inhabitants of a parish through which the road passes attending funerals of persons dying and being buried within the parish, or from ministers attending their parochial duty, or for the conveyance of vagrants or of the mails, or for the horses of officers and soldiers on duty, or for the conveyance of limbs, goods, or money, or of such goods or money, or of ordnance public or store houses, or for horses and carriages used by yeomanry or volunteers upon duty, or employed in conveying persons to or from county elections, or for horses and carriages newly crossing turnpike-roads and not proceeding not exceeding more than 100 yards thereon. There are certain exceptions to these exemptions, with respect to gates within five miles of London. Penalties not exceeding £50 are imposed on persons fraudulently taking the toll. (3 Geo. IV., c. 1, s. 3; & 5 & 6 Geo. IV., c. 28, 32, 33, 36; & 3 Geo. IV., c. 95, ss. 23, 24, 26; & 9 Geo. IV., c. 77, s. 17; & 1 & 2 Wm. IV., c. 25, ss. 1, 3, 4; & 5 & 6 Wm. IV., c. 18, ss. 1 & 2.)

Toll-gates on turnpike-roads are always made payable once a day only at any one gate, and payment at one gate generally gives exemption from payment at other gates within a certain distance. Post-horses having passed through any gate may return toll-free before nine o'clock in the morning of the following day and, when horses having passed through a gate, return the same day or within eight hours. Travelling carriages, the toll paid on the horses is to be deducted. (3 Geo. IV., c. 126, ss. 29, 50.) Many cases have occurred upon disputed liability to payment of toll more than once a day. These have mostly arisen upon the wording of the clauses in the local acts imposing the toll; some laying them on the carriages and some upon the horses. (3 Geo. IV., c. 28, 32, 33, 36; & 3 Geo. IV., c. 95, ss. 23, 24, 26; & 9 Geo. IV., c. 77, s. 17: & 1 & 2 Wm. IV., c. 25, ss. 1, 3, 4; & 5 & 6 Wm. IV., c. 18, ss. 1 & 2.)

The trustees may sell, assign, or let any part of the road or roadway, &c., to pay money into the parish fund. (6 Geo. IV., c. 104, ss. 7, 8, et seq.)

The trustees are empowered to erect toll-gates and toll-houses, the property in which is vested in them, and are required to put up at every toll-gate a table of the tolls leviable thereat, and to provide tickets denoting payment of toll to be delivered to persons paying the same. (9 Geo. IV., c. 77, ss. 3, et seq.; & 3 Geo. IV., c. 130, ss. 37, 60; & 4 Geo. IV., c. 95, ss. 26, et seq.)

The trustees of every turnpike-road have power to enter into compositions for any term not exceeding a year at a time, and to raise such money as may be necessary therefor, and to agree with the local act, or to dispose by its terms, or to any amount not exceeding the rates authorized by the local act, proceeds from the tolls, so that where money has been borrowed on the credit of the tolls, no reduction shall be made without the consent of the persons entitled to five-sixths of the money due. (3 Geo. IV., c. 126, ss. 35, 36; & 4 Geo. IV., c. 95, s. 52, et seq.)

The trustees may also fix the tolls, though no express power be given in the local act, for any term not exceeding three years at a time. (3 Geo. IV., c. 126, ss. 35, 36; & 4 Geo. IV., c. 95, s. 52, et seq.)

These provisions, in connection with the appointment and duties of officers, the meetings and proceedings of trustees, the making of causeways, ditches, and drains, the erection of milestones, the watering of roads, the prevention and removal of annoyance and nuisances, the marking of carriage and of toll-gates, and the amounts of tolls. (Wellbeloved, On Highways, the Actual State of the Watering, as the Improvement of the Peace, by D'Oly and Williams, art. Highways Turnpike.)

TURNOLE. [Ancr.]

TURSTON. [Scolopiens. vol. xxii., p. 86.]

TURPENTINE TREE, the name given to some of the species of trees belonging to the genus Pistacia. The genus Pistacia belongs to the natural order Anacardiaceae, and is known by the possession of dicous flowers, which are without petals. In the male plants they are disposed in racemes resembling catkins, and each flower is accompanied with a frondlike scale; the calyx is 5-lobed; the stamens are 5; and thethers are 4-corrugated. The female flowers are also of a similar form; the stamens are wanting, and the calyx is 3-lobed; the ovary is 1-3-celled; and each cell contains only one seed; two of the cells of the ovary are sometimes found, and three or four arise from the same ovule. The fruit is large and round, and contains a single seed; two of the seeds of the ovary are sometimes found, and three or four arise from the same ovule.

The Venetian Turpentine-Tree, or Turpentine Pistachia-Tree (P. latifolius), is a free growing to the height of 30 feet. It has deciduous unpaired narrow leaves, of about 7 leaves, which are ovate-lanceolate, rounded at the base and acute or acuminate at the apex, and borne in opposite pairs. They are not stipulate, and somewhat furrowed, and when ripe of a dark blue colour. Its leaves and flowers emit a very heavy resinous odour. This tree is a native of the south of Europe and the north of Africa, and was introduced into this country about 1636: it is not however common. One of the
To procure it, a narrow piece of bark is stripped off the trunk of the tree in spring, when the sap is in motion, and a notch is cut in the tree, at the bottom of the channel formed by the removal of the bark. A little sap will then flow down, which will run freely down to it. As it runs down, it leaves a white matter like cream, but a little thicker, which is very different from all the kinds of resin and turpentine in use, and which is generally sold to be used in the making of lampflakes. Instead of the boxwood, the matter that is received in the hole at the bottom is taken up with lades and put into a large basket; a great part of this immediately runs through, and this is the common turpentine. It is received into stone or earthen pots, and is then ready for sale. The thicker matter which remains in the basket is put into a common alembic; and a large quantity of water being added, the liquor is distilled as before. Tar may be used as any oil, and particularly where, which is produced in large quantities, is then separated from the water, and is the common oil or spirit of turpentine.

The remaining matter at the bottom of the still is the common yellow resin.

Pix liquida, tar, is obtained by the dry or destructive distillation of several woods, such as beech and pines; but chiefly from the residual mass after the distillation of wood to procure pyrolygenous acid (wood vinegar). When condensed from fumes of white-oak, contains 92 per cent of a yellow oily liquid, called pix liquida alba; while from other trees it is a thick, oily, blackish brown liquid, heavier than water, with a disagreeable empyreumatic odor, and is used to manufacture fire salve, which it congeals at a very low temperature and durates a long time. It is inflammable, burning with a bright flame and much smoke. It is a mixture of creasote, picamar, paraffine, eupicone, acetic acid, and other products of dry distillation not accurately ascertained. The tar from the deciduous trees also contains oil of turpentine, while creasote is chiefly found in beech-tar, scarcely ever in pine-tar.

Tar is little fitted for internal use, and pitch is generally substituted for it. Tar diffused through water for some time gives a yellow colour to it, and gives it a yellowish amber-like colour. This has been much vaunted as a remedy in pulmonary consumption. The introduction of it has been attributed to Bishop Berkeley, but it was recommended even by the Roman physicians; it has nearly lost its character, especially since the isolation of creasote. An oil distilled from tar is sometimes confounded with creasote, as it is likewise incorrectly termed oil of tar. Oil of tar is beneficially applied to ringworm and other diseases of the scalp. Tar ointment is very efficacious in similar affections. Equal parts of tar and sulphur ointments will generally cure purigo favosa in a fortnight, but they have little influence over purigo scrotalis, for which creasote ointment is nearly a specific for these affections. Pix nigra, pitch, is procured by the evaporation or dry distillation of tar, of which it is the residuum, and its composition is the same, except from the absence of the volatile parts. This pitch is used in some cutaneous diseases, especially of the order squamas, such as ichthyosis. The ointment is also useful in diseases of the scalp.

Abies Balsamea, Poiret § Pinus Balsamea, Linn.; Abies Balsamifera, Michaux, the Balm of Gilead, or American Silver Fir, differs in several respects from the other fins, inasmuch as it seldom grows to a greater height than 20 or 30 feet; and yields a much finer turpentine, resembling resin in some of the oleo-resins of the Terebinthaceae, and designated Canada Balsam.

This juice exudes either spontaneously, when it is of remarkable purity, and then called spurious Balm of Gilead (the genuine is from Balsamodendron gilseidense), or false Balm of Mecca, or by incision. That which exudes spontaneously is most fragrant and transparent; this last property fits it best for optical purposes, such as preserving small objects for observation; it is also much used in some cutaneous diseases.

In warm weather, especially from the older trees, it exudes spontaneously, but it is procured more abundantly by incisions of the wood. It has the consistency of recent honey, and is nearly colourless, or only slightly yellowish, succulent, tenacious, glutinous, thickening when dry, till it has become a thick paste. Odour agreeably balsamic, resembling turpentine. Taste somewhat astringent and bitterish.

Like all tree resins, it is soluble in alcohol, ether, the volatile fixed oils, and is an oleo-resin.

According to Bonastre, 100 parts contain—
Volatile oil
A resin easily soluble in alcohol
A subresin of difficult solubility
Sapinol, like subresin
Acetic acid (traces and bitter extractive)

On account of the volatility of the essential oil, and to prevent the escape of the turpentine, it is necessary to keep it in very well enclosed vessels.

An inferior article, chiefly Venice turpentine, is frequently substituted for it. Its action is irritant and diuretic, and it is occasionally used in the same way as copaiba, both as injections of the urinary organs and in diseases of the chest.

Abies canadensis, or Hemlock Spruce, is said to yield a similar juice. The young twigs put in beer, instead of hops, form a hoppy, though more unpleasant, substitute for the latter, more solid. A spontaneous separation often occurs by the volatilization of a portion of the oil, and the rest absorbing oxygen, an oxide of oil of turpentine is formed, commonly known as colophony.

Those which contain most volatile oil possess the greatest power over the system, and the oil when separated still greater.

Cotton turpentine, or Resina liquida (Terebinthina vulgaris), as the natural combination is termed, yields two distinct articles to the Materia Medica, viz.: 1. Oleum terebinthinae, obtained by the distillation of the liquid resin; 2. Resina, or the subresin or resin, which resin with a little water, remaining after nearly all the oil has been distilled off; but if the process of distillation be carried as far as possible without causing new combinations of the elements, all the water is driven off, and the residuum becomes the subresin or resin, known as Turpentine or Turpentine mass.

Oil of turpentine is soluble in highly-rectified spirit, one ounce of it communicates its odour to it: also it can be united with water, forming a hydrome (or estoaroon) which crystallizes as colourless prisms, shining, pellucid, inodorous, and as alcohol, chloroform, and carbon tetrachloride: The odour of it is.

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Oil of turpentine possesses the property of dissolving phosphates. When formed into an emulsion it not infrequently happens that the phosphorus is driven off, and the presence of oil in the oil of some free acetic acid or benzoic acid. Oil of turpentine taken internally communicates to the urine an odour of violet oil of turpentine is one of the most energetic of the volatile oils: the vapour is quickly destructive to plants, and in large doses it acts as a poison to both vertebrate and invertebrate animals. Like all volatile oils it acts powerfully on insects which regard the whole surface, hence it instantly kills wasps, lice, bees, and worms. It has a most potent action on the lower animals than on man, both externally and internally. Applied to the skin of horses, it blisters it more rapidly than the skin of man; and the action is penetrative, both by the external and internal organs. It has caused death in three minutes, while human beings have taken 3 ounces without any serious consequences. Indeed Dr. Christian states that he is not aware that it has ever produced fatal effects. Even low doses also have much as 10 or 12 ounces. (Moiroud, in Perec's Lecture).

In moderate doses it acts as a stimulant to the stomach

and whole intestinal canal; manifested by a grateful feeling of warmth, with greater activity in the mucous membrane of the intestines, and of the liver. The increase of secretion of these organs, particularly of the bile, causes more frequent evacuations: further, it promotes the secretion of the kidneys, and, likewise, but less evidently, of the sweat. In case of nausea, it causes a retching, which liberalizes the terbinafine olour to the cutaneous perspiration, and sometimes even causes an eruption on the skin.

Its effect on the vascular system is equally stimulant:

Dr. Copland made many experiments on himself, when he was health, and found that his pulse became more frequent, small, and contracted; with feelings of intoxication, anxiety, shiverings, a sensation as if the intestines were drawn towards the vertebral column, unpleasant eruptions, thirst, and a sharp hunger; sensations which food caused gradually to subside, without vomiting or diarrhoea. Very large doses produced temporary intoxication, and sometimes a kind of trance lasting twenty-four hours, without any subsequent bad effect.

Implicit reliance is placed on oil of turpentine against the tape-worm. It is in general recommended to be given in large doses, after repeatedly-dosed, mixed with madder syrup, and cinnamon-water, and is thought to directly kill...
the worm, rather than destroy it by removing the means of its further nourishment. But the most frequent remedy is by no means so eligible as that of small doses (3 to 5) per diem for a continuance, a plan recommended by Vogli (Pharmacogn., vol. ii., p. 169), and proved by Dr. Graves to be efficacious.

In chronic affection of the liver, obstructions from gallstones, &c., if no inflammatory state be present or approaching, oil of turpentine with twice its weight of spirit, followed, in the dose of from 10 to 20 drops, in yok of egg, twice a day, is found useful in many cases. It attacks the liver, and vena porta, &c. It is most likely, from its action on the liver, that it proves serviceable in chronic rheumatism. In sciatica, Dr. Cheyne recommends it in small doses, and applys it to the affected parts. It acts upon the intestines, lately, particularly of old and phlegmatic persons, and often removes the lower orders. Even typhus fever, if there be a tympanitic state of the abdomen, is benefited by it, and Dr. Cramoon has found it valuable in the yellow fever of Philadelphia. Dose from 1 to 2 drachms per diem.

Cholera asiatica, with spirits of ammonia. In obstinate constipation, in large doses. In scarlet fever, when the eruption does not come freely out, 10 to 60 drops in one to three glasses of water, in that proportion, is given. These are the utmost U.S. In chronic cramps, convulsions, and epilepsy (with only temporary benefit). In atony of the kidneys and bladder. In catarrhal vesicle, gleet, gonorrhoea, and leukorrhoea, it is often, and advantageously substituted for copalina. In atonic hemorrhages it is of the romance species, of anodyne, antispasmodic, applied externally, it is of great utility. Externally in burns, the linimentum terebinthinum, or hot dressings, is useful. In peritonitis with a tympanitic condition of the abdomen.

Oil of turpentine at a high temperature readily ignites, and burns with a fierce, dense, red flame, and much black smoke. This readiness to ignite and the copious evolution of smoke are easily explained by reference to its chemical composition. Consisting of a very large proportion of carbon, with some hydrogene, but no oxygen, it requires an elevated temperature, such as the proximity of a burning body, to cause it to rush into a state of combustion in order to satisfy the demands of the caloric. This property renders it valuable to enable a number of candles to be lighted readily, as in candelabras in public rooms, by merely immersing the end of the wick in oil of turpentine. The copious fumes of smoke render oil of turpentine an unpleasant article of combustion in private houses; but this objection may be completely obviated by submitting the oil to rectification, and burning it in a small lamp. A small quantity of oxygen is brought in contact with the particles of carbon, and thus little or no smoke is formed. This is done with the ampampha, which is merely purified oil of turpentine.

The only article yielded by the Turpentinaeceum which remains of importance is that whose biography is thus remarkable. It is the genuine Thuc, or Frankincense, has been already noticed. [Olibanum.] Chin or Cyprus turpentine, called also true turpentine, is obtained from the Pistaecia terebinthus. [Turpentine Tax.] This tree is a native of Barbary, Syria, the south of France, and, above all, of the Grecian Archipelago. The juice exudes naturally, but in very small quantity; and to procure it in greater abundance the inhabitants of Chios make in the stems and branches reverse incisions. Essential or ours obtained from one tree; hence it is very dear. It is of the consistence of new honey, tenacious, pellucid, of a light yellowish-green colour. The odour is penetrating and peculiar; and it is used in a bitter taste; but when adulterated with any of the coniferous kinds, its odour is strong, its taste acrid, and of a sensibly bitter taste. It consists of a volatile oil and resin, and when by the tincture the former is dissipated or oxidized, it becomes hard and transparent. This article is scarce in a pure state, being mixed largely with Venice turpentine, and indeed in many instances altogether supplied by that article. It was greatly esteemed by Hippocrates; and in the presence of it, it was esteemed the most necessary and best preventive of disease. It is medicinal, and, when smoked like tobacco, are found very serviceable in some cases of asthma. See Th. Martinius, Ueber Gallae Pistatchae, with figures, in Annales Pharmacie, p. 21, 179; D'Expert, in Materia Medica, p. 97, and iii., p. 254. They are obtained chiefly out of Dalmatia, and are called Caro of the Legno di Giula. They appear to be a different article from those found on the south side of the promonture of the Aphis Pistachia, in which a considerable trade is carried on in the Levant for the purpose of dyeing silk.

TURPETHE MINERAL. [Merc. xy, 110.] TURPIN or TILPIN, Latinezed TURFINVS, was originally a Benedictine monk of the church of St. Denys near Paris; but Charlemagne raised him, in a.d. 773, to the archbishopric of Rheims. This dignity he held until his death, a.d. 811, or, according to others, 813. There is a Latin romance in verse containing an account of the expedition of Charlemagne into Spain against the Saracens, of his conquest of the country, and of the heroic death of Roland in the vale of Roncesvalles. This poem, which is entitled *Historia de Vita Caroli Magni et Rolandi,* was formerly ascribed to Archbishop Turpin, as is stated on the title-page of several MSS. But among the many arguments which have been advanced against that opinion, one is sufficient to show its inconsistency. The author of the romance speaks of the death of Charlemagne as an event which is an attested fact that Archbishop Turpin died before the emperor. The work was in all probability composed about the end of the eleventh or the beginning of the twelfth century. Whether the account of the death of Charlemagne is false, or the history of Turpin, and thus gave rise to the confusion, or whether it is a mere forgery, for which the circumstances of those times offered many temptations, cannot be decided. Thus much only seems clear, that the writer of the romance speaks of Charlemagne as the model of a hero in combating paganism and the pagans, and thereby to work upon his contemporaries, so as to rouse them to take part in the Crusades. The tendency of the poem is a religious one, and it bears great marks of being the work of a learned monk, especially in the subtle disputes between the heroes, who fight as much with their tongues as with their swords. Notwithstanding all this, the work is of great interest, being one of the earliest poetical productions of the middle ages. It is printed in S. Schardius' and Reubier's collection of *Scriptores Rerum Germanicarum.* A separate edition was published by Ciampi at Florence, 1822, 8vo., and in 1874.

(Vossius, De Historicae Lat. p. 298; Bayle, Dictionnaire HIST. ET CRIT., under 'Turpin.')

TURPIN DE CRISSE, LANCELOT, Comte de Crisse, a writer on tactics, of considerable celebrity, the materials for whose biography are not only genuine, but of the highest account, astonishingly mengre. He was born in La Besuce, of a noble family, about the year 1715. He entered the army young; obtained a company in 1734, and a regiment of hussars in 1744. He distinguished himself in his charge of colonel in the wars of Italy and Germany, and was promoted to the rank of brigadier-general.

In the midst of a successful career (about 1737) he accumulated his friends by recompensing the world, and commencing a novitiate in the abbey of La Trappe. His flight from that sanctuary of asceticism was as abrupt as his entry into it. Soon after this unsuccessful attempt to make himself a saint, he became the husband of a daughter of the Marquis de Lavendhal, a lady of literary tastes, called by her contemporaries the secretary of the Abbé de Voisenon, who nominated her his literary executor, an office which, like some literary executors of a later date, she discharged by publishing all the rubbish of his study.

In 1754 Turpin de Crisse made his début as an author by publishing, in conjunction with Castillion, the "Amusements Philosophiques." The epitome dedicatory to J. J. Rousseau was composed by our author. Rousseau remarked, for his encouragement, that the work was not bad enough to entitle its author to despair of attaining eminence, not good enough to entitle him to dispense with the better.

In the same year appeared a more important work by Turpin de Crisse: — The Essay on the Art of War, upon Vol. XXV. — 3 K.
which his reputation mainly rests. It was translated into German by the express orders of Frederic the Great. Li-
gonier accepted the dedication of the English translation by
Captain Olive, and the dedication was inserted in Rollet's
and notwithstanding the advance made in the theory and
practice of war since the time of its publication, it is still
regarded as a work of authority. The war is divided into
five books. In the first everything (proportion of a campaign
and the disposition of sieges) is systematically ex-
plained; the second treats of the precautions to be ob-
served in attacking the enemy in the field; the third,
of cantonnements; the fourth, of attacking the enemy in quar-
ters; the fifth, of partisan warfare and the management of
fight troops.

In 1757 Turpin de Crisse was recalled to active service;
and in 1761 he was created Marshal-de-camp; and in 1771 he
was made a commander of the Order of Saint-Louis. In 1780
he was raised to the rank of lieutenant-general, and ob-
tained in the following year the appointment of governor
of Fort Scarpe at Douai. His name appears in the list of
lieutenants-general in 1792. He was one of the emigra-
tion, and is supposed to have died in Germany in such ob-
scurity, that both the time and place of his death are un-
known. His wife died before him, in the year 1783: it
does not appear that they had any family.

Notes:—a. An article, not without reference to the
attention of the literature of his profession. M. Weiss
(who alone has endeavoured to throw some light on the personal
history of Turpin de Crisse) mentions, in the 'Biographie
Universelle des écrivains sur les Monuments de Mon-
cuclis,' published in 1792; and 'Commentaires sur les In-
stitutions de Végée,' published in 1770. Neither of these
are to be found in the library of the British Museum.
M. Weiss says of the former, that Turpin de Crisse confines
himself for the most part to the task of explaining his
author; of the latter, that the commentator confines him-
self to the first three books of Vegetius, but throws out
many suggestions in his notes, which have been adopted
without acknowledgment. The 'Commentaires de César,
avec des Notes historiques, critiques, et militaires,' men-
tioned also by M. Weiss as published in 1785, is a reprint
of Clarke's text of the 'Commentaries,' with Wallis's trans-
lation (altered in a few places by the Count) in opposite
columns, numerous notes, and plans of battles. The mil-
itary remarks of the editor are the most valuable part of
this edition.

The only works of Turpin de Crisse we have seen—the
'Essay on the Art of War,' and the 'Notes on Caesar'—in-
dicate extensive reading in the author, and a sobriety of
judgment for which the story of his entry and retreat from
La Trappe scarcely prepares the reader. The value of his
writings as expositions of military theory, may be in-
ferred from the predilection evinced for them by Frederic
the Great of Prussia.

TURPINIA, a small genus of trees of the natural family
of Celastrines, named in honour of M. Turpin, a French
botanist, and the author of several works; in the 'Annales du Musée d'Histoire Naturelle.' It is one of the
genera common to the West Indies, India, and the neigh-
bourhood of Canton—the Dalrymplea of Dr. Rox-
burgh having been found not to differ from the Turpinia
of Ventenat. The tree has the habit of Staphylea, with
opposite, impari-pinnate leaves, and stalked serrated leaf-
lets. The flowers are white, in panicles and polygamo-
daucous; 5-celled, 5-valved, with coloured margins. Petals
5, inserted in a 10-celled involucral disk. Berry trigonal, 3-celled; cells 2-3-seeded. Turpinia poni-
fera, the first discovered Indian species, is called junki-jum
in Sibthor, where it bears a yellow roundish fruit of the size
of a median.

TURQUOISE. Calcaie; Odontolite.—Occurs in bo-
ytrodial or mammillated masses. Colour greenish-blue,
of various shades. Fracture conchoideal, rough, and un-
even. Odor and taste: sometimes calcareous; sometimes
magnesiam; at the edges. Streak white. Hardness 4-5. Spec.
gravity 2-8 to 3-0. Occurs in alluvial clay in Persia.

It has been found to consist of—

<table>
<thead>
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<th>Substance</th>
<th>%</th>
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</thead>
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<tr>
<td>Phosphoric acid</td>
<td>30-90</td>
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<tr>
<td>Alumina</td>
<td>44-50</td>
</tr>
<tr>
<td>Oxide of copper</td>
<td>3-75</td>
</tr>
<tr>
<td>Oxide of iron</td>
<td>1-80</td>
</tr>
<tr>
<td>Water</td>
<td>19-00</td>
</tr>
</tbody>
</table>

The Occidental Turquoise, found near Simon in Lower
Languedoc, is stated to be merely bone coloured by phos-
phate of iron. According to La Grange, it consists of—

<table>
<thead>
<tr>
<th>Substance</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbonate of lime</td>
<td>8</td>
</tr>
<tr>
<td>Phosphate of iron</td>
<td>2</td>
</tr>
<tr>
<td>Phosphate of magnesia</td>
<td>2</td>
</tr>
<tr>
<td>Alumina</td>
<td>15</td>
</tr>
<tr>
<td>Water</td>
<td>1-0</td>
</tr>
</tbody>
</table>

95-1

TURRLEA, a genus of plants of the natural family
Meliacae, named in honour of an Italian botanist, G.
Turra of Padua, who died in 1607. The genus is charac-
terised by having the calyx 5-cleft. Petals 5. Stamens
10, joined into a long tube, 10-leaf at the apex, having
the anthens inserted between the lobes. Stigma 5-
celled, 5-valved, with a partition in the middle of
each valve; cells 2-seeded. Leaves simple, occa-
sionally pinnate. Many of the species are highly ornamental
forming trees or shrubs in the interior of the Cape of Good
Hope, in Madagascar, the Mauritius, and in the eastern
parts of India.

TURRET (from the Latin turris) is used as the dimi-
utive of tower (in German, thürmenchen), but in a par-
cular sense, denoting what is so described is small in com-
parison with the main structure, of which it forms only a part
or single feature. Turrets may be described as of two kinds,

As a rule immediately from the ground, and those which
are formed only in the upper part of the tower and raised
up loftier than the rest. Of the first mentioned kind are
stairs turrets, which are generally of very small propor-
tions and with small windows. Turrets of the last kind
are frequently attached to the angle of a taller part of
the building, in which case they usually rise above the latter in order
to afford access to its platform roof; owing to which circum-
stance they serve to contrast with the bulkier mass, and
produce greater play of outline. Thornham Castle, Ol-
esthorne, affords a fine example of an octagon tower
and a turret of the same plan thus combined. Gatehouse
turrets, or such as flank a gateway, belong to the same
class.

Turrets which show themselves only on the upper part
of a building are either merely carried up higher than the
general line of the roof or parapet, or else spring out so
to project and overhang the wall, on which they are sup-
ported by corbeling, &c.; and in such cases are some-
times distinguished by the name of Barlions, or Barlino-
turrets.

In the austere domestic architecture of both France
and Scotland, circular towers and turrets with conical roofs
are frequently characteristic features, and so numerous
that the whole structure seems to be composed of a cluster of them. Nearly the same may be seen
in some examples of our Elizabethan style, where groups
of turrets, pointing out the greater part of a larger tower,
are generally employed to cover the outline of the building.

TURRILITES, De Montfort's name for a genus of ter-
paceous Polyplutolamna, occurring in a fossil state in
the cretaceous formations. Mr. Sowerby ('Min. Conch.' vol
1) describes several species of these peculiar shells.

Shell spiral, turreted, chambered; the turns contigu-
as all visible: chambers divided by sinuous septa, pierced
in their disks; aperture round.

As far as we know, nearly all the species are sinistral,
the septa having generally the sinuosities of an antennae,
and the siphuncle is described by Mr. Sowerby as situated
in the upper (external) part of the whorls. The cavity
beyond the last chamber was very large, as in Nautilus, and
with the expansion of the external one, the shell was
extended. The British species (T. costatus, T.
tubercolatus, T. bergieri, T. undulatus, T. obliquus, &c.:
'Min. Conchology') belong to chalk and green-sand, and
are generally small species, with thin outer and the strata which enclose the same and other species in France and other countries.

The relations of Turrilites, Scaphites, Bulacites, and
Hamites to Ammonites are very obvious; and, as through
Goniatites this great extinct group is certainly connected to
the living and extinct Nautili, Mr. Owen has ventured to include them all in the Tetrabranchiate Cephalopoda [Cephalopoda], leaving Spirula and the Belemnitides with Sepia and the Dibranchiate types. However this may be, the determination of the relative affinities among the numerous fossil cephalopods, a point of great importance, must be worked out with the help of other considerations than the respiratory system. Since the article Goniatites was written, fossils of the genus Clymenia, Minuter, have been described, from Devonshire (Ansted, in 'Cambridge Trans.' Phillips, in 'Palaeozoic Fossils of Devon'); and as baculites are mentioned in the chalk of the south of England, we are furnished by the British strata alone with a complete and uninterupted succession on the subject. Thus, the transition of cephalopods of all geological ages. The results of a general survey of these numerous forms in the successive Palaeozoic, Mesozoic, and Cainozoic periods, have been presented in the article POLYTHALACAE, and we shall here add some considerations on the successive forms of the Ammonitide, to which by common assent all the genera of chambered cephalopods shells with sinuous septa are referred. These can hardly be said to appear distinctly in strata below the lens, though the undulated and serrated septa of the Centuries of the muschelkalk make the transition from the angular or undulated septa of the Goniatites and Clymenia to the simply sinuated Ammonites of the lens. [Compare the figures in the articles Goniatites and Polythalamaceae.]

The Mesozoic strata are thus seen to be the characteristic, and perhaps exclusive, repository of the Ammonitidae; and if we suppose them to commence with lens and cease with chalk, the distribution of the several genera will appear thus:

| Chalk formation | Ammonites | Baculites | Turritellae | Nautili
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<td>Upper oolite formation</td>
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<td>Lower Eocene formation</td>
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In the table here presented all species are reckoned Ammonites in which the involutions touch each other, and the last chamber, in which the animal was mainly included, forms part of the general spiral. In Cricoceratid species there are convolutions at their origin, and whose last chamber runs out in a tangential to the spiral. In some species the whorls touch, in others they are detached. (Thus might two genera be defined, the last being the true Cricoceratid of Levalle.) In Scaphites are undulated spiral or irregular at each extremity. Hamites here includes the aphonoid or hook-like forms figured by Mr. Sowerby. Turritelle comprehends the forms which are spiral round an axis, and Baculites those which are straight.

In this point of view the Ammonitidae with sinuous sutures are parallelized by the Goniatites, Lituin, and Clymenia of the Paleozoic rocks; while both Goniatites and Clymenia show the last chamber a part of the spiral. Lituin, and certain Nautili have it produced straight; and the forms of Phragmoceratids recall in some degree those of some Scaphites. Involute Ammonites, in which the inner whorls are embraced by the outer ones, occur in the lens, and through all the formations into the chalk (Orbulites of Lamark). Convoluto Ammonites, the inner whorls apparent, appear through the same ranges. Evolute forms, such as might be included in all Paleozoic rocks, may probably be found less rare, as opportunities of inspecting perfect specimens occur (such as on the railway cutting near Chippenden); Ammonites flindersi (Tumbein, Sowerby) may be one of these; Scaphites of Hartt is another; and Hamites sp. of Bethlen a third. But the greater number appear to be localised in the upper oolite and green-sand formations, and are specially abundant in the Speeton clay of Yorkshire. The apertures of Goniatites and Ammonites, when perfect, generally exhibit remarkable constrictions and extensions into lateral arculae, and occasionally suggest the notion of variability or even individual differences in form, which conducts to Scaphites. (See Goniatites reticulatus, Phillips's 'Geology of Yorkshire'; Ammonites Brakenridgii, A. Brongniartii, &c., in 'Min. Conch.,' and Mr. Pratt on Ammonites, in 'Phil. Mag.,' 1841.) Scaphites, having revolute instead of straight extensions, differ from Cricoceratid, and show a singular difference amongst one another. Scaphites equals, 'Min. Conch.,' tab. 18 (said to be from Yeovil) and also from the green-sand formation, but Yeovil fossils are from the lower oolite), has its extremities coiled in one plane, like an Ammonite. The same is the case with Scaphites Yonnani. But Scaphites obliquus ('Min. Conch.,' tab. 18) has its extremities coiled irregularly round an axis, and thus conducts us easily to Turritella with its spiral involute, and also to Hamites (Sowerby), with its tapering, incurved, but not spiral figure. Baculites may be viewed as analogous to a straight part of Hamites.

It appears therefore from these considerations that the main differences in the various groups of the Ammonitidae with sinuous sutures are such as have been also seen in the earlier analogous Paleozoic forms; viz. variations in evolution, convulsion, evolvement, and recurvation—in one plane round a mathematical central point; in an irregular free twist round a short axis; or in a regular spiral round an elongated axis. Evolution, recurvation, rectilinearity, twisting, and spirality round an axis, appear chiefly in the higher strata, among the last terms of this singular series of forms; and these abnormal configurations may perhaps be justly viewed as dependent on an alteration of the physical conditions which allowed of the remarkable abundance of the normal Ammonitic types—while in the total change of those conditions we must look for the cause of the entire suppression of this whole series of organization.

TURRITELLA. Mr. Montfort's name for a genus of testaceous gastropods, comprising those species of Mitra which have the whorls angular and the aperture lengthened and undulated.

TURRITELLA. It would be superfluous to state the different positions assigned to this genus by zoologists, some of which will be found in the article TURRITELLA, because the detection of the animal, a description and figure of which will be found below.

Generic Character.—Animal (see the description of Turritella rosea).

Shell turriticulated, pointed, rather delicate, generally striated in the longitudinal direction of the whorls of the spire, which are numerous; aperture rounded, entire, with the edges of the lip disunited above; the outer or right lip fragile.

Operculum horny, its elements concentric.

Examples, Turritella rosea, Quoy and Gaim.

Description.—Shell elongate-conical, smooth, transversely very slightly furrowed, rose, the whorls convex; the spire acute; the aperture subquadrate.

3 K 2
Turrilitta terebra.

Description.—Shell elongate-turreted, transversely furrowed, fulvo-rufescent or reddish; whose convex, very numerous, subequal, spire with a species grows to a length of between 4 and 5 inches.

Locality.—African and Indian seas (Lam.)

M. de Blainville remarks that the most living species of Cerithium by Lamarck come from the Indian seas, the coasts of Guinea, or those of America. Nevertheless, he says, twelve fossil species occur in France alone. Defrance, he adds, increases the number to 37, from the beds anterior and posterior to the chalk, of which five are fossiliferous in Italy, according to Brocchi, one in Touraine, and one, identical, in England.

The number of species recorded by M. Deshayes, in his tables, is 24 living and 18 fossil (tertiary); and of these Turrilitta terebra, Ligur, and two new species, are noted as living and fossil (tertiary).

M. Lyell records Turrilitta terebra from the flanks of Etna (clay and volcanic tuff) and from Syracuse, T. turrilitta, from Giganté (limestone and clay); T. subangulata, turrilitta, from Caltanissetta (clay and yellow sand); T. turrilitta again, from Caltagirone. Palermo, and Ischia; and T. duplicata from the last-named locality. Turrilitta occurs also in the list of Red Sea fossils noticed in the article TURRILITTA and elsewhere in this work. T. turrilitta, imbricatula, subangulata, turrilitta, and varico are recorded by the same author from Siena; and he figures Turrilitta proto as belonging to the Miocene tertiary period, and Turrilitta imbricatula as belonging to the Eocene tertiary period. Mr. Lea describes Turrilitta carinata and lineata from the tertiary of Alabama (Claiborne beds).

With reference to the occurrence of Turrilitta below the chalk, we would refer the reader to Dr. Fitton's Stratigraphical Table, where five species are recorded, ranging from the upper greensand to the Oxford oolite, both inclusive. Mr. Murchison describes four species from the Silurian rocks (old red-sandstone, middle and lower beds only; and the lower Ludlow rock).

Proto.

Those who acknowledge Proto as a genus, place it generally, next to Turrilitta.

Generic Character.—Animal unknown.

Shell turreted, elongated, with numerous spiral whorls, which are convex or gibbous, with a decurrent band at the future, as in Turrilitta; aperture oblong, round, expanded, with the lips disunited; the right lip trenchant, commencing backward much earlier than the left lip, which is very much expanded.

Operculum.

M. de Blainville, whose description this, observes that this genus, established by Defrance, seems to contain, as yet, but one living species. As to Proto turrilitta (the fossil), M. de Blainville thinks that it is either a species of Potamides or Pila. [MELANOPHUS.]

M. Deshayes, in his tables, records two living species of Proto and four fossil (tertiary).

TURRILITUS, HORATIUS, a learned Jesuit, whose real name was Torsellino. He was born at Rome in 1549, and belonged to a distinguished family of that city. He devoted himself from early youth with indefatigable zeal to classical studies. In 1562 he entered the order of the Jesuits. He afterwards taught in the institutions of his order at Florence and Loretto, and in 1579 he was appointed rector of the seminary of the Jesuits at Rome, in which office he continued to exercise a very beneficial influence for twenty years, down to his death on the 6th of April, 1599.

Tursellinus was one of the best Latin scholars that have ever lived, and his work on the Latin particles is still the best book on that subject. His principal works are: 1. De Vita S. Francisca, Xaveri Libri Sex; Rome, 1594, the best edition of which is that of 1596, 4to.: the work is of great interest, not only on account of the distinguished man who is the subject of it, but also because it contains much information about the missions of that time. It has
been translated into nearly all the modern languages of Europe. 2. Historia Laureana, libri quinque; Rome, 1598, 4to. This is a history of the miscellaneous inscriptions on the Virgin Mary at Loreto. 3. De Usu Particularum Latinorum Sermonum, Rome, 1598, 12mo. This very excellent work was reprinted and edited, with additions and corrections, by J. G. Schwartz in 1719; it is also printed in the English edition of Facettia's Lexicon totius Latinatis; the best edition is that of Hand, Leipzig, 1829, 8vo.

Epitome Narrationum Animalium, in ten books, written in the Italian language. Although it is very brief, it has always been held in high esteem, and has not only been continued by several subsequent editors, but also translated into several other languages.

For a more detailed account of the life of Tursellinus, see R. Retelius, who has incorporated his work on the Latin particles in his Scriptores de elegantiori Latinitate Selecti. (Compare Alegambie, Bibliotheca Scriptorum Societatis Jesu; Mandosius, Bibliotheca Romana.)

TURTLE. [Tortoises.]

TURTLE-Dove, Turtur communis (Columba Turtur, Linn).

Description. — Male. — Head and neck vinous ashy; on the sides of the neck a space composed of black feathers terminated with white, and charged at the upper part of the belly light vinous; back brown ash; border of the wings bluish ash; other coverta rusty with a black spot at the centre of the feathers; abdomen white; tail-feathers blackish ash; all, with the exception of the two intermediate ones, terminated with white; the lateral feather white externally; space round the eyes and feet red; iris yellowish red. Length about eleven inches and a half.

The Female has not the white front, nor the colour of the wings so bright; her quills are brownish, whereas they are blackish in the males. (Tennm.)

The Turtle-Dove, Turtur, is a native of Europe; Tortora and Turtora communis of the Italians; Turtel taube of the Germans; Turtel duf of the Netherlanders; Columbonen fair and Turtur of the Antient British.

Belon and others consider this species to be the Trigon textus of the Greeks; but though Hasequilct enumerates it among the animals which he saw in the Holy Land, the probability is that Turtur ritiorius [Columbidae, vol. vi., p. 573] is the Tur or Turtle of the Scriptures. (Gould.)

Bechstein states that these birds are found throughout the temperate parts of Europe and Asia, and also in many of the South Sea Islands. He says that they do not arrive in the woods of Germany till the beginning of April; and are seen in large numbers in that country in September; adding that they are often seen in great numbers in the forests of Thuringia, when the pine seed has ripened well; and that in 1798 there was a prodigious quantity. Pennant relates that Turtle-doves arrive in Italy in May and migrate in September; and the editor of the edition of 'British Zoology' (1812) remarks that they visit Greece rather earlier, and generally come during the month of April in four or five vast flocks. Temminck informs us that it is found high up in the north, but not in the regions of the Arctic Circle. Mr. Yarrell states that he finds no notice of the species visiting any part of Scandinavia or Russia. It was seen by Mr. Fellows in Asia Minor in 1836; and Mr. H. Strickland saw it in Smyrna in April, 1836. It probably winters in Africa.

Habitat, Food, etc. — The Turtle-Dove, says Mr. Yarrell, in his accurate and interesting 'British Birds,' now hastening to completion, is only a summer visitor here, and, like most of our summer visitors, coming from Africa, and returns there again before winter, not remaining even in the Italian states beyond the middle of autumn. These birds arrive in England about the end of April or the beginning of May, and are found very numerous in the south-eastern, southern, and midland counties than in those which are farther north. Their appearance is observed and hailed each returning spring, as denoting the season, flowers; as second pair of serenity and peace, their mournfully plaintive notes give pleasure. Sportsmen speak of a flight of pigeons, but they say also a due of Turtles, from dolce, the term having reference to the particular character of the voice of the bird. They frequent woods, fir plantations, and high thick hedges dividing arable land. They make a thin, almost transparent, platform nest, eight or ten feet above the ground, in the forked branch of an oak, on a fir-tree, or near the top of a thick and tall bush. Upon this nest the female deposits two eggs about the middle of June, according to the observations of Mr. Jenyns. The eggs are white, rather pointed at one end, one inch two lines and a half long, by ten lines in width. The parent birds sit by turns, the male occasionally also feeding his mate during incubation, and both afterwards mutually labouring for the support of the young. In this country they are considered as producing but one brood in the season, but in the south of France these birds are known to produce two broods in the same year. Their food is grain, particularly wheat, and they are constant visitors to the wheat-field while the corn is growing, and to pea-fields: they also feed on rape and other small seeds. In the autumn they fly in small parties of ten or twelve birds, and leave this country about the end of August, and sometimes as late as the end of September, particularly in those seasons when our harvest is backward. I have several times killed both adult birds and the young of the year when out partridge-shooting in Herefordshire; but I have observed that these birds are more numerous in the thickly-wooded parts of the middle of the county of Kent than elsewhere.

The Turtle-dove has been seen in Ireland and Scotland, as well as in England. With regard to the food of the bird, it is worthy of notice that the editor, in the last edition of the 'British Zoology,' states that the stomach of one of these doves, examined by the Rev. Hugh Davies, in the month of October, contained only some seed of the Polygonum arviculare, of rape and of mustard; it must therefore, he observes, at that season have declined from choice every species of bread-corn. Willoughby found hempoed in the crop of the individual examined by him.

This elegant dove would be a great addition to our homesteads; and though the migratory impulse is very strong, it may be overcome. Pennant states that about the year 1765 a pair came into his garden at Downing in the winter season, and continued there two or three weeks. Bechstein tells us that young ones reared by a domestic pigeon are easily accustomed to the dovecot; but as they are very sensible of cold, it is necessary to warm the place of their abode during winter. They multiply fast, either when paired with each other or with the Collared Turtle (Columba Turtur) ritiorius, and in captivity should be provided with a small straw basket to build in.

In Germany Turtle-doves (Columba Ptilopus), and Stock Doves are taken by choosing a place where salt has been strewn in parks for the deer, and so placing a net that it may fall over the birds whilst they are busy pecking the salt.

Few birds have been more sung by poets, or more appealed to by lovers. The old French quatrain in the 'Portraits d'Oiseaux' (1557) thus celebrates its constancy: —

'Si la turtle-selle ayant bes chantier,
Et m'aiguilles aux travers; imite
Quel ne ciera instruction donnée
Entre euns humains d'aymer jeau?'

TUSCAN ORDER. [Civil Architecture, vii., 229; Column.]

Turtle Dov. (Gould.)
TUSCAN SCHOOL OF PAINTING.

This school of painting is frequently called the Florentine School, and is divided into several epochs, the first of which is termed the old Florentine; but the school of Florence was not the school of Tuscany until after the middle of the thirteenth century.

In the earliest period of painting in Tuscany the principal painters were of Pisa and of Siena, and there is no essential difference between the works of these early masters and of the school of Florence. Ludovico di Bari, the first of the Tuscan masters, was employed in painting the Church of S. Lorenzo, in Florence. The works of Siena and Florence, of the early part of the thirteenth century, are the oldest masters of Tuscan. They were painters in Pisa before this time, but they were Greeks from Constantinople: and there are also paintings extant in Tuscany which are said to be of the same period, but they are probably the productions of Greek artists. In the church della Trinità at Florence there is a picture of Christ painted upon canvas, and glued upon a wooden cross, which is probably of the tenth century; it was done before 1003: and in the church of San Miniato al Monte near Florence there is a Greek painting of San Miniato Martire, of the eleventh century. (Ertria Pitrice.) This picture was at one time attributed to Cimabue, but it is now generally believed to have been done by a Greek artist of the Byzantine style. The spread of the Byzantine style among the Greeks in Italy, from the fall of the Roman empire, until the revival of painting in the thirteenth century, is certain, from the remains still extant in many cities of Italy; from the illuminations in many of the manuscripts; and from the pictures of popes in the Basilica of San Paolo, commenced in the fifth century by order of St. Leo, and from other evidence.

The first considerable efforts towards the revival of painting were made by the Tuscans, and the Tuscan painters throughout have done much towards its improvement and perfection in later periods. The following masters are among the most celebrated in the history of painting, both for their works and for the great changes they effected in the prevailing styles of the time.

Giotto di Bondone (b. 1267, d. 1336); Tommaso Guidi of San Giovanni, called Masaccio (b. 1401 or 1402, d. 1428); Leonardo di Vinci (b. 1452, d. 1519); Masolino di Coli Caprese, in the church of Arezzo (b. 1474, d. 1501); Ludovico Cardi of Cigoli (b. 1559, d. 1613); and Pietro Barretti of Cortona (b. 1596, d. 1669).

These painters, through the striking characteristics of their respective styles, made epochs in the history of painting in Tuscany.

I. The oldest Tuscan artists whose names are known are Niccola and Giunta of Pisa. Niccola Pisano, or of Pisa, was a sculptor, and the first restorer of design from the external appearance of the Byzantine style. He is endeavoured to imitate the style of a bas-relief upon an ancient sarcophagus at Pisa: he lived at the beginning of the thirteenth century. Giunta Pisano is the earliest Tuscan painter to whom extant works have been assigned; he is said to have learnt painting of some Greeks who were at Pisa about the year 1210. In 1220 he was employed in the church of Angels at Assisi: there is a crucifixion and some other figures painted upon a wooden cross, the colours of which are mixed in some medium not affected by water; and at the bottom of the cross there is a mutilated inscription, thus restored by Lanzi: 'Juntia Pistano Juntini me fecit.' The drawing is careful, but very dry, and the fingers are extended, as if he had been working, not of wood, but of the times. The expression in the heads however is good, the draperies are well arranged, and the colouring, though brown, is laid on with a strong impact. This crucifixion, says Lanzi, is not in line with a similar kind ascribed to Cimabue; he was however inferior to Cimabue in fresco. There are some frescoes by Giunta in the upper church of San Francesco at Assisi: he is not mentioned after 1235.

Contemporary with Giunta of Pisa, were Guido of Siena, and Buonaventura Berlinghieri of Lucca. The former was illuminator and painter: to a Madonna in the Maleviti chapel in the church of San Domenico at Siena is attached the following inscription:

* Ma Guido de Sclatl deploravit amnas
Quem Christus levis unla visit ago poesi.*

This is a parodic allusion to the line of Guido da Siena, who was the first to compose an ode to the Virgin, the text of which is:

'*Saneti Pravitato Fazit hoc operum.*

Anodie in furecundis arte probat:*

II. That the studying and cultivating the abilities of Giotto was not one of the necessities of the Church [Giotto.] Giotto surpassed all his predecessors, and he added as much to the art of his master Cimabue as Cimabue had added to that of the Greeks. In the mature
works of Giotto there are no traces of the Byzantine style: they made an epoch in painting; and from his time Florence dates its preponderance in the history of Tuscan art.

If Cimabue, says Lanzi, may be termed the Michelangelo of his age, Giotto may be termed his Raphael. Great as was the superiority of Cimabue to Giotto, the latter's style was the more remarkable, since that of his master was highly developed. In this work he painted in the cities of Italy, but his chief works are those in the lower and upper churches of San Francesco at Assisi. In these paintings there are heads worthy in expression of the greatest masters that have succeeded him; yet, notwithstanding his standing great merits, his design is extremely hard and Gothic, especially in his large figures: he paid also little attention to perspective or chiaroscuro; and although he brought painting far from its infancy, he still left it upon the whole as far from its maturity.

The scholars and imitators of Giotto were very numerous. The principal of them were Stefano Fiorentino, Tommaso di Stefano, called Giottonio, and Taddeo Gaddi, the son of Giovanni di Nino. These, however, declined in Giotto's time. Stefano was the first as virtuoso (scena della Naturam); Taddeo Gaddi, says Vasari, excelled Giotto in his principal works, which are painted upon the ceiling of the church of Santa Croce; and in the chapel Degli Spagnuoli, in the church of Santa Maria Novella. The pictures of these three saints seated in this chapel are magnificent in the character of the heads and in the style of the draperies, which they represent San Dioscoro, Arengario, San Pietro Lombardo, and San Severino Boeot: they are engraved in Latri's "Etruria Pittrice." Contemporary with Giotto was Giovanni di Cristofano, called Buffalmacco, the sculptor of the pulpit in the church of Santa Maria Novella, which is painted together a heaven and a hell in the Struzzi chapel in the church of Santa Maria Novella; and in the Campo Santo at Pisa, Andrea painted a Last Judgment, and Bernardo a hell. In the church of Santa Croce also Garinelli painted similar scenes: amongst the blessed he placed his friends, and amongst the damned his enemies. The best preserved works of Buffalmacco are at the Campo Santo at Pisa.

The celebrated scholars of Andrea Orcagna were Bernardo Nello of Pisa and Francesco Traini of Florence: of the latter there is a celebrated picture of Thomas Aquinas at Santa Caterina at Pisa.

In the earlier part of Frank's life Giottos was the famous Simone Memmi di Martino di Siena, celebrated by Petrarch in two of his sonnets for a portrait of Laura. The same poet mentions him also in one of his letters, where he says, "I have known two distinguished and excellent painters, Giotto, a citizen of Florence, whose fame among moderns is immense, and Simone di Siena." Simone was about 1254, and after distinguishing himself by many works in various cities in Italy, he went to Avignon, where he died in 1344. He excelled in compositions, and was very rich in invention. Vasari speaks very highly of his great works in the church Degli Spagnuoli, in the church of Santa Maria Novella at Florence, which was painted in 1332. Christ going to Calvary, and the Deposition are the most important of these compositions. In his works of greatest merit in expression, in composition, and in design. (Latri, Etruria Pittrice). There is in the Ambrosian Library at Milan a MS. of Virgil with the commentary of Servius, which belonged to Petrarch; and on the situation and design of the Virgil writing, with various characteristic accessories, by Memmi: it is supposed to have been painted for Petrarch, and that the poet wrote the following lines addressed to it:

"Marco Virgilio qui quaeris erudiatus, / in quiete qua tali pictura restat, / vosa voce ad sanum marmora retulit." (Virgil, Ec. 3. 15. 85-87.)

Shortly after the death of Giotto, in 1336, painters commenced to be extremely numerous in Tuscany. In the year 1349 the painters of Florence formed themselves into a corporation under the name of Compagnia di San Luca, and Donatello had the appointment of the company of St. Luke. This society was not however composed exclusively of painters: it contained various artists in metal and in wood, in whose business ornamental design was in any way concerned. A similar institution, but on a greater and more permanent plan, was established at Siena in 1355.

Other distinguished painters of this period were, at Siena, Lineo Memmi, Cecco di Marsilio, Luca della Robbia, and Bernardo del Banco di Siena. At Florence were Giovanni and Angelo Gaddi, the sons of Taddeo Gaddi. Angelo Gaddi was an excellent colourist; but he was content to imitate the works of Giotto and in his father's school Cennino Cennini was also a good colourist. The following are also deserving of mention: Starnina, Dello Fiorentino, Jacopo di Casentino, Spinello Aretino and his son Pari Spinelli, Lorenzo di Bicci and his son Neri, also also called Giovanni di Nicola. They all followed in the style of Giotto, as did likewise all the artists of Tuscany, until a better taste was spread by the works of Masaccio.

III. In the fifteenth century, when the Medici established themselves as the rulers of Florence, and that city gradually extended its power over the neighbouring territories, and became the capital of Tuscany in matters of art as well as of state, the arts were in a manner rendered dependent upon the caprices or tastes of its princes; and as the Florentine artists, through extended patronage, gradually evinced more activity, and acquired as a body a greater importance, those of Siena and Pisa proportionately declined. The improvements made in painting at this period were very great, and one of the most essential was the commencement of a proper application of perspective: the chief promoters of this science were Tommaso di Pietro da Firenze, who was comparatively neglected by other department of painting for the study of perspective. There is in the first cloister of Santa Maria Novella a picture of the Drunkenness of Noah, by Uccello, in which he has displayed his ability in this respect: Noah is violently and well foreshortened. Another department of painting which had been neglected by the school of Giotto was chiaroscuro. This was first attempted with success by Masolino da Panicale, who executed in 1423 and 1424 for the church of Santa Maria di Piazza the picture of the Virgin appearing to St. Peter and the Virgin and Child in the chapel of San Pietro in the church of the Carmine. Masolino is also less distinguished for having been the master of the celebrated Masaccio, who, if any individual is entitled to this distinction, alone can be styled the father of modern painting.

That many of the painters however who preceded Masaccio had great ability, even for any period, is certain; and it is also certain that they had recourse to the study of nature—a fact which proves that the knowledge of nature, without the knowledge of what to select for imitation, will not lead to the production of fine forms. And although beautiful forms have been produced by the exercise of the gift of the oppressed of the imperfect, the result of choice; for we sometimes find the finest parts associated with others so inferior, that from their juxtaposition the whole has an appearance of deformity, which arises both from the inequality in individual models, and from the painter's occasionally trusting his own knowledge and occasionally having recourse to the model. This imperfection could only be avoided by the adoption of a standard of form, which should preserve a unity of style in every degree—a standard which experience has shown us, it would require centuries to attain simply by the study of nature, because of the infinite varieties of form met with in individuals. This standard however already existed in the antique, and it required only the application of the principles of this to produce it; and to have been the first to do this efficiently constitutes the great merit of Tommaso Guidi, commonly called Masaccio, on account of the slveness of his personal appearance. Masaccio introduced a style of composition and design which is so perfect that the ancients, and Michel Angelus experienced no material change. Da Vinci and Fra Bartolommeo enlarged upon Masaccio's style. Michel Angelus invented a style of his own, and he outshone it. The style of Masaccio however continued, and almost, still lived in the works of Raffaelle and the principal painters of the Roman school. Yet the great improvement in design which was accomplished in the works of Masaccio was not entirely his own: Ambrogio Lorenzetti, Lippo Memmi, and Donatello had already prepared the way for the encrament in sculpture; and Gentile da Fabriano and Vittore Pisanello, with whom Masaccio became acquainted in Rome, had made great im-
provenance upon the Giottesque school in painting. Masaccio's great works are in the Brancacci chapel in the church of Santa Maria del Carmine at Florence: they have been engraven by Lusino and others. Masaccio died before the completion of these works, in 1428, in his forty-third year; he was buried in the cloister of S. Trinita, Florence, where is also the sculptor Tino dei Cammelli. Masaccio died before the completion of these works, in 1428, in his forty-third year; he was buried in the cloister of S. Trinita, Florence, where is also the sculptor Tino dei Cammelli: he died 1428. There are many other contemporaries of Masaccio, including the busts and portraits of several beautiful Florentine females, with many foreign tapestries condemned on account of their nakedness; and they were all burnt amidst the rejoicings of the populace.

In the following year, he painted the fresco on a large scale: on this was painted an illuminated copy of Petrarch. Fra Bartolomeo, Lorenzo di Credi, and other distinguished painters, took part in this fanatical destruction.

Fra Bartolomeo imitated, or rather painted in a very similar style to, Leonardo da Vinci. Several of his works are in many respects admirable, and in composition, in expression, in the cast of draperies, and in the broadest resemblance to the works of Raphael: the greatest figure of St. Mark, in the Piti palace, combines with the style of Raphael much of the grandeur of the prophet and abys of Michel Angelo in the Sistine chapel. Bartolomeo was the true master of Raphael: these two great painters contracted a friendship for each other in 1504, when Raphael was in Florence and only twenty-one years of age. Bartolomeo died in 1517, three years before Raphael, and painting in the style of Bartolomeo, and painted many excellent pictures.

Andrea Vannucci, called dal Sarto from the trade of his father (a tailor), was also one of the most distinguished of all the Florentine painters. He was the scholar of Piero della Francesca, and a man of great originality and wanted invention. His style in colouring and in chiaroscuro is similar to that of Fra Bartolomeo, but from the study of the cartoon of Pisano he had acquired much of the style of Michel Angel in design. His easel pictures are very numerous. He died in 1530.

Michel-Angelo Buonarotti, painter, sculptor, and architect, the scholar of Domenico Ghirlandaio, revolutionized painting not only in Tuscany, but in Italy, and really throughout Europe. His works in painting are of such common with that of any of his predecessors, he was anticipated in some of the greatest beauties of composition and design by Da Vinci and by Raphael. The chief characteristics of his works are severe grandeur of design and an occasional sublimity of invention: the frescoes of the vault of the Sistine chapel, painted in 1512, are in these respects unrivalled by any other works. The cartoon of Pisano had an equal number of compositions, and Michel Angel's superior work in design: it represented many soldiers of Pisano suddenly called to arms when bathing in the Arno and was a very superior work to the rival cartoon of Leonardo da Vinci. Benvenuto Celini calls these two cartoons "the greatest things which have happened to sculpture since the olden time, and were reserved for the public: Vasari speaks to the same effect. They were both lost a few years after they were made, in a manner never accounted for. Michel Angel's was cut in pieces. There is an old print of Leonardo's by Marcantonio and Agostino Veneziano both engraved parts of Michel Angel's. The style of Michel Angel has its faults, independent of its massive muscular development: he had but one standard of form for man, woman, and child; every age and every degree; his women are female men, and his children diminutive giants. His great works are his single figures, but his paintings are as statuesque as his statues, and express a similar character; his Moses, his David in sculpture; his Daniel, and his Jeremiah or Isaiah, in painting. His Last Judgment, a vast work, but the production of his old age, has the faults of his other works, without their grandeur or invention. He died in 1564, in his 67th year. [Roman School.] Michel Angel made many drawings, but he painted scarcely anything in oil. Though the great works of Michel Angel were executed at Rome, they influenced chiefly the Florentine school; and it has been said of him that during this period is true also of the Florentine, except that the painters of Florence, unlike those of Rome, were not held in restraint in their imitation of Michel Angel by any "rubric or "norma in painting. Michel Angel was a new and therefore the more palatable, and it was an imitation of manner only, not of style. The anatomical school is the
best designation for the Florentine imitators of Michelangelo. Francesco Granacci and Daniel Ricciarelli of Volterra were the least mannered of his scholars. The latter, with his name transformed by the Florentines into Da Volterra, found his way to Siena, where his style was more his own, and he profited by the school of Siena. His design, however, is his great care, and his Descent from the Cross, in the church of San Domenico, is reckoned one of the finest pictures in Rome. Another celebrated follower of Michelangelo was Giorgio Vasari; he is better known however for his lives of the painters, sculptors, and architects than for his paintings. He executed an immense number of works, but beyond a general correctness of drawing they have nothing to recommend them. Other followers and imitators of his style were Sebastiano del Piombo, from the Venetian study of Francesco Rossi de'Salvati, Jacopo del Conte, Angelo Bronzino, and Alessandro Allori. Painters of this period who were not carried away with the host of imitators were Franciscus II., Jacopo da Pontormo, and Domenico Puligo, scholars of Andrea del Sarto; besides some others of less note: also II. Rosso, or Matte Rosso, as he is called by the French.

VII. At the end of the sixteenth century a new style was introduced by Ludovico Cardi, commonly called Cigoli, which combined careful drawing with brilliant colouring. Santi di Tito preceded him in this indifference towards the anatomical school, and he was greatly assisted in this course of study by his friend of the Sienese school, the Signorine di Passignano. This school was founded upon the style of Baroccio and that of Correggio, and had much in common with the eclectic school of the Carracci. Its ascendency in a number of studios was broken down by the fine works of Bastiano Liguzi at Florence, and by the school of Francesco Vanni at Siena. These painters were followed by younger artists, by Giovanni Biliverti, Fabrizio Boschi, Cristofano Allori, Jacopo da Empoli, Giovanni Battista Vanni; also Matteo Rosselli, named Piu—later called II. Vortenzo, Baldassare Franceschini, called II. Vortenzo, and Francesco Boschi, an excellent portrait painter; likewise by Francesco Turini and his scholar Simone Pignone; and Lorenzo Lippi, like his grand father Ross, poet and painter. Also in a somewhat similar taste of colouring and design, though in a very different style of execution, painted Carlo Dolci; his elaborate finish however is the principal merit of his works; his coloring very green, yet some of his female heads are executed in exquisite taste. He died in 1686.

VIII. In about the middle of the seventeenth century another change took place in the style of the Florentine painters. The three famous frescoes in the Pitti Palace; he left them however unfinished: they were completed by Ciro Ferri, his most distinguished follower. Cortona paid little attention to expression; his object was to produce a grand effect on the whole: his style was decorative, and his works will not bear inspection in the part. As regards picturesque effect, he grouped admirably, and his compositions are extensive; and there can be no question that his style was the best that could be adopted for the manner in which it was applied on the ceilings of the Palaces and churches. He is the head of those artists called machinists by the Italians. His principal followers in Florence were the three Dandini and their scholars, Antonio Domenico Gabbiani and others, and Pietro di Mauro, all pupils of Correggio and Domenico Puligo. A second and more distinguished Florentine artist of the end of the eighteenth century was the landscape painter Francesco Zuccherelli, who both spent some time in this country: also Tommaso Gherrardini, who died in 1797, and Pietro Pedroni, who died in 1803, are reckoned among the best painters of their period.
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and it has since been gradually increasing at the rate of between 12,000 and 13,000 individuals yearly.

About one-sixth part of the area of Tuscany is planted with vines and olive trees; another one-sixth with arable land; nearly two-sixths are either forests or plantations of chestnut-trees, which afford food to the population of the mountains; and nearly as much again is pasture land chiefly in the Maremma. The total area was estimated in January, 1835, at 132,645, of which 790 were corporative bodies, either clerical or lay. Of the whole number, only ten enjoyed an income derived from land or houses of more than 100,000 Tuscan livres, or 5535. sterling; 10,000 to 30,000, or 3336. sterling, had the greatest number of whose income did not exceed 100 livres. The whole rental of Tuscany subject to the land-tax is, according to the new 'Catasto,' 44,335,000 Tuscan livres. There is a multitude of tenants who hold their tenements by 'livello,' a kind of life-estate for four generations, paying a fixed yearly rent either in money or kind to the owner. When the fourth generation is about to expire, the contract is often renewed by mutual agreement.

But the most common way of letting land is on the 'metayer' system, by which the farmer finds half the seed and implements, and gives the owner half the produce in kind. The landlord stocks the farm, and a valuation is given to him, which is to make up the deficiency on leaving the estate. Tuscany imports upon an average 860,000 sacks of corn yearly to supply its own consumption. The principle articles of produce are—wine, of which there are many kinds, some finer than others, but all inferior to those which are imported; oil, an article of common use among the people, and of which a quantity is exported yearly to the value of about 100,000. sterling; silk is exported, either spun or woven, of value about 120,000. The other articles of native produce exported are—fruit of various sorts, lambkins and kid-skins, potash, timber, cork, juniper berries, marble and alabaster, iron from Elba, borax, sulphur, alum, and anchoivos, which are fished off the coast. Nearly one-fourth of the whole trade of Tuscany with other countries is carried on through the port of Leghorn, which is also a great mart or exchange for all kinds of foreign produce. [Livorno.]

Horse-breeding is very numerous in Tuscany; the sheep are reckoned at 600,000; most of the flocks migrate in the autumn from the highlands to pass the winter in the Maremma. Cheese is made of ewes' as well as goats' milk. The common horse is of an inferior kind; some studs however keep up a superior breed. The asses are strong and fine. Pigs are reared in great number in the woods of the Maremma, where they feed upon acorns. A herd of about 200 camels is kept up on the grand-ducal coast of San Rosso, and is said to have been introduced there since the time of the Crusades. Game of most kinds is abundant.

The mineral products are—iron, from the island of Elba, through which, and in the bay, and on the opposite coast of the mainland, at Cecina, Valpianes and Follonica; copper from Montecatini; lead and marble from Seravezza; sulphur from Pereta and Ajola; rock-salt from Volterra; alabaster from Castellina Marittima; alum from Montioni; sea-salt is produced chiefly on the coast of Elba. [Elba.]

The manufactures of Tuscany are rather numerous: they consist of common woollen; woollen caps for the Levant; hemp and linen cloth; thread silk and silk stuffs, which employ nearly 5200 looms; paper, which is the best made in Italy; glass, leather, wax; coal, which is gathered on the coast of Barbaria and worked at Leghorn; iron-ware, alabaster vases and other ornaments wrought at Volterra; chiffon, silk, alabaster, alabaster vases, which were used in the manufacture, which was at one time of great importance, has been much declined of late years. [STRAW-PLAT MANUFACTURE AND TRADE.]

The grand-duchy of Tuscany is divided, for the purpose of civil and military compartments, or provinces—districts, named Firenze, Arezzo, Pisa, Siena, and Grosseto. Each province is administered by a podestà. The province of Florence contains 28 cancellerie, or districts, at the head of which is a cancelliere, or civil called cancelliere, and is subdivided into 90 'comuni,' or communes. Each commune is presided by a municipal officer styled gonfaloniere. The province of Arezzo has 17 cancellerie, and 42 communities; that of Pisa, 13 cancellerie and 53 communities; that of Siena, 104 cancellerie; of those communities, that of Grosseto, 9 cancellerie and 21 communities. For the judicial administration there is in every commune a magistrature, called in some places Vicario, and in others Pretore. There is primary courts for civil and criminal affairs, in each of the principal towns; four courts of appeal, three at Siena, Arezzo, and Florence, and lastly, a 'Supremo Consiglio di Giustizia Civile,' at Florence, which receives appeals in civil matters from the Ruote, and an 'Imperiale Reale Consulenza,' that watches over the observance of the laws. Florence is the supreme criminal court for the whole grand-duchy. In commercial affairs there are tribunals of commerce at Florence and Leghorn. The 'Presidenza del Re' at Florence, is the chief board of police for the whole grand-duchy. For the police of the principal towns, and a body of 'Birri,' or police force scattered about various points of the country.

The military establishment is small, amounting to about 6000 men in all; it is composed of ten battalions, into two regiments of infantry, each of three battalions, a regiment of cavallieri, a battalion of grenadiers, a battalion of artillery, a battalion of veterans, and a corps of invalids. There are besides three voluntary battalions of coast-guards.

The yearly public revenue of Tuscany amounts to sixteen millions of francs, or about 640,000 pounds sterling, derived chiefly from customs, land-tax, income-tax, stamps, government revenue, and the rents of public buildings and demesnes. The expenditure consists of 1,848,000 francs for the civil list, three millions for the military, and eleven millions for the expenses of administration and other items. The accounts are made up by mutual self-taxation, 'tasse-communali,' which amounts in all to about three millions of francs, or 130,000. sterling. Provisions on entering the walled towns pay an 'octroi' of duty, at the gate named.*

The grand-duchy of Tuscany may be considered to rank, for population and importance, with the minor kingdoms of the German Confederation, Wurttemberg, Hanover, Saxony, or the grand-duchy of Baden. The grand-duke of Tuscany is a prince of moderate rank, and is represented in all the powers of Europe; and although he is closely related to the imperial house of Austria, his dynasty is quite distinct from the imperial dynasty of the hereditary states. He stands in the same relation as the king of Hanover stands to Great Britain; the grand-duke is absolute, but he governs according to the established laws, customs, and precedents: he is assisted by a council of state, composed of his secretaries of state for the four departments of the interior, foreign affairs, war, and finance, and other honoratory members. He keeps charge of the courts at the courts of Austria, France, and the Pope. At the other courts he is represented by the imperial minister of the Grand-duchy of Tuscany, who is a member of all the principal ports of Europe, the Levant, and America.

The present grand-duke is Leopold II., styled 'Imperial prince of Austria, royal prince of Hungary and Bohemia,' and is the son of the late grand-duke of Tuscany, who was born in October, 1757, and succeeded his father Ferdinand III., in June, 1824. He married in 1817 a princess of Saxony, who died in 1832, and by whom he has two daughters. He married again in 1833, Maria Antonia, a princess of the Two Sicilies, who has given him a son and several daughters. One of his sisters, Maria Theresa, is married to Carlo Alberto, king of Sardinia.

The Roman Catholic is the established religion of Tuscany, and is professed by all Tuscans, with the exception of the Jewish population, which amounts to about 7000 individuals, chiefly at Leghorn and Florence. Foreigners of other Christian communions are not only tolerated, but are allowed the exercise of their respective worship in chapels for the purpose of Leghorn and Florence, as well as their own burying-grounds. There are at Leghorn a chapel of the church of England, a German Protestant chapel, and chapels of the Swiss and French reformed communion, and a Greek chapel, the last of the Eastern church. The number of resident Protestants in Tuscany is between three and four thousand.

The church establishment of Tuscany consists of three archbishops (Florence, Pisa, and Siena), 24 bishops (Florence, Arezzo, Cortona, Pistoia, Pescia, San Miniato, Livorno, Volterra, Massa Marittima, Grosseto, Montepulciano, Sovana, Montalcino, Colle, Chiusi, Borgo San Sepolcro, and Massa). The income of most of the sees varies between 4000 and 7000 dollars; a few have only 2000
dollars. There are many collegiate churches, besides cathedrals, and 2414 parishes. The total number of individuals in holy orders, exclusive of the monastic orders, was, in 1833, 1433, and the average number in any of the diocesan clergy, derived from land and houses alone, amounted to 2,264,380 Tuscan livres, or about 60,000 pounds sterling. The proof of their other sources of income is not known. In 1833, the secular clergy of Tuscany numbered nearly 14,000 individuals.

The monastic clergy in 1833 numbered 2461 monks or friars, distributed among 133 convents, of which 81 are possessed of property, and 52 are of the mendicant orders and are supported by public charity. The income possessed by the former, derived from lands and houses alone, amounted together to 542,645 Tuscan livres, or about 18,000£; but some of them have pensions assigned on the trusts of benefactions. The mendicant orders have 2,264,380 Tuscan livres, and 54 conservators, or houses for female education attached to convents, under the direction of nuns, and possessed among them of a capital of nineteen millions of Tuscan livres.

The profession of the law is in high esteem, and it can boast of many distinguished individuals for general as well as professional learning. Among contemporary names we may mention that of the influential jurist Collini, of Capponi, of Mignani, Capei, Guarrazzi, and Rosini, who are all known as authors. A Tuscan advocate in good practice can make a thousand dollars a year; some realize much more.

The great charitable institutions, besides the Universities of Pisa and Siena, and the Medical and Surgical College annexed to the great hospital of Santa Maria Nuova at Florence, give excellent instruction to students. The Universities of Pistoja, Pisa, and Siena, for instance, are attended by about 2500 students. The instruction is gratuitous. There are, besides, Collegi Convitti, or schools for boarders, as well as for day-students, at Siena, Volterra, Aretzo, Pistoja, and Pistoja, attended by about 1000 students; mostly under the direction of the Fathers Scholasticum Piarum, who are the chief instructors of the Tuscan youth, and who deserve great praise for their real and noble spirit. In every diocese there is at least one clerical seminary for those who study for the church, and several of them also admit external or day students; the whole number attending these establishments is about 1500. Lastly, the two Universities of Pisa and Siena have, under the direction of seminarians who are attended by about one hundred pupils, and the expense of each to the parents is about 100£. So the high form for Tuscan education.

Female education is afforded by the conservatories, boarding-schools, which are directed by nuns. There is one or more of these establishments in every town. Several of them have at the same time a day-school for poor girls. In Florence and other principal towns there are educatrices, or houses of education attached to several convents for ladies of the higher classes, who have the assistance of able teachers and professors. That of the Annunziata at Florence is one of the most distinguished; it admits generally about one hundred pupils, and the expense of each to the parents is about 100£. So the high form for Tuscan education.

Gratuitous elementary schools for boys exist in almost every commune, and are supported from the local taxes. There are, besides, private educational schools, some supported by benevolent individuals, and others paid by the pupils. In the principal towns, such as Florence, Livorno, Pisa, Siena, Pistoja, and Pistoja, there is an elementary school for each commune. These elementary schools are attached to convents or schools for girls in several towns. Those of Pisa, Pistoja, and Pistoja are styled 'normal schools,' and are supported chiefly by the public treasury. Florence alone has four of these, which are attached to the Grand Duke's School.

Among the special schools we must mention the Academy of the Fine Arts at Florence, and the College of Medicine and Surgery attached to the hospital of Santa Maria Nuova in the same city.

The education of youths of noble families, a number, though usually not a very wealthy class in Tuscany, used formerly to be afforded at home under a generally inefficient and pedantic tutor, usually a poor country priest, but now generally sent to the colleges for the nobility, the principal of which is the College of Nobility of Florence, directed by the Fathers Scholasticum Piarum. Nobility however is far from being an exclusive caste in Tuscany, as there are numerous offices and professions which impart the rank of nobleman to the holder, though not to his children. The Tuscan nobility has produced in all ages men distinguished for learning, and for their patronage of learning, and the present generation is not behind in this respect; the name of several very well-known agriculturists and promoters of education; of the Marquis Gino Capponi, a man of letters and a patron of learning; of Count Fossombroni, long prime minister of Tuscany; of the late Count Baldelli Boni, a well-known writer and readers.

Owing to the diffusion of education, industry, and commerce, and to the thrifty habits of the people, and the subdivision of property, the middle classes are more numerous and have increased greatly in Tuscany. In the mercantile class great consideration, especially at Leghorn, and several merchants have been raised to the rank of noblemen by diplomas from the grand-duke.

There are numerous establishments for the insane and the infirm. There are thirty-five hospitals for the insane, fifteen foundling hospitals (the number of foundlings taken in yearly is about 2000, five orphan asylums, several 'case pie di lavoro,' or industrial houses, twenty-four inns for vagabonds, fourteen inns for old beggars, and numerous 'confiterie,' or societies of charitable persons who assist the sick poor, the prisoners, give portions to poor girls being married, afford instruction to children, distribute clothes and other solace, and bury the dead. There is a considerable Jewish population at Leghorn who have their own charitable institutions and schools. A society of shareholders has begun a railroad from Leghorn to Florence. The track from Leghorn to Pisa was expected to be opened before now. Three Tuscan steam-vessels, two of 140 horse-power, ply along the coast of Italy between Naples and Marseilles.

The civil law in Tuscany is based upon the Roman and canon laws, and the principles of former decisions for ages past. A commission for the revision of the civil law was appointed by the late grand-duke Ferdinand, and it framed several enactments which received the sanction of the Italian Government. The judicial authorities are divided into judges of inferior courts, the lords of the feudal court, and the rulers of the nobility, and of guardianship and curatorship, the offices of judges of inferior courts, and judges of the courts of the nobility. Of the judges of the civil courts of the latter class at Leghorn, the court of assizes is the principal. Leopold I. issued in 1756 a summarium, or ordinance on criminal law, to which his son and successor Ferdinand III., added another ordinance dated 1753, of which are in print. The first stage of the proceedings in criminal cases, called 'inquisition,' is carried on, as in the Austrian states, in writing. Counsel is allowed to the accused, and the oral proceedings on the trial are public. Capital executions are very rare, the heads of the criminal are more usually punished for thefts. Death in duel is considered as willful murder, and punished as such.

The ecclesiastical and episcopal courts have no criminal jurisdiction in Tuscany. The state has no power over the conduct of the clergy, and in some cases may confine offending individuals of that body to a convent, with the previous sanction however of the 'Secretario del Regio Diritto,' who acts as minister of ecclesiastical affairs. Offences against the established religion are cognizable by the lay courts and police. Religious liberty is not allowed in Tuscany; but unless a person himself comes suspicious and offensive, his private opinions are respected. No inquisitorial court exists. Bulls from Rome have no power without the 'exequatur' of the government. With regard to vacant seates, the grand-duke proposes candidates and the pope approves.
as natives; they can purchase, inherit, and dispose of property without any restrictions.

Serritton, Statistica dell' Italia: Almanacco della Toscana: article on "Education in Tuscany," in No. 3 of the Quarterly Journal of Education; Private Communication.

History of Tuscany.—A sketch of the ancient history of the people of Tuscany under Etruria. Etruria extended southwards as far as the Tiber. After the fall of the Western empire, Etruria became a province of the kingdom of the Goths, and afterwards of the Longobards, under the name of Tuscia, Tuscium. It had been used by the Romans as Tuscia and Etruria. Under the Longobards it was divided into Tuscia Regni, which included the dukedoms of Luca, Firenze, and Clusium, and Tuscia Longobardorum, which comprised the dukedoms of Castro, the present province of Viterbo. Gradually Tuscia or Tuscany, became restricted to the former division only. Under Childebran and his successors Tuscany was administered by marquises, of whom the following is the series: Boniface I., Boniface II., who gained a victory at sea over the African Saracens, A.D. 626, and effected a landing in Africa near Carthage; Adalbert I., Adalbert II., styled the rich marquis; Wide, the husband of the famous Mary of Hungary, Lambert, Boson, Hubert, Humbert, and to Tadaldus and Boniface III., who was also Count of Mantua and Modena. Boniface III. being murdered near Cremona, A.D. 1062, his widow Beatrix married Godfrey duke of Lotharingia, or Lorraine. Beatrix died in A.D. 1085. His daughter, his heir by his second marriage, inherited all the dominions of Boniface III. Her career is noticed under Gregory VII. She died A.D. 1110, leaving no issue, and the series of the marquises of Tuscany ended with her; for though the emperors of Germany as kings of Italy continued for a time to appoint imperial vicars in Tuscany, their authority was little more than nominal, as the republics of Florence, Pisa, Siena, Arezzo, Pistoia, and Lucca divided the country among them. The sequel is given under Florence, Pisa, and Siena. (History of Tuscany.) Florence, having conquered Pisa, became the predominant power in Tuscany. The progressive encroachments of Florence are clearly traced on a map of Tuscany which Latta has appended to his biography of the Medici family, in his Famiglie celebri Italiane. Sketches of the latter years of the Florentine republic are given under Leo X., Medici, and Sforza. After the fall of the republic in 1530, Charles V. appointed Alessandro de' Medici, an illegitimate son of Lorenzo, duke of Urbino, to be duke of Florence. Alessandro proved an unprincipled, cruel, and absolute tyrant. He was murdered by his cousin Lorenzo de' Medici, in January, 1537, and the party of the Medici, headed by Guicciardini, the historian, proclaimed Cosmo de' Medici, son of Giovanni, 'delle bande Nere.' Cosmo was the founder of the grand-ducal dynasty of Tuscany, having united Siena to his other dominions. [Cosmo I.]

1574. Cosmo died, and was succeeded by his son Francis I., who had the vices of his father without his abilities.

1587. Francis died without issue, and was succeeded by his brother Ferdinand I., who did much to restore industry and prosperity. He was the benefactor of Leibnath, and might be called the founder of that commercial empire.

1609. Ferdinand died, and was succeeded by his son Cosmo II., who, assisted by his able minister, Pichon, followed in his father's footsteps. The military order of S. Giorgio was established by Cosmo I., to defend the coast of Tuscany and cruise against the Barbary powers, obtained various successes at sea.

1621. Cosmo II. died, and was succeeded by his son Ferdinand II., a minor. Ferdinand's administration was weak, and his long reign was an age of decline for Tuscany. His brother Cardinal Leopoldo de' Medici was a patron of the sciences.

1670. Ferdinand II. died, and was succeeded by his son Gian Gastone, who was careless of his subjects, and given to debauchery.

1737. Gian Gastone died without issue, and with him ended the grand-ducal dynasty of Medici. He was succeeded, according to an agreement between the great powers, by Francis, duke of Lorraine and Bar, whose territories were given to Stanislaus Leczinski, to revert to the House of Lorraine. Francis married Maria Theresa, daughter and heiress of Charles VI. of Austria, emperor of Germany. Tuscany was governed by a regency, while Francis and Maria Theresa, residing only for the brief period of their marriage.

1765. Francis II. of Tuscany and I. of Germany died. His eldest son Joseph succeeded him as emperor of Germany, and his second son Leopold succeeded him as grand-duke of Tuscany. Leopold I. will forever be memorable in the history of Tuscany as a period of revival of industry and prosperity, of improvement in every department of administration, of order, peace, and an enlightened legislation. A brief sketch of his administration will be given after a brief account of Leopold II. of Austria, as the third of the Medici dynasty of Tuscany.

1790. Leopold having succeeded his brother Joseph II. as emperor of Germany and sovereign of the Austrian dominions, and his eldest son Francis being thereby hereditary prince of the Austrian monarchy, the grand-ducal crown of Tuscany devolved upon his second son Ferdinando III., who followed the wise and liberal system of administration pursued by his father. In the war of the French Revolution, Tuscany remained neutral, and even concluded a treaty to that effect with the new French republic; but when Bonaparte invaded North Italy, in 1796, he disregarded the neutrality of Tuscany, and marched to Leghorn with a body of troops for the purpose of securing the French troops which were quartered there. The effects of this, the English occupied Porto Ferraio in the island of Elba. The grand-duke however retained a precarious possession of Tuscany.

1795. The French, after the fall of the Directory, ordered the occupation of Tuscany by its troops, and the grand-duke was obliged to withdraw to Germany. The people of Arezzo and the neighbouring districts rose in arms against the French, but were defeated by them in the field. On the decline of this, the English occupied Porto Ferreira in Tuscany in July of the same year. A provisional government was established in the name of the grand-duke Ferdinand.

1800. In consequence of the victory of Marengo, the French re-entered Tuscany, and the people of Arezzo, having resisted them, their town was stormed and pillaged.

1801. By the peace of Lunville between France and Austria, Ferdinand renounced Tuscany, which Bonaparte gave to Don Ludovico Bourbon, hereditary prince of the name of 'kingdom of Etruria.' The island of Elba and the district of Pisa were given up to France.

1803. Ludovico died, and his widow, Maria Luisa of Spain, became regent of Tuscany in the name of her son.

1808. Napoleon took possession of Tuscany, and sent away the queen-regent and her son, promising them a compensation in Portugal. Tuscany was united to the French empire, of which it formed three new departments, Arno, Ombrone, and Medicea, or Elba (island). Napoleon's sister, was placed at the head of the administration, with the title of grand-duchess.

1814. The grand-duchesse Elise quitted Tuscany, which was occupied by the allied troops under the grand-duke Ferdinand III., who returned to Florence in September.

1815. The Congress of Vienna confirmed the possession of Tuscany to the grand-duke Ferdinand and his successors, and annexed to it the whole of the island of Elba, and the State of Prezidij on the coast of Siena, to which were afterwards added the principality of Pisa, with other districts and fiefs. Maria Luisa, ex-queen of Etruria, as guardian of her son, was assigned the city of Lucca, to revert to Tuscany on the death of the arch-duchess Maria Luissa of Austria, wife of Napoleon, and actual duchess of Parma, when the duchy of Parma and Lucca shall revert to the grand-duke Ferdinand.

1816. Ferdinand ordered the drainage of the Val di Chiana. Plantations were made, and roads and farmhouses constructed. The same process was afterwards pursued in the Val di Nievole for opening the marsh of Pucciochio between Pescia and the Arno.
1824. Ferdinand III, died, much regretted as a kind and liberal prince, and was succeeded by his son Leopold II. The new grand-duke has continued the system of government, established by the late grand-duke, and undertaken the great task of draining the marsh of Castiglione and other marshes which corrupted the atmosphere of the Maremma, opening new roads, embanking rivers, and establishing new towns in the suburbs of Leghorn, supplying that important town with wholesome water by means of an aqueduct, and by other measures of like utility. At the same time he has reformed the judiciary system, established new tribunals, and, by encouraging popular education as well as scientific instruction, and has issued several useful legislative and economical enactments. Tuscany is decidedly the happiest and quietest country in Italy, being that in which the body of the people live together on the best terms, and in which a considerable degree of material comfort and intellectual refinement pervades the whole mass of society.

(Among the general historians of Tuscany we may quote Pignotti, Storia della Toscana fino al Principato; Galluzzi, Storia della Granducato di Toscana sotto il Governo della Cosa Medici; Reumont, Tavole cronologiche e sinonimi della Storia d'Italia; and Viti, Geografia, fisica, e storica, del Granducato di Toscana: for the literary history, Moreni, Bibliografia Storica ragionata della Toscana: for the geography and geology, Targioni Tossetti, Relazione di alcuni viaggi fatti in direzioni diverse dell'archeologico, e per le due Province Seneesi; and the Atti, or Memoirs of the Academy dei Georgi e Toscana.)

T. Farfara, Common Coltsfoot, has a single-flowered scape imbiculated with scapes, and corollate angular, leaves; white, silky, downy, and moist, chalky, clayey situations throughout Europe. Its flowers come up in March and April, and have often disappeared before the leaves ascend from the ground. Dr. Sibthorp found this plant in Greece, and believes it to be the Dioscorea of Dioscorides. It is the same species, with a different specific name, Farfara, from its leaves resembling those of the white poplar, which was called Farfara by the Greeks. This plant from the earliest times has had a great reputation for curing coughs; hence its generic name. The part used is the leaves, which are very large, and clothed on the undersurface with a dense white cottony down. They are mucilaginous, astrigent, and slightly bitter, and are used in the same manner as the officinal senna. It is a very valuable plant, as it is the reputed to be the basis of several quack medicines. In its wild state it is remarkable for growing where no other plant is to be found, especially on newly turned-up heavy clay soils. In these situations, it has sometimes led to the inference that its seeds were contained in the earth, and germinated when thrown to the surface. It seems however more probable that the seeds of the coltsfoot plant that emit a strong odour through the air, the seeds have thus been conveyed to the place where they have found a fit soil for their development.

T. Petasites, Common Butter-bur, has a dense oblong thyrse, with corollate unequally toothed leaves, downy below, and the flowers and fruit are abundant in wet meadows and by river sides. It has long creeping roots, by means of which it is rapidly and extensively reproduced, and is a great pest in moist meadows, where it delights to grow. Like the last species, it puts forth its flowers in April and May before its leaves. On account of its early flowering, the Swedish farmers plant it near their bee-hives. Dr. Sibthorp found this plant in Greece, and believed it to be identical with the Petasites (seringa) of Dioscorides. This is the specific name of the plant, and comes from petasus, a broad covering for the head. This plant produces the largest leaves of any in Great Britain, sometimes measuring three feet broad. The butter-bur was at one time supposed to be a remedy of value in the plague, from which it has got the name Pestilent-wort. This species has been made a genus, under the name Petasites, by Gurtner, who is followed by Cassini, Desfontaines, and others. It is distinguished from the genus Tussilago by its involucre having two rows of lanceolate scales, by its flowers not being radiant, and by its scapes being many-flowered.

T. fragrans, Common Sheep-grasses, is a narrow fastigiate thyrus, radiant heads; roundish, corollate, unequally-toothed leaves, and downy beneath. This plant blooms early, and has a sweet scent, and has found very generally a place in gardens. It is a desirable flower where bees are kept. When these plants are cultivated, they may be propa-
gated by seeds, which should be sown in spring, but not at too great depth. They may be also propagated by part-
ing the roots into pieces, according to the rapidity with which they increase themselves by their roots, they should be planted in gardens in pots, otherwise they may become difficult to get rid of. Most of the species send up their flowers before their leaves, and are placed with others by gardeners in a class called 'filius ant-patrem.'

Tussilago Farfara (Coltsfoot), a perennial plant belonging to the order of compound plants, common in damp, valley & road-sides, and banks of streams, the yellow flowers of which are seen in spring preceding the nearly heart-shaped, smooth-toothed leaves, which, from their resemblance to a young horse's hoof, have received the popular name of coltsfoot. The whole plant is nearly devoid of odor; its root has a slightly bitter taste; the leaves and flowers are bitter and mucilaginous. The chief constituents are mucilage, bitter extractive, tannic acid, colouring-matter, salts, and woody fibre. The watery infusion becomes of a dark green and turpentine addition on the addition of a solution of sesquichlorides of iron. Its properties may easily be inferred from the above statement; they are demulcent, slightly astringent, tonic, and expectorant. Its name both in Greek (βωτος) and in Latin proves the estimation in which it was held as a means of relieving cough—a reputation which it does not maintain in modern times among professional observers, except a very few; but with the vulgar it is still in great estimation. This herb is smoked it rather than used in any other form; and in the north of Europe, and even with our own vulgar, this mode is employed, what is sold under the name of British Herb Tobacco being chiefly coltsfoot. It produces little heat; in fact, so the nostrum called Essence of Coltsfoot, which is a combination of balms of tulip, compound tincture of benzoine, with a large quantity of rectified spirit of wine, and not a particle of the substance from which it takes its name. In chronic coughs accompanied by much local or general irritation, still more in genuine tubercular consumption, such heating ingredients must be very hurtful; though a plain decoc-
tion of real coltsfoot would be unobjectionable, and might be of use. The leaves of pellets, when steeped in warm water, an excellent emollient poultice.

Tutbury. [Staffordshire.]

Tutela. [Tutor.]

Tutenag, an alloy used in China in the manufacture of the gong; it is white, resembling silver in appearance, and is very sonorous when struck. Its specific gravity was found by Dr. Frye to be 8.432; it is susceptible of a fine polish, and not readily subject to cold commis-
ture, and even at a red heat, it is malleable, but when heated to whiteness it is rendered brittle.

It has been analysed by Dr. Frye, who found it to consist of—

<table>
<thead>
<tr>
<th>Substance</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>40.4</td>
</tr>
<tr>
<td>Zinc</td>
<td>25.4</td>
</tr>
<tr>
<td>Nickel</td>
<td>31.8</td>
</tr>
<tr>
<td>Iron</td>
<td>2.8</td>
</tr>
</tbody>
</table>

German silver, which is now extensively used as a subs-
stitute for silver, is also an alloy of copper, zinc, and nickel.

Tutilio, a celebrated monk of the latter part of the ninth century, of the convent of St. Gall in Switzerland. The first mention of the name of the convent, which was in the year 838, were the most celebrated pietists, painters, sculptors, and gold-workers of their time in Germany. Tutilio was a universal genius, and not only an artist: he was musician, poet, orator, and states-
man. Ekkehard, junior, an old German Latin writer, thus describes him:—Erat enim valde eloquentes, voce clara et dulci, cacaturae elegans, picturae artifex, mirificus aurifex, musicos, &c. The emperor Charles the Third complained that such a man should be shut up in a convent. The story is related with a true spirit by Salomo of the German Abbey of St. Gall (801-921), who was a great patron of the arts, and he made for him a golden crucifix, richly ornamented with bus-reliefs and precious stones. He made also a cele-
brated sitting of the Virgin Mary, in gold, for a church at Metz, by which he acquired the celebrated cele-
bere the inscription, 'Hoc panetha pia caelaverat ipsa Maria.' One account says painted. This image or paint-
ing was venerated at Metz. In the church of St. Ottmar, also at St. Gall, the altar of St. Gall was decorated with an image of Christ crucified, engraved or carved by Tutilio. He is said to have died in 896, and this date is twice repeated by Florillo; yet he calls him a monk of the tenth century. Other writers also say that he was an archdeacon of Metz. It has been supposed that Tutilio, or Tuotilo, as his name is also written, and the Theophilus Presbyter who wrote a treatise in Latin upon oil-painting and other arts in about the tenth century, were the same, though no manuscript or script of this old treatise, more or less complete, at Wofenbüttel, Leipzig, Paris, and Cambridge. An ancient copy of the Wofenbüttel MS. was printed in 1781 by Brunwick, in the sixteenth number of Lessing's Beiträge zu einem historischen Geschäftswiga, and is known under the title 'Theophili Presbyteri Dier-
sarium Artium Schémata,' also 'De omni Scientific Arti
Pingeni'; but it treats of other arts besides painting. The authenticity of this work has been doubted by some, who have confounded the invention of Van Eeyck with them, simply using oil as a vehicle for pigments. This sub-
ject has been entered into at length by Rappe, in a 'Critica Tecta on Oil-Painting,' published in London and recently by J. B. incl. in a work entitled 'The Ress
Painting of the Ancients'—Harmazlerei der Alten, Leipzig, 1839. Various old notices of Tutilo are printed in the 'Hermen Alemanniafus Libri, &c. of Goldast.'

Tutilo, a monk of the tenth century, wrote a treatise on the life of Christ, in which he gave a list of those who were present at the various events, together with the names of artists who were employed in their execution, and the name of the work, together with the name of the artist, was inscribed on it. He was a great lover of art, and was one of the first to introduce it into the monasteries of the time of the Carolingians. He was a great patron of the arts, and he made for him a golden crucifix, richly ornamented with bus-reliefs and precious stones. He made also a cele-
brated sitting of the Virgin Mary, in gold, for a church at Metz, by which he acquired the celebrated cele-
bere the inscription, 'Hoc panetha pia caelaverat ipsa Maria.' One account says painted. This image or paint-

Tutulus. [Tutulus.]
belonged to the Gentiles so long as that part of the law (Jus Gentilium) remained in force. By analogy to the case of one of the tutela of liberti and libertae belonged to their patrons. When there was no person appointed tutor, and no legiti-
mus tutor existed, a tutor was appointed for persons at
Rome under the provisions of a Lex Aetilin, and for persons
in the provinces under the provisions of a Lex Julia et
Titia.

It is a consequence of the rules laid down as to the power
of appointing a tutor, that none but persons who were sui
juris could be appointed. It was a custom peculiar to
women and some other classes of persons could not appoint
a tutor.

As already stated, a pupillus could not do any legal act
which should be to his injury; but he could enter into
contracts, and could convey property in some cases to
his advantage. The pupillus was defined to consist in doing
the necessary acts for the pupillus, and interposing or adding
the legal authority to his proper acts (negotia gerere et au-
toritatem interponere: Ulpian Prag. tit. xi, c. 25). The doing of the necessary
acts applied to the case of the pupillus being infans, that
is, under seven years of age, absent, or lunatic (furiosus).
When the pupillus ceased to be infans, he could do many
acts for himself; and the tutor of the pupillus was only
necessary to make them legal acts.

A tutor might be removed from his office if he miscon-
ducted himself in it. The pupillus had also an action
against him for mismanagement of his property. The
tutor was also called upon to assist him in the management of the affairs of the pupillus; and
he could recover them by action. Security was required
by the procurator from a tutor for the due management of
the affairs of a pupillus, unless he was a testamentary tutor,
for such tutor was chosen by the testator, and, generally,
unless he was appointed by a magistrate, for in such case
he had been selected as a proper person.

The tutela of women who were puberes was a peculiar
Roman institution, founded on the maxim that a woman
could do nothing without the auctoritas of a tutor.
But there was this difference between the tutela of pupilli and
of women who were puberes: in the case of pupilli the tutor
both did the necessary acts, particularly when the
pupillus was infans, and gave his auctoritas; in the case
of women who were puberes, the tutor only gave his aucto-
ritas.

The Vestal virgins, in virtue of their office, were
exempted from tutela. Both libertinae and ingenuae
were exempted from it by acquiring the Jus Liberonum, which
was conferred by the Lex Julia et Papia Poppaea on
women who were virgins at marriage. His father Francis,
his tutor was deprived of her inheritance at the birth
of a woman was terminated by a marriage, by which she
came in manum viri; and also by other means.
A woman had no right of action against her tutor as
such, for he did not do any act in the administration of her
property; he only gave to her acts their legal validity by
his auctoritas.

The subject of the Roman tutela is one of considerable
extent; and in the case of women it involves some difficult
considerations. The matter is more fully discussed, by the
writer of this article, in the 'Dictionary of Greek and Roman
Antiquities,' where the authorities are referred to.

TUTSAN, the name of a plant indigenous to Great
Britain. This plant was included by Linnaeus under the
canon Hypericum, with the name H. Aquilegioides, but
has been separated by Allioni, and made itself the type of
a genus, under the name Androsaemum officinale. An-
drosaemus is a genus of plants that are generally
berry, and having but one cell. A. officinalis has three
styles; a shrubby compressed stem, two feet high;
unusual sepals; large ovate serrate leaves. The flowers are
large and arranged in cymes. The berry is black, and
when squashed it gives a blood-red juice; hence the
name Androsaemum, or 'man-blood' (Anglo-Saxon.
The English name Tutsan is derived from
Huet sain, French, a term employed on account of its
bitterness; the root of the plant being applied as a
mouth-wash: a custom which arose out of the supposi-
tion that nature had pointed out the use of these berries
by their bloody colour.

Tutsan is a small tree or shrub that is found in many
parts of the world; it is found in Europe, but is
not an abundant plant. In Great Britain its distribu-
tion is very local. It occurs abundantly in some parts of
Norfolk and Hertfordshire, and is not infrequent in Ire
land and the west of Scotland.

TUY, the tutors from

TUYFORD, [NOTTINGHAMSHIRE.]

TUY, a district and bishopric of Galicia in Spain, com-
prising eight parishes. The capital, Tuy, is the antient
Tude in mentioned in the Antonine Itinerary. It is situated
in a fertile plain, covered with meadows and small
rivers which empty into it. Tuy was a city of some
importance under the Goths. It was taken and de-
stroyed by the Arabs; but about a century after the founda-
tion of the town by the Moors it was rebuilt by them.

It is remarkable that some time after by Fernando H. of Leon, on
the site which it occupies at present. The castle, and a palace,
which is now inhabited by the bishop, were also erected by him.
The city is the seat of an archbishopric and an episcopal see.

The cathedral, which is in the Gothic style, is not a striking
building. The environs of Tuy are well cultivated, and
planted with vines, oranges, lemons, and other trees and plants
of southern climates; besides hemp and flax, which consti-
tute the chief production of the surrounding country.
The population of Tuy amounted in 1820 to something
more than 6000. [Minnano, Diccionario Geográfico de
España y Portugal.]

TUY, LUCAS DE, or LUCAS TUDENSIS, a cele-
brated Spanish historian, so named because he was bishop of
Tuy, lived in the thirteenth century, and was probably
native of Leon. He came under the notice of King
Ferdinand, in whose service he conducted a treaty of
peace between the Castilians and the English; and he
was appointed tutor to the infant Leon, afterwards
Frederick III. of Germany. He seems to have
written 'Chronicon Mundii,' which appeared for the first time
at Salamanca in 1501. The first two books of the
'third volume, were translated into Spanish in 1506.
The style of this work, which ends with the reduc-
tion of Cordova in 1236, is not bad, though it is often
abrupt; but the book is valuable, as it contains many
facts of great importance, except those of contemporary
history, which he copied from earlier historians.

Vijddy Fideique Controversia adversus Albigenas: this
was printed at 'Monaco, and also at Ingolstadt, in 1612, 4to.
Lucas is also said to have written a Life of St. Isidorus,
and to have translated into Spanish the History written by that
prelate. (Nicolao Antonius, Bibliotheca Sacra, vol. viii,
lib. 3, cap. 2 and 3; Flores, España Sagrada, vol. xxii, p. 108.)

TWEDDELL, JOHN, was born on the 1st of June, 1769,
at Three-provod near Hexham in Northumberland, where his
father Francis was the rector of the parish of Tynedale,
and later a priest of the See of Carlisle. He was
educated by the Rev. Matthew Raines, who watched and
directed the studies of young Tweddell with anxious care.
After
he had left school, and before entering the university of
Cambridge, he studied for some time under Dr. Samuel
Farr, who made his pupil familiar with the best writings of
antiquity, and at the same time secured his permanent
esteem and attachment. Tweddell gained the highest
classical honours in the university of Cambridge; and in
1792 he was elected a fellow of Trinity College. His 'Pro-
Fusiones Juvenes,' which he published the year after
(1793), show the extent and versatility of his powers, and
raised at the time great expectations of the young scholar.

His own inclination seems to have led him to devote himself
to classical learning, or, as some of his letters suggest, to
a diplomatic career, but his father wished that he should
study the law; and although this profession was altogether
against his taste, he made so much progress in it at the
Middle Temple. Here he devoted himself to his new
pursuits with as much application as his aversion to them
would allow him. At last however he seems to have been
unable to continue his studies, and made up his
mind to travel for some years in order to prepare himself for a
different course of life, and to acquire a knowledge of the
courts of Europe and their several systems of policy.
Accordingly he embarked for Hamburg on the 30th of Sep-
tember, 1793. He passed through Holland, Germany, Switzerland,
and thence eastward to Asia, where
he visited among other parts the Crimea and the coasts of the
Euxine. Thence he proceeded to several islands of the Archipelago, and to Athens, where he took up his residence for six years, during which time he explored and described the remains of ancient art and architecture, and employed a distinguished French artist of the name of Preaux in making drawings for him. But in the midst of these pursuits he died in the 2d of July, 1799, after a short illness, buried within the precincts of the temple of Theseus. A monument was erected on his grave, with a Greek inscription, by the Rev. Robert Walpole.

During the whole time of his travels Tweddell kept a diary, in which he recorded everything remarkable he met with, intending on his return to England to publish an account of his travels, together with some of the drawings which he executed on his death. Unfortunately, he made all possible efforts to get his effects, MSS., and drawings over to England. A great number of MSS., together with upwards of 300 highly finished drawings, were actually forwarded from Athens to Constantinople, and intrusted to the care of the English ambassador there, but nothing ever reached this country, and all investigations that have been instituted by the friends of Tweddell have remained without any result. The whole matter is still a mystery. The only memorial which remains of his travels is a number of letters addressed to his friends in England, which were published by his brother the Rev. Robert Tweddell, under the title 'Remains of the late John Tweddell, Esq., being a Series of Letters from various Parts of the Continent of Europe, together with a re-publication of his "Prolusions Juvenile," London, 1815, 4to. This collection of letters is preceded by a memoir of the author, by his brother Robert, who gives a particular account of the amiable and picturesque, and modest character of his brother, which is perfectly borne out by the spirit that pervades these letters. Respecting the loss of the MSS., and drawings, and all that was said about the matter at the time, see the British Critic, vol. V.

TWEED. [Berwick; Berwickshire.]

TWEEDMOUTH. [Berwickshire.]

TWEELE TABLES. The Roman writers speak of the Twelve Tables, and call them the Decemviral, Leges XII Tabularum, sometimes simply Lex, the LAW, as being pre-eminent the foundation of Roman Law; and by other names. After some struggle between the patricians and the plebs, a plebiscite was passed (n.c. 449) with the assent of the senate, in pursuance of which three commissioners were sent to Athens and other Greek states to inquire about their legislation. The code was revised in n.c. 450, and in the following year ten patricians (Decemviri) were appointed to draw up a code of laws, whence the name Leges Decemvira. The Decemviri, at the head of whom was Appius Claudius, presented the Twelve Tables, which were approved by the senate, and received the final sanction of the Consul, Publius Coriata. The code being considered defective, Decemviri were again elected (n.c. 450), and two more tables were added, whence the name Twelve Tables. The laws were cut on tablets of bronze and set up in a public place: they were not promulgated till n.c. 449, after the overthrow of the Decemviri, who had attempted to perpetuate their power against the terms of their appointment. It is impossible to ascertain from the scanty history of the Decemviral legislation what the commissioners brought back with them from the Greek cities, or how far the codes of the Greeks affected this first Roman attempt to form a code. Twelve Tables under various names; the name then the Twelve Tables. pn Bushel, publ. privato juris—the source of Public and Private Law,
so much from evening to evening, that the mathematical definition of twilight, namely, the interval which elapses from sunset to the moment when the sun is 15° below the horizon, is totally useless, be that angle of depression what it may. It is, in fact, one angle for one evening and another for another, according to the weather.

The twilight, mathematical, is, if they had considered, be an unknown quantity, it might still be made useful in warning the weatherwise not to place so much reliance as they do upon another mathematical result, the shortest day. If the atmosphere produced no effect at all, the duration of twilight would certainly be the shortest. But it is to be remembered that the day of which people usually speak means 'sunset and twilight put together': a bright Christmas followed by a foggy spring will change the place of the shortest day very materially, by diminishing the twilight of the latter.

The mathematical consideration of twilight, upon an assumption as to the degree of depression of the sun at which it ends, will be found in all books of astronomy.

TWINUING, THOMAS, was the only son of a tea-merchant by his first wife, and born in 1734. His father wished his son to succeed him in his business, but as Thomas had an invincible desire to devote himself to study, his father gave way to him and sent him to Cambridge, where he entered Sidney College. Here he distinguished himself not only as a scholar, but by his practical as well as theoretical knowledge of music. There he assumed a name, the harpsichord, the organ, and the violin, and few persons knew more about the history and science of the art than Twining. In 1760 he took his degree of B.A., and three years later that of A.M. In 1768 he became rector of White Notley in Essex, to which in 1770, he exchanged the rectory of Stow, in Lincolnshire, and he was chosen M.P. for the county of Norfolk in 1780. A Mr. Mary, Colchester, was added. To this latter appointment he was presented by Dr. Lowth, then bishop of London, without any other recommendation than that of his personal character. Henceforth he devoted himself with all his might to his study and to the prosecution of his parochial duties and to the pursuit of study, until his death, on the 6th of August, 1804, at the age of seventy-two.

Twining was a man of considerable learning and of great taste in the arts, especially poetry and music. He had a good knowledge of the ancient languages, and is said to have spoken and written French and Italian with the same correctness and fluency as his mother tongue. In the performance of his clerical duties he was most conscientious, and during the last forty years of his life he scarcely ever allowed himself to be absent from his parishes more than two weeks in the year, although these were always much courted. The only work that Twining ever published is a translation of Aristotle's Poetics, which is reckoned one of the best English translations of ancient writers.

Mr. Twining died on the 16th of July, 1804. He translated the whole of the work of Anacreon and Mr. Theocritus, and the poetical portion of the works of Pindar and Mr. Persius.

Mr. Twining wrote numerous papers in the 'Transactions of the Royal Society of Edinburgh.'
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T Y E


Tychsen, Olaus Gerhard, a celebrated Orientalist, was born at Tondern in Schleswig, on the 14th of December, 1734. His father was a tailor, in very poor circumstances, but with the assistance of some benevolent friends he was enabled to allow his son, who evinced considerable talent, to proceed to his learned studies. Up to his seventeenth year Olaus attended the university at Halle, and read in the grammar of his native town, and thence went to the gymnasium at Altona, where the celebrated Maternus de Cilia had great influence upon him, especially in directing his attention to Oriental literature; a short time after this he made himself master of the Hebrew language, and with the peculiar dialect spoken by the German Jews of all parts of Germany. Thus prepared he went in 1756 to the university of Göttingen. J. G. H. Fuller journeyed to Halle, and was still more engaged in his labours for the conversion of Jews and Mohammedans to Christianity; and when Tychsen had finished his studies, he thought him a fit person to engage in these undertakings. Tychsen was accordingly sent by Callenberg, in 1760, on a journey through Germany and Denmark. In 1760 Callenberg died, and Tychsen returned without having converted a single Jew. In this year the university of Rostock was transferred to Bützow, and Tychsen became professor of Oriental literature; and three years later he obtained the ordinary professorship in the same department. Here he began his varied literary activity, which soon spread his name over all Europe. A part of the professors had remained at Rostock on the transfer of the university to Bützow; and as this would ultimately have led to the establishment of two universities, a re-union of the two parts was brought about. Rostock, 1769, and Tychsen was appointed chief librarian and keeper of the manuscripts of Rostock, which offices he held until his death. In 1810, after having been employed in the university for fifty years, he celebrated his jubilee, and received various honours and distinctions on that occasion. He died at Rostock on the 30th of December, 1815.

Tychsen was a man of extraordinary knowledge in his departments, and, with all his singularities and conceits, he promoted the study of Biblical and Eastern literature more than any man of his time. He undertook the laborious task of collecting the various readings of the Old Testament, of comparing the earliest translations with the original, and of making accurate descriptions of the most rare and curious manuscripts. In this, he was followed by Benjamin Kennicott among the first writings of the kind which established sound principles of biblical criticism, although his Pietistic tendency prevented the unbiased development of his inquiries in theological matters. He wrote several dissertations in the Aramaic, Punic, and Syrian languages, and on the inscriptions of Persopolis.

He had also made investigations into the history of the various Christian sects in Asia: and was the first who directed attention to the numerous catechisms of the various Christians. All these things combined to procure him a European reputation, and engaged him in an extensive correspondence, but they also produced an. immoderate degree of vanity, and the presumption of knowing everything, which led him into many gross absurdities, and for which he was now and then severely chastised, as in his controversies with Francis Perez Bayer, archdeacon of Valencia. The most important among Tychsen's works is a journal called 'Bütsowische Nebenstunden' (leisure hours of Bützow), which contains many of his essays. It appeared at Bützow from 1766 till 1799, and consists of six volumes. His library, which was very rich in MSS. and works on Oriental literature, consisted of about 40,000 volumes. His principal work was a copy of his splendid dictionary and grammar of the Persian language, in several folios. For a detailed account of the life and writings of Tychsen, see Hartmann, Olyf Gerhard Tychsen, or Wanderungen durch die mannichfaltigsten Gétte der bibliothek Forschungen in den orientalischen Sprachen, 1793, 8vo.

Tychsen, Thomas Christian, a celebrated Oriental and classical scholar, was born on the 8th of May 1756, at Horshyll in Schleswig, where his father, who gave him a sound classical education, undertook a voyage, and returned a copy of his splendid dictionary and grammar of the Persian language, in several folios. For a detailed account of the life and writings of Tychsen, see Hartmann, Olyf Gerhard Tychsen, or Wanderungen durch die mannichfaltigsten Gétte der bibliothek Forschungen in den orientalischen Sprachen, 1793, 8vo.

Tyhe, Christopher, doctor in music—a man who appears prominently in musical biography, both on account of his professional ability, and as possessor of some literary distinction. He was born in Westminster, and educated in the King's College.

He was especially favored by Henry VIII., and held the distinguishing appointment of musical instructor to Prince Edward, and, most probably, the other children of that monarch. He was admitted to the faculty of the University of Cambridge, in 1545, and, as admont, in Oxford, three years after. In the reign of Queen Elizabeth he held the office of organist to the Chapel-Royal, for which he received the royal privilege, and was admitted to the honorary title of Servetus and Anthes, of four and five parts, which he composed many years after his death; and, we add, some fes of his compositions are still listened to with unfading interest by worthy lovers of the art who have acquired any knowledge of its principles and are acquainted with its best specimens.

In a play by Rowe, printed in 1613, is a dialogue between Prince Edward, afterwards Edward VI., and Dr.
Tye, in which the illustrious pupil thus announced his royal father's opinion of the doctor's merit:—

"I oft have heard my father truly speak—
In your high praise; and this his language, too, was but too common a saying among your own countrymen; and I, for my part, antedate the example of Doctor Tye, your contemporary."

In later days, 'One God, one Farinelli!' was said of an Italian emissary, the fanatical lady who screamed it out from a box at the opera most likely. Most likely, knowing that a similar absurdity, not to call it profaneness, had been uttered three centuries before.

Dr. Tye possessed a considerable knowledge of Italian and Latin. The latter was often used in those affecting story of Theodore and Honoria from Boccaccio, and published in 12mo, black-letter, under the title of *A Notable History of Nastigio and Traversari, translated this Italian into English verse, by C. T.*—Imprinted at London, in Poule's Churchyard, by Thomas Purcell, dwelling at the sign of the Lueree, anno 1569. He also commenced a translation of the *Acts of the Apostles in verse,* of which he only completed the first fourteen chapters, and these were printed in 1583, by William Seres. The work was begun because, says Watton (Hist. of Poetry, Tye 'had been taught to believe that rhyme and edification were closely connected, and that every part of scripture should be as active a luring of his heart as was the playing of the lute, or the musical skill he had acquired under so scientific a master. Sir John Hawkins has given a specimen both of the poetry and music of this work in vol. li. of his History.'

Dr. Tye was a constant attendant at court, where his accomplishments rendered him a welcome visitor. In his later days, Anthony Wood says that he became rather peculiar in his dress, always having on the organ in the chapel of Queen Elizabeth [that] which contained much music, but little to delight the ear, she would send the verger to tell him that he played out of tune; whereupon he sent word that her ears were out of tune.

This curious anecdote appears, as a note, in the handwriting of Wood, in the Ashdown MSS., fol. 189.

*TYPOLOPHORA, a genus of plants of the natural family of Asclepiadceae, so named by Mr. Brown, from (tylos, round, a circular, and phora, the root 'to bear,' in reference to the ventricose pollin masses. The genus is distinguished by having a rotate 5-parted corol. Staminous corona 5-leaved; leaflets depressed, fleshly, toothless inside. Pollen masses erect, fixed by the base, transverse and ascending. Capsules smooth, although somewhat roughened by the apex, contained 4 to 6 seeds. The seeds are conose. The species form twining herbs or under-shrubs. The leaves are membranous, flat. The umbels of small flowers interphloin or disposed alternately alternate above, are terminal and axillary; they are mostly of the Malayan Peninsula, Java, and New South Wales, and are not of any known use, with the exception of T. aesthetica, which is very common in the peninsula of India, and called in Telgins kate-polla. Dr. Roxburgh describes it as being frequently employed there as a substitute for ipecacuanha. He says that he had often prescribed it himself and always found it answer as well as ipecacuanha, and he had had a similar report from others. Dr. Anderson, physician-general at Surat, has also praised it, and 'tried it with great success, in a dysentery which happened to be epidemic in the camp. The store of ipecacuanha had, it seems, been wholly expended, and Dr. A., finding the practice of the native doctors more successful than his own, followed their example with good success. He collected and sent to Madras a quantity of the plant which they pointed out to him, as it seemed an article of the Hindu Malarae Medicin; which it was observable had a very good reputation.

TYLONIS. *[Isopoda, vol. xi., p. 55.]*

TYMPANUM. [Ear.]

*TYNDALE, or TYNDALE, WILLIAM,* whose name is one of the greatest in the history of the English reformation, was born at Bisham between 1492 and 1523. He was the son of a gentleman of the name of Tye, who had a large estate in Berkshire, and was a Protestant. He seems to have been a page at the court of Henry VIII., and to have received a good education. After the accession of Edward VI., he was appointed to the master's chair at Magdalen College, Oxford, but he soon resigned it, and went to Germany, where he studied divinity. He returned to England about the year 1539, and was appointed to the professorship of the Greek language at Oxford. He was a good scholar, and had a great influence in the university. He was a man of great zeal, and a firm believer in the principles of the reformation. He was a great advocate for the translation of the Bible into the language of the people, and he assisted in the preparation of the first English version of the Bible, which was published in 1525 or 1526. He was also the author of several other works, including a translation of the Apocrypha, and a work on the Greek language. He died in 1536, but his influence continued to be felt for many years after his death. He was a man of great learning, and a great printer, and his name is rightly remembered as one of the greatest in the history of the English reformation.
one upon which bibliographers are not agreed. [Bible.] These original impressions appear to have been rapidly sold out in England, and not reprinted in foreign countries; but some English translations were, on the Continent, published under the title of Tyndale, and many were subjected to the scrutiny of the Inquisition. Tyndale himself brought out a new edition in 1526, which was followed in 1527 by an enlarged and corrected edition. From these two editions were derived all subsequent translations, and proved very influential in the spread of the Reformation throughout Europe. In 1549, when the Bible was authorized for use in England by Queen Elizabeth, the text of Tyndale was used as the basis for the Authorized Version. The translation of Tyndale was based on the Greek and Hebrew texts, and it is regarded as one of the most accurate and literal translations of the Bible into English. Tyndale's work laid the foundation for the development of English as a literary language, and his translation became the basis for subsequent English Bible translations, including the King James Version. Tyndale's translation is characterized by its clear and straightforward style, and it was widely read and studied by English scholars, theologians, and lawyers.
Peter to give him his only daughter Christmas in marriage; a promise which he soon afterwards performed. But there were as many difficulties at first with these letters, as there had been before with wooden ones, the metal being too hard. To support the force of the impression, this defect was soon remedied by mixing the metal with a substance which sufficiently hardened it.

Without attempting further to follow the early history of type-founder, suffice to state that the apparatus employed appears, at a very early period, to have assumed its present form. The first satisfactory evidence upon this point is afforded by the device of Radius Aesensius, an eminent printer of Paris and Lyons, at the beginning of the sixteenth century; his device was subsequently adopted, with various modifications, by several other printers, among whom was an English practitioner, Anthony Scoloker, of Ipswich. It exhibits the various operations then usually carried on at a printing-office, embracing type-founding as well as composing and printing; and it represents the matrix and other apparatus of the type-founder in the form still used. Most of the early printers, in England as well as the Continent, cut and cast their own types; and one of the earliest noted of labour which has tended so greatly to the improvement of the art, is found in a decree of the Star Chamber, dated July 11, 1637, intended to suppress or render more difficult further improvements which were being carried on by others opposed to the government, who, about that period, established secret printing-offices for the purpose.

This decree ordained that there should be only four founders of printers for printing, and that all the other apprentices, who might occur in that number should be filled up by the archbishop of Canterbury or the bishop of London, and six other high commissioners; and it lavished the most stringent regulations upon the master-founders respecting the employment of journeymen and the taking of apprentices. These oppressive restrictions were re-enacted for two years, by an act of parliament of the fourteenth year of Charles II., and continued for limited periods in his sixteenth and seventeenth years. They were continued for seven years in the first year of James II., 1685, and finally expired, on the termination of the last-mentioned term, in 1693.

Although Caxton and Wynkyn de Worde had, in the infancy of English printing, established a high character as type-founders, this branch of the art long remained in a depressed state in England, the best types being supplied by continental founders; and it was not until comparatively late that any considerable degree of English ingenuity, and of establishing a well-deserved and permanent pre-eminence for British types. Having executed some remarkably neat letters for lettering books, he was encouraged to attempt punch-cutting; his first engagement in this way being for the Society for promoting Christian Knowledge, for whom he executed an Arabic fount about the year 1720. Caxton was encouraged and assisted by Bowyer; and the first octavo type in English, which not only put an end to the importation of Dutch types, but occasioned a demand for his own on the Continent. His foundry was continued by his descendants, and is still in operation. Another name memorable in the history of English type-founding is that of John Baskerville, of Birmingham, who died in 1775. His stock of beautiful types was sold to a literary society in Paris, and used for printing a splendid edition of the works of Voltaire; and the demand for his books in England, or sufficient encouragement to induce him to continue his business. In Glasgow, where the art of type-founding has been carried to a high state of perfection, it is commenced by John Bowyer, the grandson of James Dunlop, whose letters were but roughly cut; but about 1740 it received great improvements from Messrs. Alexander Wilson and John Bain, whose establishment, which is still carried on by the descendants of these persons, became the best in Europe. The history of the early British founders is
 minutely given in a very rare pamphlet published in 1788, by the eccentric Edward Rowe Mores, entitled "A Dissertation upon English Typographical Founders and Foundries," and Hansard, in his "Typographia," has reprinted most of the information collected by Rowe, together with notices of more recent type-founders. In France the names of Breitkopf and Didot have attained high celebrity for improvements in type-founding. The printing establishment and foundry of the former, who died in 1794, are said to have acquired the reputation of being the most perfect in the world, not excepting those of the Society de Propaganda at Rome, and to have contained punches for four hundred alphabets.

The first and most important operation of a type-foundry is the formation of the punches, which are well-tempered pieces of steel, each of which bears on its face a single letter, formed with the greatest possible accuracy by filing, cutting, and punching the hollows with smaller punches. The face of the punch exactly resembles that of the finished type: the letter being reversed, and in high relief. The punch-cutter, in addition to the care and judgment required for making the letter of precisely the right size, form, and thickness, so that it may range well with other letters of the same font or set, must consider the best degree of slope for the sides of the letter, so that, on the one hand, he may avoid making them so vertical that the lines will be weak, and easily broken or battered; and, on the other, that they may not, owing to too rapid an increase of thickness towards the base, produce a thick blurred impression when printed from. When the punch is completed and hardened, it is struck into a piece of copper, which, when it has received the impression from the end of the punch, is called a matrix, and forms a mould for the face of the type. The striking of the matrix, like every other operation in the formation of the mould, requires great nicety, because, if the punch be not held perfectly vertical, the face of the type will not be at right angles with its sides, and the impression will consequently be uneven. The depth of the impression is also of consequence, as it affects the height of the type; but this may be regulated by filing the face of the matrix. The sides and end of the matrix are then accurately squared; perfect truth in this respect being necessary, in order that, when the matrix is adjusted in the mould, the letter may be perfectly square with that portion of it which is to form the shank or body of the type, and may also have its proper position with reference to the top and bottom of the body; so that when the types are set up together and printed from, the letters may not only be upright, but may also range in a perfectly straight line. The mould, of which a representation at the top, by which the type-metal is poured in, and below it the actual mould for the body of the type, with the matrices at the bottom to form the sides in the proper angles, are so constructed that they will slide a little upon each other, laterally, as to vary the thickness of the body of the letter, that the same mould may be used, with different matrices, for cast-iron. For this purpose, a proper forms are of narrow bodies, to m or w, which have wide bodies. The type-metal is usually melted in a small cast-iron pot, set in brickwork with an enclosed fire under it, and is poured from the mould as soon as the metal is sufficiently hardened, which is indicated by the usual jerks the mould quickly upwards by a peculiar motion of his arm, and thereby expels the air, and forces the fluid metal to enter the cavities of the matrix. An improvement adopted by some founders is in having the type-metal enclosed, with a small force-pump built to cover, by means of which a jet of metal is forcibly injected into the mould, whereby the necessity for the upward jerking motion is obviated. When the metal is set the caster removes the pressure of the long curved spring at the bottom of the mould, and thereby releases the matrices from the face of the type. The mould is then separated and the type is removed by the application of one of the hooks attached to the upper part of each half. Completed and formed, the matrices are placed in rows in the bottom of the mould, casting the type, releasing the spring, opening the mould, and removing the type, are all performed in about the eighth part of minute; so that an expert workman can write a line in a second.

When the type leaves the caster, each of them has a small block of metal attached to its shank, being that which filled the throat or funnel of the mould. These are removed by a boy, who takes up the types by their edges, or rather by the top and bottom of the body, breaks off the superfluous metal by a motion almost too quick to be followed by the eye. The average number thus treated in an hour is 2000, but some boys can break as many as 5000. The next operation is to rub each side of the mould, casting the type, relaxing the spring, opening the mould, and removing the type, are all performed in about the eighth part of minute; so that an expert workman can write a line in a second. When the type leaves the caster, each of them has a small block of metal attached to its shank, being that which filled the throat or funnel of the mould. These are removed by a boy, who takes up the types by their edges, or rather by the top and bottom of the body, breaks off the superfluous metal by a motion almost too quick to be followed by the eye. The average number thus treated in an hour is 2000, but some boys can break as many as 5000. The next operation is to rub each side of the mould, casting the type, relaxing the spring, opening the mould, and removing the type, are all performed in about the eighth part of minute; so that an expert workman can write a line in a second. When the type leaves the caster, each of them has a small block of metal attached to its shank, being that which filled the throat or funnel of the mould. These are removed by a boy, who takes up the types by their edges, or rather by the top and bottom of the body, breaks off the superfluous metal by a motion almost too quick to be followed by the eye. The average number thus treated in an hour is 2000, but some boys can break as many as 5000. The next operation is to rub each side of the mould, casting the type, relaxing the spring, opening the mould, and removing the type, are all performed in about the eighth part of minute; so that an expert workman can write a line in a second. When the type leaves the caster, each of them has a small block of metal attached to its shank, being that which filled the throat or funnel of the mould. These are removed by a boy, who takes up the types by their edges, or rather by the top and bottom of the body, breaks off the superfluous metal by a motion almost too quick to be followed by the eye. The average number thus treated in an hour is 2000, but some boys can break as many as 5000. The next operation is to rub each side of the mould, casting the type, relaxing the spring, opening the mould, and removing the type, are all performed in about the eighth part of minute; so that an expert workman can write a line in a second. When the type leaves the caster, each of them has a small block of metal attached to its shank, being that which filled the throat or funnel of the mould. These are removed by a boy, who takes up the types by their edges, or rather by the top and bottom of the body, breaks off the superfluous metal by a motion almost too quick to be followed by the eye. The average number thus treated in an hour is 2000, but some boys can break as many as 5000. The next operation is to rub each side of the mould, casting the type, relaxing the spring, opening the mould, and removing the type, are all performed in about the eighth part of minute; so that an expert workman can write a line in a second. When the type leaves the caster, each of them has a small block of metal attached to its shank, being that which filled the throat or funnel of the mould. These are removed by a boy, who takes up the types by their edges, or rather by the top and bottom of the body, breaks off the superfluous metal by a motion almost too quick to be followed by the eye. The average number thus treated in an hour is 2000, but some boys can break as many as 5000. The next operation is to rub each side of the mould, casting the type, relaxing the spring, opening the mould, and removing the type, are all performed in about the eighth part of minute; so that an expert workman can write a line in a second. When the type leaves the caster, each of them has a small block of metal attached to its shank, being that which filled the throat or funnel of the mould. These are removed by a boy, who takes up the types by their edges, or rather by the top and bottom of the body, breaks off the superfluous metal by a motion almost too quick to be followed by the eye. The average number thus treated in an hour is 2000, but some boys can break as many as 5000. The next operation is to rub each side of the mould, casting the type, relaxing the spring, opening the mould, and removing the type, are all performed in about the eighth part of minute; so that an expert workman can write a line in a second.

Although the composition of type-metal varies greatly in different countries, and even in the practice of different British founders, it leads almost invariably forms the principal ingredient. Some of the earliest founders are said to have used iron to harden it, but in modern times regulus of antimony is commonly employed for the purpose. Hansard states that in Germany an alloy, consisting of 1 part lead, 2 parts tin, 6 parts copper, brass, or lead, and 1 part antimony, is used for the purpose. It will not bend, but it breaks like glass; and it is said to be harder than tin and lead, softer than copper, brass, or lead, and more capable than lead. The same authority states that the alloy used in Holland is unknown, but that it probably differs from those used in Germany and in England.

Moxon, an English writer of the seventeenth century, describes an alloy of 22 parts lead to 3 parts iron and antimony, which may be melted together, and an alloy of 3 parts lead, 2 parts tin, and 5 parts antimony, which is a good alloy; but small types require to be of harder metal, and often have 25 parts of antimony to 75 of lead. Some founders add a little tin or bismuth; the latter metal becom
Great Primer is the largest type ever used for printing books. It is seldom employed for anything excepting large folio Bibles, and on this account is sometimes called the "Bible type". It was called this type Gro-any, and the Germans, from its having been the third of seven sizes formerly used, name it Terttt. About 51½ in. in width, or the same number of lines in depth, occupy a foot.

2. English, called by the French and Dutch St. Augustin (from which it is supposed to have been first used for printing the works of that saint), in which the families are: typography printing, but although an edition of Anderson's History of Commerce, in four quarto volumes, 1787-9, and some other works, were printed in this way, the scheme was eventually abandoned.

As the several letters of the alphabet are, in common printing, required in very different proportions, the number of each letter in a font needs to be carefully regulated, to prevent the proportions varying in different languages, and in different kinds of work; for ordinary English book-work they are as follows:—n

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To the above are added accented and dotted letters, in numbers ranging from 100 to 250; numerals 1 to 9, and 0, from 1000 to 1300 each; and notes or marks of reference, apostrophes, &c., in number varying from 60 to 90. The number of CAPITALS supplied with such a font range from the lowest number, 80 (Z), to the highest, 61, with 40 of & and 30 of CE. Of SMALL CAPITALS, the number required in ordinary cases is about one-half the number of large capitals; and Italics are also supplied in small numbers. Spaces, which are pieces of metal resembling a narrow line of type used to separate words, consist of various thicknesses, to enable the compositor to justify his work, or to fill up an entire line to the same degree of neatness, by varying the spaces between the words. Of the half space, which is a space 3/4 of the thickness of the same height, hair-spaces, 3000 are supplied with a front of the above extent. Of the three next sizes, called thin, middle, and thick spaces, the numbers are 8000, 12,000, and 16,000 respectively. The small capitals are in experience a space, and in font to the letter m, which is exactly square, or as wide as it is deep, of which the number is 2500. In addition to these are larger quadrats, equal in body to two, three, or four m's, which are used for filling up lines at the end of a paragraph, or in poetry, and for setting up blank lines in order to separate two paragraphs. These are supplied by weight, according to the kind of work for which the font is required.

Although all British employers employ the same names for types of similar size, it is to be regretted that perfect uniformity in the names of types is not in the case of the type used by the Germans. It is therefore necessary to allow the types of different foundries to be used together without inconvenience. The subjoined specimen shows the various sizes employed in England for book-work, beginning with the largest, and descending to the smallest.

3. Pica. This type is much used for printing the text of standard literary works, and is generally referred to by printers as a standard for the measurement of work. Leads, brass-rules for printing lines, braces, or quotations, &c., are always made to so many Pica's, whether used with the type or not. In France and Germany it bears the name of Cœurs, apparently from having been originally used in printing his Epistles. 71 Pica's go to a foot.

4. Small Pica, called Philosophic in France, and Brevier in Germany, is a type very extensively used; perhaps more than any other. Novels are almost invariably printed in this letter, of which about 83 m's go to a foot.

5. Long Primer. This next type, which is much used for printing works in duodecimo, is called Petit Roman in France, and Corpus in Germany; the latter name being probably derived from its use in printing the Corpus Juris; 89 m's of Long Primer go to a foot.

6. Bourgeois appears, by its name, to have come originally from France; but the French type which comes nearest to it is now called Cambrai. Hansard states, in the article "Type," in the Encyclopaedia Britannica, that the French have no type corresponding with this. It is a type very much used, and is that employed for the text of the Penny Cyclopaedia. It is half the size of Great Primer, and about 10½ m's go to a foot.

7. Brevier, called in France Petit Texte, and in Germany Petit oder Junger (maiden letter), derives its English name, most probably, from its having been first used for printing breviate or Roman Catholic church-books. It is employed for printing small works, and for notes to those printed in larger type. In this work it is used in the indexes appended at the end of each chapter. About 112½ m's go to a foot.

8. Minion (French, Mignonne; German, Colonel) is used principally in newspapers, although some titles and prayer-books, and pocket editions of other works, are printed in it. It is half the size of English; and 12½ m's go to a foot.

9. Neoptolemus (French and German, Neoptolemo). Though observed, of this beautiful type, that it was first introduced it was, of course, without a com- parative size in the larger types; and he thinks that it still remains as a char- acter, and that every smaller type is below the compass that any eye of ommisight is able to read. It was then only introduced in this work. Its size is half Pica; and 14½ m's go to a foot.

10. Ruby is a somewhat irregular size introduced by English foundries subsequently to the smaller types given below, and is employed especially for Bible, prayer-books, &c. It is stated that it was originally intended to print the Psalter in Red, and to give it an open appearance. The body of INN, in Ruby, was by some considered too large for such a use, and this was reduced at 2½ lines as a compromise. It is also much used for notes to larger sizes, and is also used in large cheaper sizes.

11. Print, called by the French, Letratin, and by the German Pest, was the size of the London Universale, employed to print the Psalter, and considered a good size for printers who have a variety of work in their fore. It is still much used for notes to larger sizes, and is also used in large cheaper sizes.
Oftypes larger than those employed for book-work, the first, in an ascending series, is called **Paragon**; the next is **Double Picca**, which is twice the size of **Small Picca**; above which are **Two-line Picca**, **England English**, **Typha**, **Two-line Primeval and Trisepalous Double Picca**, each of which is double the size of the common type from which it is taken. One other type, **Canon**, has also a distinctive name; but all above it are called, according to the dictionary of Lewis's in their height, **First**, **Second**, **Third**, **Six-line Picca**, &c. Large letters, such as are used in posting-bills, were formerly cast in sand-moulds, and hence called **sand-letters**; but the fourth William Caslon introduced a convenient method of making matrices for such types, without the use of punches, by cutting the letter completely through a piece of copper or brass from one-eighth to one-fourth of an inch thick, making the apertures wider on one side than on the other; and then riveting the plate so cut with the face (or side at which the apertures are smallest) downwards upon a smooth surface of brass, which forms the face of the letter.

Ornamental types are made in endless variety for printing cards and circulars, and for other fancy purposes; but of these it is only necessary to mention particularly what is called **Script** type, which is cut to imitate writing. The early attempts to imitate cursive characters by letters cast upon a square body were very clumsy, it being impossible under such circumstances to give an easy inclination to the letters, and to make them join neatly. To remedy this M. Firmin Didot invented types with a body the sides of which form oblique angles with the top and bottom, and are so formed that they will, nevertheless, lock firmly together, without any inclination to slide upon each other. This may be readily understood from the annexed cut, which represents the words 'Bought of' set up in script type, with a triangular piece of metal added at each end to allow of their being wedged up with type or quadrats of the usual form. Didot cast, on bodies of this form, the component parts of letters; but his idea was improved upon by English founders, who cut the letters complete, and provide for every variety of junction which may be required by casting some of the letters on different bodies, according to the relative positions they may be required to occupy. More recently, some founders have succeeded in casting types on a square body which answer the same purpose as Script, and these, on account of the greater facility of composition, are more generally used for common work.

Many schemes have been suggested for facilitating the manufacture of types by the use of machinery; but as these have failed to come into general use, they may be dismissed with a very brief notice. One of the earliest formed part of a very comprehensive project for the improvement of printing brought forward by Mr. William Nicholson, editor of 'Nicholson's Journal,' about 1720. Another, which was patented about 1823, by Dr. William Church, of Birmingham, proposed to cast types at the rate of 75,000 per hour, and to melt and recast them after each time of printing. A third, one of extentions, so vast as it does not propose to dispense with the subsequent rubbing and dressing, is the process of Henri Didot, patented in England by Louis John Pouchée, for casting at the rate of 15,000 per hour; which has been successfully practised, although it does not appear near to supersede the ordinary mode of casting by hand.

**TYPHA** is a natural order of plants, belonging to Linley's epacide group of monocotyledons. The order includes two genera, **Typha** and **Phragmites**. They are herbaceous plants, growing in marshes and ditches, having stems without nodi and perennial rhizomes; the leaves are rigid, ensiform, and with parallel veins; the inflorescence is spicate or capitate, without a spadix; the flowers are unisexual; sepals 3 or more, sometimes merely a bundle of hairs; no petals; the male flowers have 3 or 6 stamens, with wedge-shaped anthers and long filaments, which are sometimes united; the female flowers have a single, superior, 1-celled ovary, with a solitary pendulous ovule; the style is short, and surmounted by one or two simple linear stigmas; the fruit is dry, 1-celled, and 1-seeded; the embryo is in the centre of the albumen, with the radicle next the hilum.

Brown makes Typhaceae a section of **Aroideae**, but most systematic botanists have followed Adanson in making this an independent order. The trisepalous, semiglanose calyx, or sometimes a bundle of hairs, with their long filaments, clavate anthers, solitary ovules, and peculiar habit, are very characteristic. The species of the two genera are abundant in the northern parts of the world, and are mostly absent in tropical countries.

**Typha angustifolia**.

1. spadix crowded with flowers; 2, stamens with united filaments; 3, male flowers with united filaments; 4, ovary surrounded by the base-seta; 5, section of ovary exhibiting solitary pendulous ovule.

The genus **Typha** is known by the male and female flowers being both seated on the same spike, the male flowers being uppermost; the stamens are setose, and united by the filaments; the ovary is surrounded by setae (see Fig. 4); and the style is persistent. There are three species of this genus, inhabitants of the temperate parts of the globe, and all are found in Great Britain. The name Typha is derived from typhos (τυφός), a marsh, because these plants grow in marshy places. In English they are called cat's-tail and reed-mace, the former from the resemblance of their spikes to the tail of a cat. They are frequently called bull-rushes, but this name is restricted to another genus, the Scirpus.

**T. latifolia**, Great Cat's-tail or Reed-mace, has linear, nearly plane leaves, with the sterile and fertile flowers continuous. This is a very handsome aquatic, and grows 8 feet high, and 16 inches in diameter. The leaves are three feet in length and an inch in width. When the densely crowded spike is brushed and a lighted candle applied near it, a sudden flash is produced. This arises from the firing of the pollen that is diffused in the air. On the Continent the down of the flowers is used for stuffing pillows, &c.; cattle are fond of the leaves, and the roots are sometimes eaten as a salad. In common with
Sparganium and Scirpus, the leaves are used by coopers for filling up the interstices between the wools of their casks; and the inner bark is used by the Romans as a cordage. It is this plant which many of the Italian painters have put in the hand of Christ when he was mocked by the Roman soldiers as a king.

**TYPHIS (Malacology).** De Montfort's name for a genus of testaceous moluskis: *type Murex tubifer.*

TYPHIS tubifer, according to M. Deshayes, occurs both living and fossil (tertiary).

Mr. Broderip has described five additional species; two of which were brought to country by Mr. Hugh Cuming, and one by Captain Belcher, R.N.

The TYPHIS of Cuming, *T. Cumingi*, and of West and Columbia (Salango), in sandy mud at the depth of six and seven fathoms; and Captain Belcher's was taken at Cape Blanco (Western Africa).

The species above approaches nearly to the Gogon fossil, *TYPHIS frondosus*, J. Sow. Of the other two species, *T. Sowerbii* and *T. pinatus*, the first inhabits the Mediterranean Sea; the locality of the other is unknown.

The fossil analogues of this genus have hitherto been found in the London clay, calcareous gravel, and sub-Apennine beds. (Zool. Pro¢.; Müller's *Synopsis.*)

**TYPHIS** is also used subsequently by M. Rizzo to designate a genus of Scalavon, (vol. xii., p. 367). Cuvier places this genus among the Amphiopoda, between Aspidodes and Ancus.

There are only two small antennae. The head is large, with the extremity of it projecting. Each of its feet is annexed to its proper segment; the four anterior feet are terminated by a didacylous claw. On each side of the thorax are two moveable plates, forming a sort of valves, which, when united, and when the animal folds its feet and its tail underneath, close up the body below, and give it the form of a spheroid. The posterior extremity of the tail is without appendages. (Régne Animal.)

**TYPHLOPHALMIES,** the name by which M.M. Duméril and Bibron state that the specimen of this genus which they have seen, comprehending those Saurians which are completely blind, or whose eyes are so small that they do not exist, so to speak, excepting in the rudimentary state, and entirely covered with a large skin, which separates them from the skin, are not distinguishable, as they still may be in other Saurians, AMPHIBIA for instance, above whose eye the skin passes without being divided into two lids, as in the Scrophalinae, or pierced circularly so as to leave the globe of the eye entirely naked, as in the Ophichthales.

M.M. Duméril and Bibron observe, that in the present state of science there are only known to species which can be referred to the subfamily of TYPHLOPHALMIES, Scapho-codians; these two species have both, the one and the other, the body elongated, narrow, cylindrical, like that of the species of Acontias (Javelin Snake), or TYPHLOS: nevertheless they differ from each other in many other points of their organization, as to justify their separation into two genera, distinguishable at first sight, the one being entirely without limbs, and the other having two at the posterior part of the trunk.

**Dibamus.** (Dum. and Bibr.)

**Generic Character.**—Muzzle conical, encased up to the forehead in a scaly covering composed of three pieces; lower jaw pierced in the same manner. Nostrils lateral, rounded, pierced in the median piece of the rostral case, without a groove. Teeth bifrons, flat, suboval, squamous, not divided at its anterior extremity, notched semicircularly backwards. Teeth conical, simple, equal. Palate entire, not toothed. No auricular apertures. A single pair of limbs (posterior), which are short, stout, truncate, or rounded. Tail short, truncated, rounded at the end. Scales smooth.

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M.M. Duméril and Bibron state that the Dibamus have neither groove nor notch on the palate, nor there any term for the posterior portion of the skull, as observable in their text, not inserted in front, but semicircularly notched, as it were, behind; its surface is covered with a very great number of small flattened insolated papillae, having the appearance of scales. The teeth which are in the jaws are low, round, and slightly pointed. The nostrils are two small round holes, pierced on each side of the muzzle in the great plate at its end and above it, and to which are soldered two other plates which cover, one on the right and the other on the left, the upper lip. A single great plate protects the lower jaw. There is no distinguishable trace of the ear externally. There are no anterior feet, but at the sides of the vent are attached two small small cephalic appendages which represent the posterior limbs. The tail is very short, cylindrical, of the same size as the body, truncated and rounded behind. Example, Dibamus. *Nouvelle Guinee, Dum. and Bibr. (Acan- tius Subaccesus of the Leyden Museum).* Olive brown. Locality, New Guinea.

**TYPHLINE.** (Wiegmann.)

**Generic Character.**—Muzzle conical, increased to the forehead in a scaly covering composed of three pieces, lower jaw pierced in the same manner. Nostrils lateral, small, communicating with a longitudinal furrow situated backwards. Teeth conical, simple, equal. Palate not toothed. Auricles rudimentary. Eyes small, placed on the back of the skull, notched at their point. No auricular apertures. No limbs. Tail short, truncated, rounded at the end. (Dum. and Bibr.)

M.M. Duméril and Bibron state that *TYPHLINE* is distinguished from *Dibamus* in being apodous, and in having the tongue arrow-head-like and inserted at its point; in having the palate grooved for the second portion of its length; and, finally, in having the muzzle marked on each side behind the nostril with a longitudinal furrow, with which this last communicates. Type, *Acanthus eocatus,* Cuv. Example.—Typhline Cuvierii, Wieg. (Acanthus eocatus, Murr., Cuv., Gray). Colour a yellowish tincture relieved with violet.

**Locality,** South Africa.

**TYPHLOPS,** Schneider's name for a genus of reptiles placed by Cuvier among the Ophidia, or SERPENTS, and thus characterised by him:

Body covered with small imbricated scales, as in the Orectes (Orectes), among which naturalists long arranged them; the muzzle advanced, furnished with plates, the tongue rather long and forked, the eye like a point, hardly visible, the vent not divided, the extremity of the body one long four times greater than the other.

These, adds Cuvier, are small serpents similar in point of view to crocodiles, and species are found in the warm climates of both continents.

Some have the head of the same size as the body, and obtuse. They resemble ends of fine pinchfire (boîtes de fiche mince). *Typhlops brunnius,* Cuv. (Ruscel, Serp. Cor., xiii., 25.)


In some the fore part of the muzzle is covered in front with a single large plate whose anterior border is slightly excavate: *Auguis lumbriculis,* Lac., ii., pl. xx.; Brown, *Amer. Mem. 1751.*

Brown, *Am., xiv. 1; Sch. i., xcvii. 2.

Finally, there is one which has the muzzle terminated by a small conic point, and is entirely blind. Its posterior extremity is enveloped in an oval and horny bucket. *Typhlops philippinensis,* Cuv., eight inches (French) in length, and entirely blind. (Régne Animal.)

Cuvier arranges this group immediately after the Amphilene (Amphisbene), and immediately before the Serpentes properly so called.

Mr. Swainson makes the Amphibiasauri, or Blind-worms, the fifth and last family of his Ophidia, comprise the following:

**Genera** Amphibiasauri, Linna, (with the subgenus Lep- tosternon, Spix); Typhlops, *with the species superbosus, Spix; Amphibiasauri, Wieg., and Typhlops, Wieg.; Anilius, Spix; Amphibiasauri, Oken, and Uropeltis, Cuv.)

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The genus Typhlops is thus characterised by Mr. Swainson:—

**Eyes** hardly visible; anus close to the extremity of the body, in the subcaudal, and accompanied with small imbricate scales; front of the head with plates; muzzle produced.

**Sten stomata** he characterises as having the muzzle depressed, obtuse, and covered in front with several plates. 

**Typhlins**, as having the muzzle with a single frontal sharp-edged plate. 

**Rhinophis**, as having the muzzle pointed, conical; tip of the nape enveloped in a homely shield; eyes hid. 

**Typhlins**, as having the muzzle with a single convex plate; eyes none; tail ending in a spine. 

The genus *Anilius* is characterised by Mr. Swainson as follows:—

Body and head cylindrical, with small imbricate scales, which are but slightly larger on the belly and under the tail; the latter extremely short. 

Mr. Swainson observes that it remains to be determined whether this group enters among the *Coluberidae*, connecting them with the *Anguidae*, or forms a portion of the latter family. In placing them among the serpents, he says he has adopted the views of Cuvier. To the *Amphisbaenae*, he observes, they seem related by analogy. The subgenera *Anilius* and *Uropeltis* he thus characterises:—

**Anilius.**—Tail obtuse; a single series of larger scales in advance. 

**Uropeltis.**—Head very small, muzzle pointed, tail obliquely truncated, with a double range of scales. 

Mr. J. E. Gray places the *Typhlopsidae*, consisting of the genus Typhlops, only, between the *Acontiadeae* and the *Geckoidea*, in the order *Sauria*.

According to his arrangement, compose the genera *Nesia*, *Enesiia*, *Acontias*, *Dibamus*, and *Typhlops.* 

**Typhlonius.**—Genus of plants of the natural family of Monarchias, including several species of Arum of Linnaeus, Roxburgh, and other botanists. The genus is distinguished among the Eurorhodoce by having the spathe convolute at its base. Spadix interruptedly angrobyous below, with rudiments of the sexual organs between the stamens, naked, with a subulate apex. 

Ovaries with a single ovule, affixed at the base, erect. The species are all stemless herbs, indigenous to Iran, but with perennial tuberous root-stocks, leaves with long footstalks, nerved, cordate or hastate, or hastate; ovules, protuberant from the sheathing bases of the leaves; the spathe of a uniform colour. 

These *Oxiraeia* is described by Dr. Roxburgh by the name of Arum oxiracme, and its common in the shady mountainous regions, where the soil is dry and fertile. 

It is said that *Gekko* had to pass through the desert and the mountains before he could come to his school, for he had to be taught how to read and write. 

**Typhlone** (Greek ῥεπόν, a whirlwind) is a name frequently applied to a tropical storm: it is also given to the hot winds which occasionally blow with great violence in Africa, Syria, Arabia, and Persia; and which are felt, though rarely and with much diminished force, in the southern parts of Italy and Spain. The sirocco of Egypt and the coasts of the Mediterranean, the samoun of Arabia, and the bura of Persia, are understood to be so many designations of the typhoon; all of them being supposed to originate in the same cause, with modifications depending merely on the nature of the particles expelled from the great storm in the different countries.

Frequently when the winds have a whirling as well as a progressive motion, columns of sand are raised and driven about with great rapidity; and Burchardt observes that in Africa, as in the East the dust obscures the face of the sun, giving to the atmosphere a blue, yellow, or a reddish tint, according to the colour of the sands over which the storm blows. 

*de Humboldt* occasionally observed columns of sand in motion in the interior of South America. When the breeze is coming from the direction of the masses of moving sand and from the supposed detestable quality of the winds, are now considered as exaggerations; the inconveniences felt by men and animals during the continuance of the hurricane are chiefly such as arise from the dryness of the air and the possibility of the injury of sand which is blown into the eyes. 

**Tornado.**

**Typhus.**—[Payen.] 

**Typhonicus.**—[Schrader, vol. xxi., p. 415.] 

**Tyranonio** (Typhonius), a Greek grammarian, and a native of Amius in Pontus, was made prisoner by Lucullus during his campaign in Pontus, n.c. 72. According to Suidas the original name of this grammarian was Therapass, instead of which he was nick-named or shortened to Tyrannio on account of his severity towards those who studied under him. He was carried to Rome by Lucullus, and given as a present to Murrae, who restored him to freedom. At Rome he became himself a teacher of grammar, and is said to have amassed a considerable fortune.

He is also said to have been employed in arranging the celebrated library of Apelleco, which Suidas had brought to Rome. 

**Stenomys.**—[Roxb.] 

**Tyrannio.**—[Cuvier,] and the Tyrannoi, as Aristotle and Theophrastus. (Plut., Sulis, 26; Strabo, xiii., p. 699.) These *Geckotidee,* derived from a root for *gecko,* which he says he had a great knowledge of boats and islands. 

The *Cicero* did to the great satisfaction of the reader of the *Aeneis,* *Ad Att., ii.* He who supposed that Cicero, *Ad Att., i.* however should himself have possessed, as Suidas states, a library of upwards of 30,000 volumes, is hardly credible. 

Cicero speaks with great respect of his knowledge and love of instruction; and we are informed that in n.c. 56 he gave lectures in the house of Cicero to Quintus the son of Cicero's brother Quintus. (Cicero, *Ad Q. Frat., iv.* 4.) Strabo (xii., p. 548) also mentions him as one of the persons whose instruction he had received. 

He appears to have possessed considerable knowledge of geometry, which he used to edit a very advanced age. (Suidas, s. e.) 

Suidas mentions a second or younger Tyrannio, when he calls a native of Phocis and a pupil of the elder Tyrannio, whose name he also adopted as his real name was Diocles. He was made prisoner in the war between Antony and Octavianus, and was bought by one Drymas, a freedman of Octavianus. He gave him to Terentius, the son of the latter, who restored him, and employed him to occupy himself with teaching. He is said to have written sixty-eight works, all of which are now lost. Suidas mentions the titles of some, such as *On the Prosysody of the Driving Men.* 

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was somewhat less than sovereign, he was not monarch; but in either case he would perhaps be called tyrannus; and accordingly the word does not express with accuracy the degree of political power which an individual acquired, but it rather expresses the mode of acquisition, or refers to the exercise of the powers which a tyrant did possess. The tyrants among the Greeks, always indicates that the person so called was at the head of the state, and possessed at least more power than any other individual or any number of individuals, as used by the writers, did not carry with it any notion of blame; it simply denoted a person possessed of such political power as above mentioned, whether he used it well or ill. Many so-called tyrants were popular with the mass of the common people, and used their popular use, under the circumstances of the time and art. They might appropriately be called kings or princes in the modern acceptance of those terms, except perhaps that the uncertainty of their tenure of power and the want of a recognised hereditary succession in the tyranny, or a regular mode of succeeding to it, would render the application of any modern name inappropriate.

Some passages in Herodotus (iii. 90, Kc.; vi. 23, Kc.; vii. 165); the words monarch and tyrant are used as synonyms to express an individual who possesses sovereign power; and in one instance at least (vi. 23, 24) he calls the same person king (BßapoSc) and monarch (µaωροντος). Aristotle (Polit., iii. 10) speaks of them together in the same body of legislation, and says the word tyrant might be in the hands of one or a few, or of the many, adds that we are accustomed to call a monarch which has regard to the interests of all members of the state a kingdom (BßapoSc); and it is to coincide in this respect with the interests of the monarch is a tyranny. In the case of Miltiadès, who became tyrant of the Thracian Chersonesus, Nepos (Miltiad.) remarks that 'all persons are considered and called tyranni who enjoy lasting power in a state which has once been free.' This definition seems to express pretty clearly the old Greek notion of a tyrant, but it leaves out of consideration the mode in which the power was acquired. Nepos remarks that Miltiades was called 'tyrant' 'by an instinctual and popular use, and not justly,' for he had been elected by the people. Accordingly, he says in another place, he had the dignity or rank of king without the name. This is consistent with Herodotus (vi. 30), who says that the people made Miltiadès tyrant (προτερον καθηκόντας). Few of the Greek tyrannies lasted long, and the conduct of those who held this power was generally such as to attach in the course of time an odious signification to the word tyrant, and to make an expression which in its original acceptation denoted change in the signification of the word was introduced. Tyrannies among the Greeks seem to have arisen about the time of Archilochus, when the old kingless forms of government were in a state of confusion and the old oligarchic constitutions had been established in their place. But as such constitutions laboured under the defect of being badly organized, there was often a conflict of parties in a state, which may be represented by the terms democratic and oligarchic parties; and an aspiring citizen had thus the opportunity of acquiring the sovereignty by joining one or the other, and thus making himself a tyrant in the Greek sense of the term. Many of the old Greek tyrannies were abolished by the influence of the Sparta, the constitution of which was hostile both to monarchy and democracy. But we read of tyrannies so-called among the Greeks in the time of Philip and Demosthenes, from which we may collect either that they had not attained to a certain or definite point, or that they had not arrived to the rank of tyrant (προτερον καθηκόντας), which he expresses in another place as the acquisition of a kingship. (Erat. Encom., c. 25, 26.)

Among the Romans, writers on tyranny is often used as synonymous with tyrant, especially by the poets. Grecian couples dominus and tyrannus, whereby intending to use tyrannus in a bad sense, which was perhaps the more common acceptation of the word among the Romans, in time and subsequently. Seneca seems to refer to the original sense of tyrannus when he says, 'A tyrant is to be distinguished from a king (rex) by his conduct, and not by the name; for Dionysius the elder (who was called a tyrant) was a man of extraordinary virtue.' Sulla may be appropriately called a tyrant, for he only ceased from slaughter when he had no more enemies to kill. (Facciol., Lex., 'Tyrannus.') According to this, a tyrant might be called tyrant without being a cruel governor, for there were instances of persons so called who had not the power with moderation; and yet a man who had not the title of tyrant might be called tyrant on account of his cruelty. It seems as if Seneca was trying to distinguish the word tyrannus in his time from its earlier historical signification. Tribellius Pollio has written the 'History of the Thirty Tyrants' who sprung up in the Roman empire in the time of Gallienus and Valerian. These so-called tyrants were not more tyrannical, in the modern sense of the term, than many Roman emperors.

The use of the modern words tyrant, tyrannical, has been as vague as that of most other political terms. The term tyrant is properly limited to the government of one man who is sovereign, to the popular application of the term expresses disapproval of his conduct. Aristotle's definition of tyranny would apply well enough to a modern tyrant: he is a sovereign who looks only to his own interest, and what he does in order to accomplish his objects. But if he were a wise sovereign, and administered the state solely with a view to his real interest, that would be found in the same manner as his own interest, but tyrannical he would not be called a tyrant, though perhaps he would come within Aristotle's definition. But Aristotle's language, though apparently precise, is not so, and he means by a tyrant administering the state for his own interest, that he also administers it to the detriment of others. As the mass judge of things by their results, a sovereign would now be called tyrannical whose administration should render his people unhappy; at least he would run the risk of being called tyrannical, though he might do whatever was the goodness of his intentions, if he failed to satisfy the people. The word tyrannical is now often applied to acts of governments which are not monarchies; but this is an improper use of the word. We may say that the laws enacted by the sovereign are sometimes impolitic, unwise, or injurious to the state generally; they may also be sometimes called oppressive; but they cannot with propriety be called tyrannical, though they may be so. In addition to this, the word is of more general sense of characterizing a law which for some reason the person who uses the term does not like.

Confusion in the use of political terms, which is an index of the state of society, is therefore a matter of some moment to clear up such confusion, which all people should try to do who presume to speak or write on matters political. A careful perusal of the following articles in this work, even if they should not be quite free from error, will put a man in the way of coming to right notions as to the meaning of Aristocracy, Constitution, Democracy, Law, Monarchy, Republic, Sovereignty.
and the Rhine, and constitutes a boundary between Tyrol and Switzerland. The main mass of this mountain is formed by a ridge on the west part of the Rhine to its entrance into the Boden See. [LAKE OF CONSTANCE.] On the north of Tyrol is Bavaria. Along this line also there are high mountains, but they do not constitute an uninterrupted chain, being broken by the valley of the Drau, which runs southward into the great plain of Southern Germany. East of Tyrol are the Austrian provinces of Austria and Illyria, from which it is chiefly divided by the northern range of the Rhaetic Alps and the Drau from those of the Inn and Eisack; only a small portion of the basin of the Drau is included in Tyrol. The mountains which on the south separate Tyrol from the Lombard kingdom are frequently interrupted by streams, which enable from the mountain region of Tyrol by very narrow valleys.

According to the latest estimates the surface of Tyrol contains 11,457 square miles, which is not quite double the area of Yorkshire, and somewhat less than three-fourths of the area of Switzerland. Tyrol is much more mountainous than Switzerland. One-third of Switzerland is an undulating or hilly plain, but Tyrol, with the exception of a comparatively small tract, is covered with high mountain-masses, on which a great number of summits rise above the snow-line and are surrounded by extensive glaciers. Level tracts, admitting of cultivation with the plough, are only found along the course of the rivers, where they sometimes attain a width of a mile, and in a few places, but they are usually not more than half a mile wide. All these tracts taken together do not cover one-tenth of the surface of the country; nine-tenths are occupied by the highest mountainous districts.

The Tyrolian Alps form the eastern portion of the Central or Rhaetic Alps, and do not rise so high as the Western Alps in Mount Rosa or Mount Blanc, but they are as high as the western portion of the Rhaetic Alps in Graubünden. The most elevated parts lie along the western boundary-line, south of the Inn river, and in the great chain which runs through the country from west to east, dividing the waters which issue from the Danube basin southward to the Adriatic, or eastward to the river Drau. The western chain, as already observed, runs uninterrupted, from the Lake of Idro to the Ortler Spitz. South of 46° 6' it does not attain the region of perpetual snow, and probably does not exceed 7000 feet above the sea-level. But near 46° 8' it rises in Monte Aladamo to more than 11,000 feet, and from this summit to the Ortler Spitz (46° 30'); hardly any portion of the range is free from snow even in the middle of the summer. The highest general elevation of this range probably exceeds 9000 feet above the sea. The Ortler Spitz is the highest summit of the Rhaetic Alps, being 12,555 feet above the sea. It is surrounded by other summits which are more than 10,000 feet above the sea.

The deep and wide valley of the Upper Etsch (Adige), called Vinschgau, separates the mountain-masses of the Ortler Spitz from the mountain-range which traverses Tyrol from east to west. This range is divided into two high and elevated mountain-masses, which are divided by a large and wide depression of the mountain, which occurs near 11° 30' E. long., and through which the road over the Brenner passes from Germany to Italy. The mountain-region west of this road consists of two extensive and very elevated mountain-masses, which are connected by a high ridge. The western mountain-mass is called the mountains of the Platey Kögl, or of the Great Oetztalh Ferner, and the eastern mountain-mass the mountain of Winacher Ferner. The mountains of the Platey Kögl occupy nearly the whole country between the Inn river on the west and the Achen river on the east, a space of nearly 30 miles from south to north, and 20 miles from west to east. A considerable portion of this tract is always covered with snow, from which rise numerous pinnacles, among which the highest are Mount Gebelacht, 12,276 feet; the Similun Spitz, 11,850 feet; and the Great Oetztalh Ferner, 10,434 feet above the sea-level. This is one of the most beautiful of the mountain regions of Tyrol by a high and narrow ridge, which only in a few places is separated from the snow by a ridge. The Winacher Ferner also rise above the snow-line, but the mass is less extensive than that of the Platey Kögl. Several summits rise above 12,000 feet, such as the Kitzklofen, the Winacher Ferner, the Winter Stuben, and the Bock Kögl.

The depression which occurs east of the Winacher Mountains is of considerable extent, for no summit always covered with snow occurs in a space extending more than 10 miles from the ridges. The circle of the snow is not a part of the Tyrolian Alps probably exceeds 7500 feet in height; and in the middle, near 1° 30' E. long., it is much lower: the road over the Brenner is at its highest level (1920 feet above sea-level). This is the lowest mountain-road across the Alps, and has accordingly become the most frequented line of commercial intercourse between Germany and Italy. This road may be considered as beginning at the foot of the valley of the Inn, where it runs in a southern direction; it ascends by the valley of the Sill or the Wipfthal to its source near the post-house of Brenner, where it attains its highest level. Descending from the mountain passes, the road enters the valley of the Eisack above Sterzing, and follows the course of that river to its junction with the Etsch (Adige) below Botzen, whence it continues in the valley of Eisach, to Trent, Rovereto, Avio, and Verona. A few miles above Verona it emerges from the mountains and enters the Plain of Lombardy. Innsbruck is about 1920 and Trent 900 feet above the sea-level.

East of the depression through which the road over the Brenner lies, the most elevated masses of the Tyrolian Alps do not rise so high as those in the western portion of the Rhaetic Alps in Graubünden. The most elevated parts lie along the western boundary-line, south of the Inn river, and in the great chain which runs through the country from west to east, dividing the water which issue from the Danube basin southward to the Adriatic, or eastward to the river Drau. The western chain, as already observed, runs uninterrupted, from the Lake of Idro to the Ortler Spitz. South of 46° 6' it does not attain the region of perpetual snow, and probably does not exceed 7000 feet above the sea-level. But near 46° 8' it rises in Monte Aladamo to more than 11,000 feet, and from this summit to the Ortler Spitz (46° 30'); hardly any portion of the range is free from snow even in the middle of the summer. The highest general elevation of this range probably exceeds 9000 feet above the sea. The Ortler Spitz is the highest summit of the Rhaetic Alps, being 12,555 feet above the sea. It is surrounded by other summits which are more than 10,000 feet above the sea.

On the north-west and north of the mountain-region is the Tyrol, which, separated from those of the Inn by the valley of Innsbruck, reaches another mountain which contains the sources of the rivers Lech and Isar, which descend from northwards, and enter the Plain of Bavaria. In this range there are only two summits rise above the snow-line. The highest are the Arlberg, which is 10,200, and the Great Solstein, which is 17002 feet above the sea-level. West of the last-mentioned summit runs the road which leads from the Plain of Bavaria to Innsbruck, and therefore is to be crossed by the Austrian boundary. This road continues to the Brenner. It leaves the Plain of Bavaria at Benediktbeuren, runs through Mittenwald to the Scharnitz, near which fortification it attains its highest level, which hardly falls much below the 7500 feet above the sea. Above the second summit it descends into the valley of the Inn, which it reaches at Zirl, from which place to Innsbruck it follows the valley.

The mountains which fill up the south-eastern portion of Tyrol are called the Carnic Alps. They begin on the south-west, on the banks of the Etsch, north-west of Verona, and extend partly within Tyrol, and partly on its boundary-line with the Lombardo-Venetian kingdom, in a north-eastern direction to the source of the river Drau, where they turn to the east and leave Tyrol. Very few of the summits of this extensive mountain-region reach the snow-line. The most elevated is Mount Marmolata, which rises to 11,500 feet above the sea-level. The connection between this range and the eastern Tyrolian Alps is formed by a moderately elevated and narrow ridge, which occurs near 12° 12' E. long., and separates the sources of the Drau, which flows eastward, from those of the river Rienz, which runs westward and joins the Eisach at Brixiun. On the north this ridge is connected with other ranges of mountains and snowfields, which occur south of the Drei Herrn Spitz. Over this ridge runs the road which connects with the remainder of the Austrian state. It begins at Brixiun, and the Etsch is joined by the valley of the Rienz to Toblach, traverses the above-mentioned ridge east of Toblach, and descends into the valley of the Drau to Innichen, in which it continues to the east and joins the Eisach. From there it branches off to the southward, which leads over the Penteliner Renn and enters the Plain of northern Italy. It leaves the road at Toblach.

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the beginning of autumn, and dissolve in a few hours an immense quantity of snow, which about that season begins to accumulate on the less elevated mountains, and the volume of water which is thus set free is expected to bring considerable inundations in some parts of the valleys. The most fertile lands are in the valleys of the Inn and of the Etsch; the valley of the Etsch is the most fruitful.

When, rye, barley, and oats are cut, where the climate or stony soil is not unfavourable. In some parts buckwheat is grown to a great extent, and used for bread. Millet is also grown, but not extensively. Indian corn is the principal corn grown in Austrian Tyrol, and it is cultivated along the whole of the frontier with Italy.

The river of Tyrol is the Inn and the Etsch. The Inn rises in the western part of the Rhätische Alps in Engadin, and runs about 500 miles before it enters the Inn valley at Amsperg, and for a distance of about 100 miles, it becomes navigable for river-boats. Below this point, the Inn flows to La Chaux-de-Fonds, and for a distance of about 20 miles, it is navigable for river-boats. The Etsch originates in the mountains near the source of the Inn, and runs to the eastward until it is joined by the Passeier rivulet, when it turns to the south. At its junction with the Etsch below Botzen it turns southward and begins to be navigable. At Dorf, it leaves the Etsch and enters the Lombard-Venetian kingdom. The navigation of these rivers is difficult, and frequently interrupted by their rapids, especially after the melting of the snows.

As a great portion of the country, probably one-tenth, is always covered with snow, whilst its most southern valleys are barely 500 feet above the sea-level, the climate of Tyrol must differ greatly in different places. At Innsbruck the mean temperature of the winter is 30°, or nearly 8° less than at London; and that of the summer is 64°, or about 23° more than at London. The mean annual temperature is 49°, or 1° less than at London. At Trent the mean annual temperature is 53°, or nearly 8° higher than at London.

All those parts which on the north are 7500 feet, and on the south 6500 feet above the sea-level, are always covered with snow. Lower down, to an elevation of 6000 feet, the snow is not common, but is sometimes found on the summits of mountains, which are not much exposed to the sun, but in other places the declivities of the mountains are covered with grass and flowers. In the region between 6000 and 5000 feet, the snow does not grow, but there are some bushes, between which the soil is covered with grass that serves for pasture during two or three months in summer. There are no houses inhabited all the year round at this elevation. Fire- trees occur even at an elevation of 5000 and 4000 feet, where a few permanent habitations are found, and some potatoes and vegetables are cultivated. The winter lasts in this region eight or nine months. Agriculture is carried on with success in all places below 4000 feet. Rice and sugar are grown in the plains, but potatoes are to a considerable extent, though they do not grow large when planted above 3000 feet. Apple and pear trees succeed at the elevation of 4000 feet, and even somewhat higher, but plum-trees only to 3800, and walnuts even lower. The bee is found between 3000 and 4000 feet, and the oak between 1900 and 3000 feet above the sea-level. Wheat does not succeed above 3000 feet, and vines only between 800 and 1000 feet.

In Tyrol, owing to the great unevenness of the surface, the air is in continual motion, and a calm day is a rare occurrence. The southern winds are like the sirocco of Italy, much feared on account of the effect that they produce on the health, especially in the southern valleys. They are most frequent towards the end of summer and in the beginning of autumn, and dissolve in a few hours an immense quantity of snow, which about that season begins to accumulate on the less elevated mountains, and the volume of water which is thus set free is expected to bring considerable inundations in some parts of the valleys. The most fertile lands are in the valleys of the Inn and of the Etsch; the valley of the Etsch is the most fruitful.

Manufactures and Trade.—The Tyrolese manufacturers are extremely industrious, and have a remarkable talent for mechanical arts. Tyrol is not a manufacturing country. The women spin flax, weave linen, knit caps and stockings, make baskets and caps; they sell their produce, and Bregenz formerly reared great numbers of canary-birds as objects of commerce. Some towns manufacture goods of various kinds, as Bregenz, Roveredo, Ah, and Innsbruck. It is remarkable that these places send their manufactures to a great extent, and in the trade of the Tyrolese is considerable, especially the transit trade, which is much facilitated by the admirable new roads. Besides the export of the natural productions of the country, thousands of the inhabitants annually migrate as peddlers or hawkers, with gloves, carpets, curings in wood (from Gröden), and engravings; the trade in canary-birds has nearly ceased. The Tyrolese have a remarkable talent for fine arts; Pilcher, one of the most eminent of modern lapidaries; Trager, one of the best fresco painters of the eighteenth century; the sculptors Schöpf and Zeuner, Sir G. Kneller and Angelica Kaufmann, were natives of Tyrol. The Tyrolese have likewise a good genius for military science, which grants only to be well directed and more encouraged. Education has been much extended within these few years. In 1833 there were 1564 schools, including 12 high schools, 36 schools of industry, and 12 schools of design. Of 110,856 children, 108,986 actually attended. Besides these there are eight gymnasias, a lyceum, two seminaries, and a university at Innsbruck. The beneficent and charitable institutions are numerous and well established.

Population.—According to returns made in the years 1829 to 1832, the population had been progressively increasing, and was in the latter year 813,000, of whom above 600,000 were Germans and the remainder Italians. They are all Roman Catholics. The population may now exceed 830,000.
Character, Manners, and Language.—The character of the Tyrolese has many peculiarities which distinguish them from all their neighbours. They are honest, frank, with a very independent spirit and a nice sense of honour, and strong attachment to their native land; the object of the numerous emigrations is merely to procure a small capital with which to buy a piece of land at home. They are especially distinguished by their devoted attachment to their sovereign, the emperor of Austria. They are fond of the chase and of many games, and are a poetical and musical people. They are said to be immoderate in their love of brandy, prize-fighting, and of satirical songs which may be seen, and indeed printed, on the walls of almost every inn. The Tyrolese are subject to the infliction of dangerous wounds, which are more numerous in Tyrol than in all the other provinces of the empire together. The above remarks apply only to the German population.

The inhabitants of Southern Tyrol have more of the Italian in their manners, language, and even in their dress, while the North retains more of the antique character.

History.—At the earliest period to which we can trace the history of Tyrol it formed part of Rhetia, and was subdued by the Romans in the reign of Augustus. After being ravaged by successive hordes of barbarians, the Marcomanni, the Alemani, the Huns, and the Goths, it was divided into several petty lordships, all of which acknowledged the primacy of the bishop of Salzburg. In the twelfth century, on the fall of the house of Guelph, the Tyrolese became immediate subjects of the empire, and the petty lordships were absorbed under two heads: the two families being united by marriage, the country was divided into the territories of Bariss and Tirolo. The latter, in 1335, left one daughter, Margaret Maultasche, who made over her dominions to her cousins the dukes of Austria. Austria, after having remained in possession of it several centuries, was compelled to cede it by the peace of Presburg, in 1805, to Bavaria. Attached as the people were to the house of Austria, and to their constitution, which was remarkably free, they were dissatisfied with the change of masters, and still more with the measures of the new government. Accordingly, when war between France and Austria again broke out in 1809, the whole province rose in arms, under Andreas Hofer, but the great disasters of Austria left them without support, and the country was again occupied by the French and Bavarians, in whose possession it remained till 1814, when, to the great joy of the people, they were restored to the dominion of Austria, and reinstated in all their ancient privileges.

The most important part of the circuit of the same name, is situated on the navigable river Adige, in a beautiful and fertile valley which is surrounded with high mountains. A traveller coming from Germany is much struck with the appearance of this city, which has quite an Italian character. The buildings are very high, the streets are tolerably wide, and well paved with broad flag pavement for pedestrians. There are many handsome buildings in the city, and some churches worthy of notice. Among the former are the theatre, the episcopal palace, and the palace of Tergata Tabareli, built of red marble by Bramante d'Urbino: of the thirteen churches the most remarkable are the cathedral, a large edifice in the old Greek style, entirely of marble, the building of which was begun in the tenth century and finished in the sixteenth; 2, Saint Maggiore, built entirely of red marble, with an extremely lofty chapel, which is much admired, and is memorable as having been the place in which the Council of Trent held its sittings from 1546 till 1663; 3, the church of the seminary (formerly belonging to the Jesuits), adorned with a profusion of costly marble; 4, the church della Annunziata, the lofty cupola of which is supported by immense pillars of red marble, each consisting of a single block. Some of the churches and palaces have fine paintings. Signor Grovanelli has a remarkable collection of medals and antiquities, mostly found in South Tyrol. Trent is the residence of the bishop, with a chapter of eight canons. The city has 12,000 inhabitants. The occupations of the people are the silk manufacture and the cultivation of the vine. There are in the city extensive sugar-houses, a large imperial tobacco manufactury, and many distilleries of brandy. Among the charitable institutions, public institutions are a gymnasium, a lyceum, a Franciscan and a Capuchin convent, and various hospitals and poor-houses.

Rovereto is situated in the middle of the pleasant Lazarian valley, which is planted with vines and mulberry-trees, on the river Leno, which flows through the town, and at a short distance from the left bank of the Adige, over which there is a stone bridge. The town, though not large, has been highly celebrated for its gardens and small capital, which it is worth the time of any visitor to the town to take a walk there. The town is the seat of several courts of justice, and has a gymnasiun, three monasteries, an English convent with a school for girls, a public library, and some charitable institutions. The inhabitants, about 16,000 in number, manufacture silk, leather, and tobacco, and have a distinguished reputation for the manufacture of fine wines. They are annually exported. In 1467 Rovereto was taken by storm by the archiduke Sigismund, in sight of the whole Venetian army. On this occasion bombs were used for the first time.

BOTZEN, BREGENZ, BRIXEN, INNSBRUCK, and SCHWAZ are described under their respective names.

(Trockhaus, Conversations Lexicon; Blumenau, Gemälde der Oesterreichischen Monarchie; Die Oesterreichische National Encyclopedia; R. v. Jendy, Handbuch für Reisende durch Oesterreich, edited by A. Schmidt.)

TYRONE, an inland county in the province of Ulster in Ireland, bounded on the north and north-east by the county of Donegal, on the south-east by the county of Armagh, on the south by that of Monaghan, on the south-west by that of Fermoy, and on the west and north-west by that of Donegal. Its form approximates to that of an oblong quadrangle, containing 415 square miles. It is divided into two parts; the western of which is about 12 miles from the sea, and north-west respectively. The largest dimensions, which are the diagonals of the quadrangle, are as follows: from the shore of Lough Neagh at the mouth of the Ballinderry river in the east, to the county of Donegal in the west, 57 miles; and from the banks of the Foyle, at the junction of the three counties of Tyrone, Donegal, and Londonderry, in the north, to the junction of the counties of Tyrone, Armagh, and Monaghan in the south, 47 or 48 miles. The total area (exclusive of Lough Neagh which is assigned to this county), according to the Ordnance Survey, 806,293 acres, 3 roods (or nearly 1260 square miles), of which 774,300 acres, 2 poles (or 1210 square miles) are land; and 31,793 acres, 2 roods. 38 poles (or nearly 50 square miles) are water.

The population, in 1831, was 304,468, giving nearly 22 inhabitants to a square mile. In area it is about equal to the combined counties of London and Middlesex; and falls considerably short of it in both amount and density of population. Omagh, the assize town, is 96 miles in a direct line north-west of Dublin, or 110 miles by the Londonderry mail road through Ashbourne, Slane, Carrickmacross, and Cavan, to Dublin; 48 miles north-east of Londonderry; and 28 miles north by west of Ballycastle; the town of Lough Neagh on the east.

Surface, Geology, Hydrography, and Communications—This county lies, for the most part, between the two mountainous districts which cross Ulster from east to west. The northernmost of these districts (that of Antrim, Londonderry, and Donegal) encroaches upon the northern border; and the southernmost (that of Down, Antrim, Monaghan, and Fermanagh) encroaches upon the southern border. Outlying groups of mountains occupy portions of the intermediate district, especially on the west, where they extend nearly across the county. One group connecting the two great mountain-distries, crosses the county a little to the eastward of the centre, and divides the lower ground, which occupies most of the central and eastern parts of the county, into two parts, the plain or basin of Omagh in the centre, and the plain of Lough Neagh on the east.

The plain of Lough Neagh (the surface of which lies nearly 50 feet above the level of the sea), rises gradually from the shore of the lough westward towards the mountains which separate it from the plain of Omagh. It extends south-eastward across the border of the county, which is here formed by the river Blackwater, into the two districts of Down, Antrim, and south-eastward to the neighbourhood of Clougher and Five-mile's Town, on the foot of the mountains which border the county on the south.

The county is watered by the rivers Foyle and Erne, the latter coming into the county from the mountains of Donegal and county Tyrone, and dividing the county into two parts, the river Foyle in the north, and the river Erne in the south. The watercourses are divided into two systems, one running north-east, and the other south-west; the two systems unite near the county town of Omagh. There are also a great number of lakes and small streams in the county.

The county is traversed by a system of roads, which are partially turnpiped, and in the county town is a good market.
The lakes are numerous; but are all small except Lough Neagh, of whose surface 27,365 acres, 1 rod, 24 poles, or nearly 43 square miles, are assigned in the Ordnance Survey to this county.

The Dublin and Londonderry mail-road crosses the country from south-east to north-west by Aughnasloe, Ballygawley, Beragh, Omagh, Newtown-Stewart, and Strabane; the Newry and Coleraine cross-mail road crosses the southern portion of the county, through May, Dunamoon, and Cookstown.

We subjoin the height of some of the more remarkable elevations: Slieveh Saviel, 2233 feet; Mullagh Clogher, or the Stranorlar Mountain, 1868 feet; Officeragh, 1866 feet; Carnakilly, 1596 feet; Slieveh Kirk, 1225 feet; Bovey Mount, 1118 feet; all on or near the border of the county, towards Londonderry. Doosih, in the mountain group which bounds the plain of Omagh on the west, 1119 feet; Mullagh-carn, 1728 feet; Bassy Bell, 1866 feet; Slieveh Ard, 1381 feet; and Mary Gray, 826 feet; all north of the plain of Omagh. The hills north-east of the plain of Omagh, between the Owen Killow and the Glenelly, to the height of 1432 feet. The measurements are from the Ordnance Survey.


The soil of the barony of Omagh is mostly of a light friable nature, and of a brown colour, upon a firm, loamy subsoil, mixed with gravel, and in some places upon a sandy stratum, and others upon a slaty rock. Limestone is found at Kilmore, near the town of Omagh, at Drumquid, and on the borders of the county of Fermanagh. Peat bogs and masses abound in all parts of the barony; in their vicinity the land is of a moory or peaty nature upon a clayey subsoil.

The agriculture in this barony is very far behind that of the county of Armagh, or any other we have visited. The principal landlords are absentee; and do not encourage improvements; many of the farmers are ignorant of the cultivation of turnips, clover, rape, or mangel-wurzel: some of them say they are aware of the advantage they would receive by these plants, but they are too poor to get lime, manure, or sand to begin the system. Their plan is to grow a succession of out crops (sometimes five), after potatoes, till the land can no longer produce, and in that exhausted state it is left to rest, as they term it, till it is deemed fit for further encroaching on the subject. The affords in the interin, left as it is in many or most cases to spontaneous production, is poor in the extreme; some few sow a little white-grass (Holsen lanatus). Rye-grass and timothy-grass are sown in a very few instances; it is impossible for the tenant to comply with the Agricultural Society in the county of Tyrone. The farms average about 12 acres Irish measure. Two-thirds are ordinarily under the plough. The rent of the arable land, keeping the high land near the mountains, is £. 10s. per acre, Irish; the tithe, 1s. to 2s. 6d. per acre; the county cess, 3s. to 4s. per acre. Many have leases, but without any instruction for proper cultivation, and, on the other hand, without any condition on the part of the landlord to assist the tenant in draining and inclosing, &c., as is the usual practice in many parts of England. Notwithstanding, it is usual for the farmers to burn lime, as the number of limelicks in all parts of the barony testify. The limestone at Kilmore cannot be had very cheap; it is charged 10d. per barrel of four bushels. The farmers prefer carting the stone and burning it in kilns with sods or turf on their own farms; this they do at vacant times: the breaking and burning cost 5d. per ton; when burned, it is all as black as a sooty pocket; the rest is his own cartage and labour in stone, turf, &c.; 30 or 40 barrels are put on land which has been previously arable, and double this number is laid on rough, per ton; when burned, it is all black as a sooty pocket, the rest is his own cartage and labour in stone, turf, &c.; 30 or 40 barrels are put on land which has been previously arable, and double this number is laid on rough, per ton; when burned, it is all black as a sooty pocket, the rest is his own cartage and labour in stone, turf, &c.; 30 or 40 barrels are put on land which has been previously arable, and double this number is laid on rough, per ton; when burned, it is all black as a sooty pocket, the rest is his own cartage and labour in stone, turf, &c.; 30 or 40 barrels are put on land which has been previously arable, and double this number is laid on rough, per ton; when burned, it is all black as a sooty pocket, the rest is his own cartage and labour in stone, turf, &c.; 30 or 40 barrels are put on land which has been previously arable, and double this number is laid on rough, per ton; when burned, it is all black as a sooty pocket, the rest is his own cartage and labour in stone, turf, &c.; 30 or 40 barrels are put on land which has been previously arable, and double this number is laid on rough, per ton; when burned, it is all black as a sooty pocket, the rest is his own cartage and labour in stone, turf, &c.; 30 or 40 barrels are put on land which has been previously arable, and double this number is laid on rough, per ton; when burned, it is all black as a sooty pocket, the rest is his own cartage and labour in stone, turf, &c.; 30 or 40 barrels are put on land which has been previously arable, and double this number is laid on rough, per ton; when burned, it is all black as a sooty
sufficient supply of manure till they adopt the system of keep-
ing their cattle on green food in the house. Another proof of
the advantage of cutting green food for cattle, and keeping
them in the house, may be derived by comparing the quan-
tity of butter given by the calves of cows under the two modes of feeding. In Omagh they state the quan-
tity to be 60 to 70 lbs. in the year; in Armagh, under the
steed-feeding, it is 100 to 112 lbs. The old Irish breed of
butter is most exclusively, no improved breed having been
introduced.

'Sheep are rarely seen; we observed on an average about
one in a mile, in travelling through most parts of the barony:
except in demesnes, it was said by the farmers that there was
only one sheep to 300 acres. The hills, as well as in the other
parts of Ireland which we have visited, are of a good description. The horses are also useful, and
adapted to the country and the small farms. The car
is still in use here, with the revolving axle-tree and solid
wheels: there is also a species of carriage quite novel to
me, viz. a sledge, or as it is here called, a sled or slide: it
consists of the shafts of a cart, having nailed to each of
them at the lower end a piece of crooked wood, a yard or
four feet long, to slide upon the ground; upon these shafts
a basket is placed to carry turf, hay, &c.; these sledges are
used on the mountain-sides, being lighter to draw up the
steeps of the hills, and less subject to be overturned. They
do not require the same care of the wheels as good roads in
England of what are called sledgings, viz. a simple slight
projecting rail, extended round the cart for the purpose of
carrying a load of hay or straw. The car continues to be much improved; the old clumsy wooden
plough, with its wooden mould-board, has given place
to the Scotch and iron plough, with a pair of horses abreast.
Their spades and shovels differ from the English in being
six or six feet long, which are certainly calculated for
keeping the body more erect, and for ease in their use, and
in some cases may be as useful, but the English spade and shovel are in my opinion calculated for
double work, given time. Although the roads in every direction were receiving great care from the
residents of water and mud upon them, we did not see half
dozens engaged in removing them, but the whole ten days
we were residing in and travelling in the barony; that is, we
did not see half dozons engaged in the work of removing
them. It is noticeable that so many poor men are forced to be idle, though
so anxious to get a day's work, that they would travel six
or seven miles for it, according to the evidence given at
Armagh. A little labour in opening the sides of roads to allow
the water to run freely off, scrapping the mud off, and putting
a few stones into the hollows, saves the great expense
which is very commonly resorted to in covering a road
entirely with stones, rendering it impassable for a long time.
Many of the roads which are not timbered are in a most neglected and shameful state, but the farmers say that they cannot adopt any proceedings, and
therefore must suffer.

'Very little attempt appears to be made to cultivate the
surface of the bog-lands; what is done is chiefly by hand-
labour: no horses are used upon moses or bogs, with
patience to prevent them sinking, as practised in Lancashire.
Potatoes are all grown on the ridge or lazy-bed method;
not a single instance occurred where the plough was used. Wheat is very little grown, which may be in part accounted
for by the distance to any port or water-conveyance: what
is produced is sent to Collon or Dungannon. The Irish
miles: many parts of the barony and county are well
adapted to its growth under proper cultivation. At
Omagh there is a good market for oats. Very few orchards
seem to be found.

'Many of the enclosures are large for the size of the
farms, and the fences so bad, that they are obliged to bring all their cattle into the house at night,
or only to permit them to attend by day. In more
parts quickset fences have largely been adopted, but they
are not in general much; and, in the same cases the tenants have had
to purchase the thorns and plant them, which are not very
desirable. About 3,000; less, is the thousand. It is allowed by all that
the farmers are becoming very careless of the
acre; any improvement: the situation of the cottler is deplorable,
living, or more properly, merely possessing an existence,
in poverty, rags, and wretchedness, in dwellings not fit for
a four-footed animal, frequently without windows or chimneys,
built of sods or mud, 12 or 14 feet square, imperceptibly
covered with rushes or straw, the smoke issuing out of
the door and various parts of the roof.'

'The Irish acre is equal to 1 acre 2 roods 19 per
to statute measure; and the Irish mile to 1 mile 2 furlongs
7 poles.

'The cultivation of potatoes has increased. There is
no permanent grass-land. The butter of the district is of
second quality, but it has improved considerably of last
years. The milk is now made into butter, and the cheese is not a

The con-ace system is by no means so general in the
county as in many parts of Ireland: in a great number of
parishes it is quite unknown.

Farmer servants, unmarried and living in their master's
houses, are numerous, and give their skill from 12. to 21.
years besides their living. Day-labourers in and about
the towns are generally without regular employment, and
are the destitute class. Cottier labourers are the most
numerous class. These give the first four days of every
week throughout the year to a farmer, for which they receive from the farmer the following payment:—
Three days on the days when they work for him; a cabin ab.
from 15 to 20 perches of measured land for potatoes; as
much land as will be sufficient for sowing two pecks a
fax; and permission to cut as much turf as two men can cut
through eggi, which turf is brought home for them by the farmer. In some cases they get a little ground,
perhaps half an acre, which is let to them. In other cases the
week are considered necessary for the cultivation of their
own little crop, out of the proceeds of which they have
to clothe themselves and their families, to feed those
families, and maintain the women and children. In every seven
of these difficult task they are enabled to
perform chiefly by the industry of their families in the
dressing and sale of their flax and by rearing a pig. Was
a cottier is old, and unable to work as the farmer wishes,
he must go out and beg, unless he has a family able to
maintain him. It sick and unable to work, his crop is
seized, and perhaps sold; or if, by the kindness of the
farmer, he is left to have the last time to sell his addition of
flax, he must sell it, or something else. Some cottiers get the privilege of keeping a cow on the farmer's
land in which they pay 4l. 4s. a year, which is generally paid
in money.

Employment is scarce: day-labourers seldom get more
than half work through the year, and many do not get
even that: a labourer gets in summer 6d. per day and board;
in winter, when employment is very scarce, 6d. per
day and dinne: a boy under sixteen may earn about 1l. 6s.
in the half-year as servant to a farmer. A cottier's son
may earn 4l. 4d. a day by spinning, at the utmost:
children in general get no employment till they are twelve or
fourteen years of age. The food of the labouring class consists
chiefly of potatoes; a small amount of oatmeal, and
sometimes barley. Many of the cotters, which have been described already, are wretchedly furnished; their clothing also is wretched. Turf is
the common fuel, and is abundant and cheap; yet, amidst all their privations, they are, on the whole, a peaceable well-
behaved people.

Divisions, Towns, &c.—The county is divided into four
counties, as follows:

<table>
<thead>
<tr>
<th>Area</th>
<th>Total</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>Barony</td>
<td></td>
<td></td>
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<tr>
<td>Dungannon</td>
<td>384.9</td>
<td>111</td>
<td>31</td>
<td>25</td>
<td>27</td>
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<td>Co.'</td>
<td>365.7</td>
<td>109</td>
<td>28</td>
<td>21</td>
<td>26</td>
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<td>Omagh</td>
<td>122.7</td>
<td>35</td>
<td>10</td>
<td>9</td>
<td>6</td>
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<tr>
<td>Strabane</td>
<td>298.5</td>
<td>89</td>
<td>25</td>
<td>20</td>
<td>20</td>
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</tbody>
</table>

The county contains the assize-town of Omagh, the
borough of Dungannon, the es-boroughs of Strabane,
Augher, and Clohoge (Clohoge, Bishopric of), disan
chized at the Union; the market-towns of Aughaclooge,
Cookstown, Drunquin, Fintona, Moy, Newtown-Stewart,
Stewart's-town, and Tremlick; and the post (but not market-
towns of Coal-island, Donnavagh, and Five-mile-town.

Omagh is in the parish of Drumragh, in the county of
Tyrone, situated on the west side of the county, and near
or near the close of the eighth century. It is on
the south bank of the Camoven, immediately below the
junction of the Drumnagh; and consists of one principal
street, nearly parallel to the course of the river, and one
or two smaller streets branching from it. The streets are paved, but not lighted. There were, in 1831, 557 dwelling-houses, with 371 families, and a population of 2211: the houses are mostly of respectable appearance, and slated. The parish church of Drumragh, a large and handsome building, was erected in the town; and there are a Roman Catholic chapel, two Presbyterian meeting-houses, and one Methodist; a handsome court-house for the assizes, a county gaol, barracks for the military and for the police, the latter just over the bridge, in Cappagh parish; a considerable flour-mill, a distillery, a savings bank, and a news-room. The town has not much trade: there is an extensive brewery in Cappagh parish, just across the river. There is a well-supplied market on Saturday, but there is scarcely any trade for oats. Brown linens are sold on alternate Saturdays, and there are ten fairs in the year.

Dungannon is in Drumglass parish, in the barony of Creggan, about 16 miles from Omagh, on the Londonerry mail-road from Newry to Coalisland. It was an antiently one of the chief seats of the Hy Niall or O'Neill family, and suffered considerably in the early hostilities between the native Irish and the English of the Pale, as well as in the great rebellion of 1641 and the war of the Williamite. The town consists of four principal and some smaller streets, and had, in 1831, 569 inhabited houses, with 708 families, forming a population of 3515. The town is lighted with gas, and has many gasometers. It has several churches: two, erected after the Restoration; the parish church of Drumglass, a handsome building, with a lofty octagonal spire; a Roman Catholic church, two meeting-houses for Presbyterians and one for Methodists; of which the principal trade of the town is the manufacture and bleaching of linen; in the immediate neighbourhood are several limestone- quarries, some potteries, iron-works, lime-works, and flour-mills, a large distillery, and a brewery; and at Drumglass, only two miles distant, there is a distillery. Dungannon was incorporated by charter of James I, a.d. 1612; but the corporation has been dissolved by the late Irish Municipal Reform Act. It sends one member to Parliament. Dungannon is near the town a royal college or school, with (in 1834) nearly 80 boys; the school-buildings, which cost 4026{, were erected a.d. 1786, by order of primate Robinson of Armagh, who gave the ground and 2000l towards the expenses. Near the town is Northland House, the residence of Lord Ranfurly.

Strabane, in the barony of Strabane, 16 miles northnorth-west of Omagh, on the Londonderry road, consists of a number of streets irregularly built on the north-east or ridge of a natural elevation in 1831, 2756 inhabited houses, with 6551 families, the population was 4700. The parish church of Camus parish (in which part of the town stands) is in Strabane; and there are two Roman Catholic churches, one of them in the suburb beyond the river, and one meeting-house, if not more, Presbyterian or Methodists, and a court-house and bridge, all. Corn (for which Strabane has the most important market in the county), salt beef and pork, butter, eggs, and poultry, are exported; and timber, staves, iron, copper, and other metals, are imported. There is a considerable brewery, and on the Foyle, below the town, is an important salmon fishery. Trade is facilitated by the Strabane canal, the basin of which is adjacent to the town, and has good wharfs and quays, with warehouses and storehouses for grain. Strabane was incorporated by charter of James I: the corporation has been dissolved by the late Irish Municipal Reform Act.

Aughawgy in the barony of Clogher, about 16 miles south-south-east of Omagh, and about two miles north-east of the town of Clogher. It stands on the south side of the river Blackwater, and consists of one small street and a group of houses detached from the street. Near the town is a small church, a stone and gable house, in which divine service is performed every Sunday. The town was incorporated by James I, but the corporation has gone into abeyance. The population of the town and immediate vicinity was, in 1831, 633, chiefly Protes-

Aughnacloy, in the barony of Dungannon, and Ballygawley, in that of Clogher, are both on the Dublin and Londonderry mail-road. Aughnacloy is 20 miles S. E. from Omagh, and Ballygawley 16 miles. Aughnacloy has a population in 1831, 1742; consists of one principal street along the mail-road, and of some smaller streets. It contains some good houses, the parish church of Carrenteel, a Roman Catholic chapel, a Presbyterian meeting-house, and a convenient market-house. The market is on Wednesdays, and there is a monthly fair for live-stock. Ballygawley (population in 1831, 972) consists of one principal street along the mail-road, and has some large and well-built houses, and a Presbyterian meeting-house. A small manufacture of clothes is carried on, and there are a brewery and a distillery. The market is on Friday, and in it every fortnight there is a considerable sale of linen. There is a monthly fair for live-stock. Caledon is in the barony of Dungannon, between Armagh and Aughnacloy, on the left bank of the Blackwater, and at the south-eastern extremity of the county. It consists of one main street, and had in 1831 a population of 1079. The parish church of Aughaloo is in the town, and there are a Roman Catholic chapel and a Methodist meeting-house; near the town is Caledon House and demesne, the residence of the earl of Caledon. There is a large flour-mill, a distillery, and several potteries, or kilns, in the town, which are chiefly for the manufacture of linens. Caledon was antiently called Aghalo or Aughaloo, and at a later period Kennard, which name is still frequently used by old people. Castlecomer, or Derg-bridge, is on the main road (to Omagh), and is a station on the Derg, over which is a handsome stone bridge of four arches. West of the town are the ruins of an old castle, built before a.d. 1619, by Sir John Davis, attorney-general for Ireland. Population in 1831, 575. Cookstown, in Dungannon barony, consists of one street, and had in 1831 575 inhabitants, and 1010. It is on the main road from Newry to Coalisland. It had in 1831 a population of 2883. Many of the houses are large, built of stone and slate. The parish church of Derryloran is in the town, and in or near the town, meeting-houses, for Methodists and Roman Catholic chapel. There are two weekly markets, one on Tuesday for corn, and one on Saturday for linen-cloth and yarn, flax, live-stock and provisions, and a monthly fair for farming-stock. Near the town is a bleach-mill and a number of limestone or freestone quarries. Fintona, in the barony of Clogher, on a feeder of the Drumragh, nine miles S. by W. of Omagh, consists of one main-street, with some well-built houses, and a church. Unbleached linens are woven and sold in considerable quantity in the market, which is held on Friday. The parish church is in the town: the Roman Catholic chapel is at some distance from it. Moy, on the Londonerry road, which is the main mail-road, just where it enters the county, on the banks of the Blackwater, over which is a bridge communicating with the town of Charlemont in Armagh. Moy had in 1831 a population of 92. It consists of a principal street, expanding in one part into a square or market-place, and of one or two smaller streets branching from the market-place; and contains the parish church, a Roman Catholic chapel, several dissenting meeting-houses, and a commodious market-house. Considerable trade is carried on in coal, corn, timber, salt, iron, and slate, by means of the navigation of the Blackwater: there is a well-provided market on Friday, and a monthly fair for horse-dealing. Linen is woven, and round the town are some bleach-greens, and potteries for coarse ware. Newtown-Stewart is in the barony of Strabane, on the left bank of the Strule (over which there is a bridge), 10 miles from Omagh, on the mail-road to Londonderry. It consists of several streets irregularly laid out, but well-paved; it had in 1831 a population of 1737. The houses are for the most part neat and well-built; and the town contains several Presbyterian or other dissenting meeting-houses, and the ruins of an ancient castle. There is a market on Monday for agricultural produce and unbleached linen, and a monthly car-fair for live-stock; and there is a mail-road from the barony to Dungannon, between Dungannon and Cookstown, and consists of a large market-place, and three streets meeting in it: it had in 1831 a population of 1010. Some linens and mixed fabrics of linens and cotton (called
unions) are made; in the neighbourhood are several lime-
stone-quarries, and considerable trade is carried on in the
town, which is the mart of the surrounding district.
Stewartstown contains a number of well-built houses,
stands a handsome church, Donaghenny, a Roman
Catholic chapel, two Presbyterian meeting-houses, a
school-house, and a market-house. The other market-
towns are too small to require notice.

The subsequent town, surrounded "x
is, Sis 7
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31,69*
win

The grand-jury presentments for 1840 amounted to
48,312/. 14s. 8d., thus distributed:—

New roads, bridges, &c. 
Erection or repair of court or session-houses 
Erection or repair of gaols, &c. 
All other prison expenses 
Police 
Salaries of county officers, not included above 
Public charities 
Miscellaneous

£8,824 7 6
162 1 11
50 0 0
1,434 10 0
78 0 0
3,965 18 9
4,170 18 2
3,651 6 7
5,113 7 0
2,686 2 14

The town was taken by the Union. It is now called
Omagh. Those who were among the most powerful of the
native chiefs. In the reign of Henry VIII. (a.d. 1542), Hugh
O'Neill was created earl of Tyrone, with remainder to his
illegitimate son Matthew. He was appointed lord of Dungannon.
The earl, having made a plan for extending his power
over the government, and for Matthew's exclusion, was, through
the information of the latter, seized by Sir James Croft,
lord-deputy, and detained in prison at Dublin. His son
Shane or John O'Neill, assembling some troops, partly
Scottish adventurers, defeated the forces of the lord-
deputy and of his brother Matthew, whom he afterwards
assassinated; he then invaded the territory of Tyrone, and was
received with torrential enthusiasm by the insurgents,
who saved him from a sure defeat, but conpired to maintain himself in his own
district of Tyrone, of which, on the death of his father, he
assumed the title of earl. He was assassinated (a.d. 1561)
by a Scottish captain, in whose encampment he had taken
refuge, and who was engaged in the attack of Sir Henry Bagenal
in the rebellion of Hugh O'Neill, earl of Tyrone, and
son of Matthew of Dungannon (a.d. 1596) and following
years. Dungannon Castle, where he resided, was burnt by him on
the advice of the lord-deputy, while he was at
Lough Neagh in 1597. The royal forces under Sir Henry Bagenal were entirely
defeated at Lough Neagh, on the banks of the Blackwater, on
the border of the county. In a.d. 1601 O'Neill,
president by the lord-deputy Mountjoy, was compelled again to burn
Dungannon, and the erection of forts on the banks of the
river Blackwater and on the shore of Lough Neagh com-
pelled him to submit.

Tyrone has been formed into a county before this rebel-
lious (a.d. 1656), but the first sough was not appointed
until after its close (a.d. 1663). It was comprehend-
in the great settlement made in Ulster in the following
years (Ulter), and was, in great part, parcelled out among
"untakers" (i.e. persons who undertook to settle settle-
men or colonies), partly Scotch and partly English.

In the great rebellion of 1641 Dungannon Fort was seized
by Sir Phelim O'Neill, and the whole county fell into the
hands of the insurgents of Aughris and Castlederg, the garrisons of which fell
in the War of 1646. The Scots and English under Monro were defeated by the
Irish insurgents at Lough Neagh, with the loss of above
3,000 men: this victory restored to the insurgents a pre-
dominance in Ulster which however they failed to maintain on the
arrival and success of Cromwell in 1649. In the revolu-
tionary war, the army of James, after raising the siege of
Donagh, retired to Strabane in this county.

Ordinance Survey of Tyrone; Lewis's Topographical
TYRRELL, JAMES, was the eldest of the four sons of Sir Timothy Tyrrell, of Shotover, near Oxford, by Elizabeth, only child of archbishop Usher; and was born in Gloucestershire. He was placed in the immediate education in the free school of Camberton, he was, in 1637, admitted a gentleman-commoner of Queen's College, Oxford, where he resided three years, and then entered himself of the Inner Temple. He took his degree of M.A. in September, 1640, two years after he was called to the bar. He did not however follow the profession of the law, but employed a life of leisure in historical inquiries and the composition of his various works, residing for some years in the county of Lincolnshire, and afterwards at Shotover, for the sake of easier access to the Oxford libraries. He died in 1718, leaving by his wife Mary, daughter and heiress of Sir Michael Hutchison, of Haddray in Worecestershire, one son, lieutenant-general James Tyrrell, who was governor of Gravesend and Tilbury Fort, and afterwards of Berwick and Holy Island, and sat in parliament for Boroughbridge from 1722 till his death in August, 1742, at the age of 66.

Tyrrell, Edward, was a native of York, and entered at the age of 17 into the service of Charles II. of a posthumous work of his grandfather archbishop Usher, entitled 'The Power communicated by God to the Prince, and the Obedience required of the Subject,' which was written in General consent with the national constitution. In the civil war, by command of Charles I., and was now, in the beginning of the year 1661, published in quarto, by Dr. Sanderson, bishop of Lincoln. His next performance was an adaptation of the works of Peter Heylin, D.D., in his pamphlet called Responsion Petrius. Tyrrell, who with all the other deputy lieutenants and justices of peace of his county, had been struck out of the commission by James II. for refusing to dispense with the Test Act and other penal laws affecting the Roman Catholics, warmly hailed the Revolution; and, after the establishment of the new government, he came forth as a champion of that change in a series of political Dialogues, by which he endeavoured to break the hold of a tenth in 1693, three more in 1694, another in 1695; and which were afterwards collected, and republished, in a folio volume, in 1718, and again in 1727, under the title of 'Biblions or the History of the Flux and Fall of the Constitution of the English Government, with respect to the last Extent of the Regal Power and the Rights and Liberties of the Subject,' &c. In 1692 also he published anonymously, in octavo, 'A Brief Disquisition of the Law of Nature, according to the Principles and Method laid down in the Reverend Dr. Cumberlands (now Lord Bishop of Peterborough) Latin Treatise on that Subject.' It is mainly a translation and compendium of Bishop Cumberland's work 'De Legibus Naturae,' yet not however without additional illustrations and other matter, and many changes in the arrangement and mode of exposition. But Tyrrell's great work is his 'General History of England, both Ecclesiastical and Civil,' in 3 vols. (London, first published in five parts), Lond. 1700-1704. As expressed on the title-page, this history was intended to be brought down 'from the earliest accounts of time to the reign of . . . king William.' It contained only a part of that design was accomplished: the first volume coming down to the Norman Conquest; the second, Part 1, to the accession of John; Part 2, to that of Edward I.; the third, Part 1, to the accession of Edward II.; Part 2, to the end of Agnes fourth. It was prefixed to Thomas de Eimmam (8vo, Oxford, 1727), that a further portion of the work had been prepared for the press; but it has never appeared. Tyrrell's history, which has now become scarce, is not however much inferior to the earlier English chroniclers, of whose accounts indeed it is in great part a literal translation; but it is rather an undigested accumulation of materials than an historical narrative with even the humblest pretensions to an artistic character. Besides the narratives there are many passages of undigested prose, the tendencies, &c., occupied with the investigation of particular points, or the defence of the author's favourite notions. The most remarkable of which are, that the Norman Conquest was not a revolution in the original Saxon frame of the government, and that the representation of the commons in parliament in particular has been uninterrupted since the Saxon times. The vindication of these opinions is also the object of several of his 'Political Dialogues.'

TYRRENNIUS.

TYRTAEUS (Tyrtaios), the second great elegiast among the ancient Greeks. His age is determined by the fact that he assisted the Spartans in their second Messenian War, which ended by the surrender of Messene to their general Mantius in the year B.C. 668 and 660, whereas others place its commencement about the year B.C. 669, and even later. The birth-place of Tyrtaeus is differently stated: Suidas calls him a Milesian or a Laconian: he of course became a Laconian after receiving the Spartan franchise; and the circumstance that after he had been a Spartan citizen he spoke in his poems of himself as such, and of his Spartan ancestors, led Strabo to think that Tyrtaeus was originally a Dorian of Eretria near Mount Pindus, from whence some centuries before a portion of the Dorians had immigrated into Peloponnesus. That he was actually residing in Attica, either at Phaedre or at Athens, just before he went to Sparta, is attested by the generally acknowledged fact of theOCK of Athens. The composition of the poems attributed to Tyrtaeus is, going to Sparta, as related by Pausanias and others, runs thus. When the second Messenian War broke out, the Spartans, not knowing how to act, consulted the oracle at Delphi. The god replied: 'Go to Sparta Tyrtaeus, a schoolmaster who was lame in one foot and had never shown any signs of talent. The story about his lameness may be questioned, but that his mental powers were sufficient to collect and arrange, with sufficient clearness to bring to light the effects which his poetry is said to have produced at Sparta, and the renown which are still extant. The elegy, which had recently been introduced in Greece by Callinus of Mileus, was the means by which Tyrtaeus introduced the Spartans with courage and confidence, and by which he led them to their victories over the Messenians.

On his arrival in Sparta he recited his warlike anapaestic elegies to the magistrates, and to an assembled council. Among the poems was one addressed to the Spartan Tyrtaeus, a schoolmaster who was lame in one foot and had never shown any sign of talent. The story about his lameness may be questioned, but that his mental powers were sufficient to collect and arrange, with sufficient clearness to bring to light the effects which his poetry is said to have produced at Sparta, and the renown which are still extant. The elegy, which had recently been introduced in Greece by Callinus of Mileus, was the means by which Tyrtaeus introduced the Spartans with courage and confidence, and by which he led them to their victories over the Messenians. For this purpose he composed the most celebrated of his elegies, called 'Eumnomia' (Ewonomia; it calls it a 'rhetoric,' that is, 'good government.' Some fragments of it are still extant, and enable us to form some idea of the whole composition. A third class of elegies were march-songs, which the Greeks called μελα παληγενήσια, ἰσχύαλα, ἰσχύαλα, παληγα, etc., and the Spartans and Messenians, for whom they were composed, sang them in a warlike spirit and a warlike spirit, for they continued for centuries after to be sung, not only at Sparta, but among the Dorians generally; or before they went off to battle. There are extant three entire poems of this kind, but it is a matter of very great doubt whether they are not much mutilated and interpolated. All the works of Tyrtaeus were written and delivered in a warlike spirit. Tyrtaeus had the good fortune to live to see the fruits of his wise advice—the reduction of the Messenians to the condition of Helots (Paus., iv., 14, 5); and the accounts of which we now possess are doubtless derived from the original documents, or from authors who had received them, or from the oral tradition. They were probably derived in a great measure from his poems. The first collection of the remains of Tyrtaeus that appeared in print is that of S. Geleutus and M. Aurigallus, which also

TYR.
TYRWHITT, THOMAS, was the eldest son of the Rev. Dr. Robert Tyrwhitt, the descendant of an ancient literary family who, from the time of the birth of the 1st Earl of Egremont, to his son, in London, 29th March, 1774, was rector of St. James's, Westminster, and afterwards became a canon residential and prebendary of St. Paul's, archdeacon of London, and a canon of Windsor. Thomas was first sent to school at Kensington, whence he removed in 1741 to Eton, and he remained there till he was entered of Queen's College, Oxford, in 1754. He was admitted to the fellowship of Merton College; and, having taken his degree of M.A. the following year, although he had also entered himself of the Middle Temple, he continued his residence at the university till 1762, when, resigning his seat for the Bar, and devoting himself to 'the duties of the office of clerk of the House of Commons, in which he was appointed on the resignation of Jeremiah Dyson, Esq., but finding the fatigue too great for his health, he relinquished this situation, and voted the rest of his life to literary pursuits. Mr. Tyrwhitt, who was greatly beloved for his amiable character, died at his house in Welbeck-street on the 13th of August, 1798.

The works of Tyrwhitt include a list of his publications, all of which display sound scholarship, and are characterized by taste and critical acumen, or, at the least, great accuracy and precision, and the most painstaking and conscientious industry, where higher qualifications were not called for - a body of work, entitled "An Epistle to Florio at Oxford" (Mr. Ellis of Christ Church), 4to. Lond. 1794. 'Translations from the Poet's Messiah and Philippi's Splendid Slaying into Latin, and of the Eighth Ithian Ode of the same. Volume I. 1795, with an additional volume in 1796. 'Conjectures on Some Passages in Shakespeare' (anonymous, but with the portrait of the author prefixed), 8vo., 1766. 'Proceedings and Debates in the House of Commons in 1702, and in 1711 and 1712, of the Reign of Queen's College, Oxford, with an Appendix.' 2 vols. 8vo., London Press, 1786. 'The Manner of Holding Parliaments in England; by Henry Elyngre, Cier. Par.; corrected and enlarged, from the Author's original MS.' 8vo., 1767. 'Fragmenta Duo Philippica' (from the Harleian MS. 21, anonymous), 8vo., 1773. 'The Canterbury Tales of Chaucer,' with Dissertations. Notes, Glossary, &c. 2 vols. 4to. Oxford, 1773; also 5 vols. 8vo., 1778; and since several editions. 'The Poems of the later authors of the 17th century, translated into English verse.' 1785, 8vo. 'A Vindication of the Appendix to the Poems called 'Rowley's,' 8vo., 1779. An edition in Greek and Latin, with notes, of the poems entitled 'Adorm (On Stones), attributed by some to Ophr. But according to Tyrwhitt written in the early part of the 16th century. 'Conjectures in Strabone' (privately printed), 1783. An edition of 'Oration of Isacius against the Grecians,' newly discovered in the Medicean Library, 4vo. Rome, 1782; and also left many other conjectures and discoveries, as well as the Cottonian Library. 'The Poets,' which were prepared for the press by the Rev. Thomas Burgess and the Rev. John Hanold (afterwards bishops of Salisbury and London), and brought out at London, in 1778. 'The Poets,' 4th edition, is a body of work entitled 'Pamphlet.' 8vo., 1779. 'A Vindication of the Poems of the later authors of the 17th century, translated into English verse,' printed in the Society of Antiquaries (the 'Archaeologia') with several disquisitions of distinguished learning and ingenuity. His 'Dissertation on Bucolics,' after having been republished by himself with additions at the end of his edition of the Greek poem 'On Stones,' was reprinted at Edinburgh, and 'as were his Conjectures upon Strabo,' in 1788, under the superintendence of Th. Ch. Harle. An octavo volume, entitled 'Thomas Tyrwhitt's Conjectures in Aeschylus, Euripides, et Aristophanum; accedit Epistola Tyrwhittiana.' was brought out at Oxford, from the Clarendon Press, in 1822, and it appears from the preface that a small impression of the same matter had many years before been printed, under the titles of Burgess, at Durham. The letters, which fill from p. 91 to 92, by Ivo Ruther (in Latin), from Villon (in French), from Brounce (in French), from Ruhken (in Latin), from Schwegler (in Latin), and from M. M. Thielsch of Moscow (in French). The letters are, however, to consist of 'Advermaria collected from Tyrwhitt's papers; but this, we believe, has not yet appeared.' 1782. EDWARD, was born in Somersetshire in 1798. He studied at Oxford, and received a bachelor's degree there in 1767, after which he went to Cambridge,
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He was made doctor of medicine in 1680. He lived in London, and was physician to the Bridewell and Bethlem hospitals, reader of anatomy at Surgeons' Hall, and, for a time, chief contributor to the early volumes of the Transactions of the Royal Society, as well as of the College of Physicians, he was a Fellow. He died in 1708.

Tyssen, one of the first comparative anatomists of his time. All his works therein, and of the work of the great school of anatomy, the chief of whom are as follows:—1. Pho-
cena, or the Anatomy of a Porpoise dissected at Gresham College,' London, 1680, 4to.; 2. 'Cariguyeua, seu Marsup-
iale Americanum; or the Anatomy of an Opossum dis-
sected, for the use of Surgeons, by David and Gal-
out, sive Homo Sylvestris; or the Anatomy of a Pyg-
mie, compared with that of a Monkey, an Ape, and a Man,' London, 1699, folio. This is Tyson's best and most valuable work; for though the others are not less accurate, this relates to a subject on which opportunities are exceedingly rare. It was a compilation, and the later labours of Professors Owen and Vorlik, though they have added to what Tyson described, have probably considerably reduced the value of observations; an accuracy the more meritorious, because, before his time, no dissection of the animal had been recorded. Haller, with full justice, says, 'We have nothing in comp-
parison, that can be compared to this work of ex-
cepting the works on insects;' by which last he probably means those of Swammerdam. 4. There was published with the last-mentioned work, 'A Philosophical Essay concerning the Pygmies, the Monkeys, and the Ants,' 1661, a work which in appearance will appear that they were all either Apes or Monkeys.' 5. And to a second edition of the two preceding was added, 'Viper Caudis-
saur Americanas, or the Anatomy of a Rattle-Snake.' 6. 'Observations, London and Ox-
fard, 1690-1705, folio.

Some of these works had before appeared in the 'Philoso-
phical Transactions,' which contain numerous other papers communicated by Tyson between 1678 and 1704. The most important among them relate to the renal cap-
sules, the anal glands of the musk-animal and others, the black excretion of the cuttle-fish, the anatomy of the en-
terons, and of the Tjassu, and the colour of hair and teeth in ovarian cysts. Tyson also contributed largely to Samuel Collins's "System of Anatomy," to Ray's "Synopsis Methodo-
dica Quadrupedum," and to Willughby's "Historia Piscium."

(Dictionnaire Historique de la Médecine; Haller, Biblio-
theque de Lyon, 1731-32.)

TYSSENS, PETER, a celebrated Flemish painter, born at Antwerp, in 1623. Tyssen's, after Rubens and Vandyck, was the first Flemish painter of his time, in history and in portrait-painting, left him the remembrance of a highly patronised, but finding portrait-painting a more pro-
fitable employment, he devoted his time exclusively to that branch of the art, until, disgusted with some uneden-
critics which were passed upon some of them, he gave up portrait-painting, and again applied himself, with in-
creased success, to history. There are few cities in Fland-
ders without a specimen of the works of Tyssen, but there are few of his paintings out of his own country. The As-
sumption of the Virgin, in the church of the carthusians of St. James at Antwerp, is generally considered his master-
piece. His drawing was vigorous and correct, his colouring good, and his composition very spirited: he en-
riched his pictures by tasteful architectural backgrounds. In 1661 Tyssen was made director of the Academy of Ant-
werp. He died in 1692.

His two sons, Nicholas and Augustine, were also dis-
tinguished painters in their respective lines. Nicholas was born at Antwerp in 1660; spent several years in Italy, and in 1770 was employed in the service of John William, the elector-palatine at Düsseldorf, who sent him his principal cities. Nicholas was a great painter of pictures for the gallery which he was about to form. Tyssen executed his commission to the utmost satisfaction of the elector, but the pictures which he purchased, with others of the Düsseldorf gallery, now form part of the other large collection of pictures and pieces of ancient armour, implements of war, and trophies: he afterwards

tried flower-painting, but he painted latterly birds, in which he was very excellent; and his pictures of this class are little inferior to those of Boel or Hoochooker. He visited London, where he died, in 1718.

Augustine Tyssen was born at Antwerp in 1662, and was a landscape painter, and executed many clever pictures in the style of Berghem, which he enriched in a similar way, with ruins, figures, and cattle. In 1691 he was made director of the Academy, and died in 1720.

(Desamps, La Vie des Peintres Flamands, &c.; Pil-
thony, Dictionary of Painters, ed. 1829.)

TYTTLER, WILLIAM, was born at Edinburgh, 12th October, 1711. His father, Alexander Tytler, writer (or attorney) in Edinburgh; his mother, Jane, daugh-
ter of Mr. William Leslie, merchant in Aberdeen. He himself, after an education at the high school and Uni-
versity of Edinburgh, was admitted a writer to the signet in 1742; and he presided that branch of the legal dis-
elsion till his death, Sept. 12th, 1792. Mr. Tytler, besides being an accomplished musician, and distinguished for his taste in all the fine arts, was the author of several literary works, the chief of which was his Inquiry, Historical and Critical, into the Evidence against Mary Queen of Scots, first printed in an 8vo. vol., in 1759, and, after several editions, extended to 2 vols. 8vo., in 1790, acquired a universal celebrity. It is a remarkable work, not only in its accuracy and fairness, but also against Robertson and Hume. His other publications are:—'A Dissertation on the Marriage of Queen Mary to the Earl of Bothwell,' in the 'Transactions of the Society of Antiquaries of Scotland,' vol. i. 12th, 1769; 'The Archi-
vals of James I. of Scotland,' 8vo., Edin., 1783; 'A Dissertation on Scottish Music,' subjoined to Arnott's 'History of Edinburgh;' 'Observations on the Vision,' a folio, London, 1782; and other works, in folio, 'An essay on the fashionable Amusements of the English nation during the last Century,' both published in the Scottish 'Antiquarian Transactions,' and one paper in the 'Lounger.' Mr. William Tytler was the father of Alexander F. Tytler, Bishop of Woodhouselee.

TYTTLER, ALEXANDER FRASER, styled Lord Wood-
houselee, was born at Edinburgh, 15th October, 1747, and was the eldest son of William Tytler, Esq., of Woodhouse-
lee, in Midlothian, and of Anne, eldest daughter of Douglas, Lord Craig, Esq., of Costerton, in the same county. He attended the high school of his native town from 1755 to 1763, when he was sent to an academy kept at Kensington, in Middlesex, by James Edgbaston, the elder. He spent most of his youth in London, where he made studies on English grammar and pronunciation. Here he studied drawing, natural history, and Italian, as well as the classics. Returning home in 1763, he entered the Uni-
versity of Edinburgh with a view of studying for the bar. He was admitted to his degree of Bachelor of Arts in 1766, and was appointed, in 1768, sub-
stitute for the last-mentioned title; he was subsequently raised to the bar, and became, in 1771, advocate to the

Of the lectures, of which this work is an ab-
tract, were left ready for the press by the author, but have never been printed. In 1779 Philip musical, and legal, for which he was appointed director of the legal dis-
sion in 1776. His death occurred at the age of 80, in London, 1840. The lectures, of which this work is an ab-
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sion in 1776. His death occurred at the age of 80, in London, 1840. The lectures, of which this work is an ab-

TZETZES, JOANNES, a learned grammarian and poet of Constantinople, who lived during the latter half of the twelfth century of our era. He was the son of Michael Tzetzes and Eudocia, his father’s brother, Joannes Tzetzes, then the chief librarian at the Archangel Church. Before the latter in 1187, Society of Edinburgh, on the 3rd of June, 1816, and 6th of January, 1817, and is printed in the Society’s Transactions, vol. viii. 4to., Edinburgh, 1818, pp. 516-564.

TZETZES, ISAAK [sic].

TZETZES wrote commentaries, but only those on the "Iliad," on Hesiod, and on Lyceophon have been printed. Others, as those on Oppian’s Halieutica, on the Bactrian, as well as his own works on; Comedy and Comic Poets, the Ambidgment of the Rhetoric of Hermogenes, a collection of his letters, and other works, are still in MS. The only edition of the ‘Commentary on the Iliad,’ by Giacomo Sebastiani, is published by Dr. Hermann, who published it with the work of Draco Stratonetus on Mess., Leipzig, 1812, 8vo. The commentary on Hesiod is printed in the editions of this poet, by Victor Trincavelli, Venice, 1593, 4to., and in that of DanIEL HENRoux, Leyden, 1689, 4to. The commentary on Lyceophon’s “Cassandria” is ascribed in the MS. to Isaac Tzetzes, the brother of Joannes, but Joannes states in two passages (Chil. ix. Hist. 206; Epist. ad Bas. Aetickunum, printed in Potter’s Commentary on Lyceophon, p. 11), that he wrote the commentary himself and gave it to his brother Isaac. J. C. Müller, the last editor, is of opinion that it is the joint production of the two brothers; that it was written for the use of the authors, and that it was afterwards made an improved and enlarged edition. This opinion is strongly supported by the condition of the existing MSS., some of which contain considerably more matter than others, and the vanity and arrogance which are so striking in the “Chil.” ed. However, the commentary is a most useful compilation from those of the Alexandrine grammarians, and contains a vast amount of mythological and historical information not to be obtained elsewhere, and without it we should scarcely be able to understand the obscure poem of Lyceophon. It is printed in several editions of Lyceophon, first in that of Basel, 1546, fol., and subsequently in those of Canter, Potter, and others. The better of these is the second, made by Daniel Henricus, without the text of Lyceophon, that is by C. G. Müller, Leipzig, 1611, 3 vols. 8vo., with useful notes and indices.

TZETZES, ISAAC. [TZETZES, JOANNE.]
The riverless south-east side; thirdly, by sketching the central plain with the river channels which intersect it.

1. The principal rivers which descend the north-west and north-east sides of the basin are—1, the Euphrates and its affluents; 2, the Tigris and those affluents which, after it before it enters the plain; 3, the Diyallah and its affluents; 4, the Kerkis and its affluents; 5, the Karun and its affluents; 6, the Jeriah and its affluents.

The Euphrates river is formed in two hours above Kebban Maden (36° N. lat., 36° E. long.) by the confluence of two rivers, to both of which the name Frat is occasionally applied, but which are more generally known, the eastern as the Murad-chai, the western as the Karak-eh.

The Murad-chai rises on the west side of Ala-tag, near the north-eastern termination of the mountain-group mentioned above as encircling lake Van. The stream flows down a mountain ravine nearly six hours due north to Diyadin (39° 32' N. lat., 43° 40' E. long.); at Diyadin it turns to the north-west, and flows in that direction about 24 miles to Kara-Kilisa. In this part of its course the Murad-chai has the undulating country at the base of Ala-tag on its left bank, the undulating landscape which connects the mountain-range, of which that summit forms a part, with a chain of hills extending from the north-west base of the greater Ararat (39° 42' N. lat., 44° 18' E. long.), westwards along the Belut-bah at the base of the Murad-chai. The river Kilisa the Murad-chai receives the Sheriyan-su, which rises in these hills and flows from west to east; the united waters flow to the south-west. From Diyadin to Molin-Suleiman (46° 15' N. lat., 39° 40' E. long.), about 40 miles in a straight line: the level land on both sides of the stream varies in breadth from 6 to 10 miles; it is called the plain of Arishkend. The soil is rich and watered by numerous streams flowing to the Murad-chai, which runs in a ravine considerably below the level of the plain. Nine miles below Diyadin the Murad-chai, in the month of September, 1838, was 20 or 30 paces in breadth, and did not reach above a horse's knee. The upper part of Arishkend is unknown; but it cannot be less than 6000 feet above the sea, and is probably more. From Kara-Kilisa to the junction of the Char-buhur with the Murad-chai (about 39° N. lat., 41° 37' E. long.), scarcely anything is known of the course of the latter. It appears to flow in a general direction of south-west, having the mountain-range of which Ala-tag, Sapan-tag (about 10,000 feet), and Nimrud-tag are the most remarkable summits, situated parallel to it at a considerable distance on the south-east, and the mountains south of the Ars and of Erzerum at about an equal distance to the north-west. The town of Malasgird is situated on the Murad-chai about 36 miles below Kara-Kilisa; not far from Mieie-grd the river is joined by the Murad-chai, which issues from the north-west. Near the source of the Kalchi is Khinis, which the natives say is 24 miles from Malasgird. Capt. Glascott's barometrical measurement gives Khinis an elevation of 630 feet above the sea; and from Khinis to the junction with the Kara-su, from the low hills bordering the plain of Arishkend on the south-west to Khinis was a continuous plain. The Char-buhur rises near the sources of the Aras in a continuation of the mountain district extending west from Amarat, and flows 36 or 40 miles till it joins the Murad-chai; the rivers meet in a straight line, the former coming from the west, the latter from the east, and the surface of the water at the point of junction is 800 yards in width. The river, as it further proceeds, is measured by the barometer, it appeared to be 4188 feet above the sea. The united stream turns off at right angles to the south, through a narrow valley which widens gradually till it becomes part of the plain of Khinis. The river retains the direction of south for about 10 miles, when it receives the Kara-su, flowing from the south-west, the course of the Nimrud-tag, and again turns to the west, from the junction with the Kara-su to Palu (38° 39' N. lat., 39° 58' E. long.) is not much better known than its course between Kara-Kilisa and the mouth of the Char-buhur. From the junction of the Karaski with the Murad-chai to the western extremity of the plain of Alishan (about 39° E. long.) appears to be one continuous valley. On the north side of this valley is a mountain-range connected with that which extends west from Amarat between the upper Ars and upper Murad-chai, and between
Errum and Mush is called Bingol-tag; between Erzinger and Palu it is called Dujjak-tag. The summits of the Bingol-tag retain patches of snow throughout the summer; the snow melts entirely from the Dujjak-tag in summer, but the road which crosses from Palu to Erzinger is blocked with snow three months of the year. On the south side of the valley is a mountain-range, on the opposite or southern declivity of which are the sources of the Tigris. The direction of this range is in a north-easterly direction, and about 30 miles east of Mush it touches the extremity of the Nimrud-tag (the direction of which is about south-west to north-east), and continues onward along the southern shore of Lake Yezin (at 40° 35' E. long.), at an elevation of 4964 feet. The mountain-peaks of course exceed in height the crests of the passes, but none of them appear to retain snow during the summer. The Murud-chai enters the plain between these ranges from the north, near its junction with the Kara-su (41° 3 E. long.); and flows west between them till it receives the river of Alishan (39° 4 E. long.), at which point it turns to the north-west and flows through a plain near Alishan Maden, the northern boundary of this valley (from the sources of the Kara-su to a ford on the Murud-chai, a few miles below their junction), and its western extremity (from Palu to the sources of the river Alishan), alone are known in detail. Mr. Brunt's route between these two places passed along different roads on the northern mountains at a considerable distance from the river. The Murud-chai at its junction with the Kara-su is about 4000 feet above the level of the sea; at Palu it is 39° 45' east, about 20 miles below its junction with the Kara-su it wasforded in the month of August, where it is divided into two channels. The northern channel was only knee-deep, in the southern the water reached to the horse's ankle, and the current was very rapid; there is a ford opposite the town, but intricate and precipitous. Above Palu the stream is narrow by mountains rising abruptly from its banks in some places to a breadth of 33 yards. Between Mush and Palu the river is navigated (down stream) by rafts supported on inflated skins, which are employed in transporting charcoal, firewood, &c. Between the mouth of the Alishan river and Kebban Maden the banks of the Murud-chai do not appear to have been visited by Europeans.

In the Western Euphrates district, according to Mr. Abbott, at Domlu, seven and a half hours north-north-east of Erzrum. Two hours below Domlu the stream enters the plain of Erzrum, through which it flows from east to west for about 40 miles; it is bordered by a torrent flowing from Kara-Kulak to the east, and the stream turning to the south descends through a ravine into the plain of Terjan. The length of the plain of Erzrum from its eastern termination a few miles east of the city of that name, to the sources near Kara-Kulak is about twenty-six hours, or about 65 miles: its greatest breadth is from 15 to 20 miles. The house of the British consulate at Erzrum is, according to the observations of Mr. Glaeser, 38° 12' N.:; the easternmost observations of a Russian iron foundry staff place the town in 41° 18' E. long. The mean of sixty observations with the barometer, in April, 1838, gave it an elevation of 614 feet above the sea. The south boundary of the plain of Erzrum is formed by the Kara-su. It is noticed under the names Bingol-tag and Dujjak-tag; the northern boundary by a range of highlands which appears to extend uninterrupted from beyond Kara on the east to the summit of the foot of Mount Argus, dividing the valley of the Euphrates from that of the Tigris. This range forms the break in the mountains by which the Murud-chai leaves the valley of Palu (2781 feet). Malatiyeh (38° 25' N.), on the Tokhmah-su, about 10 or 12 miles west from its junction with the Euphrates, and about 30 miles distant from the sources of the Murud-chai, is situated 20 feet above the sea. There must be a mistake in one or both of these estimates, but they may be assumed to indicate the approximate level of the river-bed between Palu and the Murud-chai. The distance from Erzrum to Kara-Kulak is about 30 miles. From the accounts of the inhabitants, which are corroborated by that of Egin, the Murud-chai forms the boundary between the Russian and the Turkish empire. The elevation of the Murud-chai in the valley of Erzrum is formed by the meeting of projecting spurs of the north and south mountain-ranges; of the spur of the Dujjak-tag, which bounds the valley of the Manna-Khatun on the north, and the spur of the opposite range, which forms the south side of the river, is blown to pieces during the winter storms, but the perpendicular height of the spur of the Murud-chai is about 100 yards broad in the month of October, 1838. The plain of Terjan, at the lower end of the ravine by which the Kara-su descends on its way to Erzrum, must be considerably lower, for the winter is not severe enough to prevent the cattle being sent out to feed, and the grain turns yellow in Terjan before the heads are formed at Erzrum. This lower plain of Terjan is about 100 yards broad in the month of October, 1838. There is a considerable stream, which rises in the Bingol-tag near the sources of the Aras) and the Char-buhur, joins the Kara-su from the south-east. From the plain of Terjan the course of the Kara-su to its junction with the Murud-chai is about 134 miles, in the general direction from north-east to south-west through a succession of difficult mountain-passes and narrow but fertile plains. The plain of Erzrum (interesting as having been according to Osmanli tradition, the first settlement in Western Asia of Ertogrul, the ancestor of Kara-Osman, the founder of their dynasty) is about 20 miles long by 7 or 8 broad; the town of Erzrum, or Egin, itself is about 0.2 miles in extent, and is about 30 miles from Karsan, the most southern village in the plain of Terjan. Mr. Brunt found the grain ready for the sickle at Erzrum on the 6th of July, 1835, and the season was considered a backward one. The Dujjak mountains on the northern side of the river present some difficulty at one or two places within this distance during the dry season. Immediately above Kebmakh the river forces its way through a narrow defile, having the Dujjak range on the left, and on the right mountains all but precipitous. The river is navigable for some distance on the south side of the range; it receives the Keumer-su from the west, a stream by which great quantities of wood are floated down. The Keumer-su descends from the plain of Divirgi, about 60 miles to the west, and which, according to Mr. Amworth, is 3116 feet above the sea. The valley of the Keumer-su has a considerable declivity, and the Kara-su must therefore have sunk at the point of their junction much below its level in the plain of Erzrum. Kemakh is built on the east bank, a narrow and steep slope between the river and the precipitous mountains from Kemakh to Egin is a distance of nearly 43 miles. At Khostu (near Egin than Kemakh) there is a ferry, a post station, and a Zapore with sufficient water in the Kara-su between Kemakh and Egin to render it navigable for boats, but the frequent rapids, rocks, and shoals impede the navigation. At Egin the mountains rise from the banks of the river by a steep slope, which is precipitated by abrupt precipices and ravines. The height of the mountains above the stream may be about 4000 feet, and the valley is so narrow that they seem to overhang the town. From Egin the confluence of the Kara-su and Murud-chai (about 35 miles), and thence to Kebban-Maden (about 5 miles farther), the channel of the river is obstructed by shoal and rocks, and only employed in floating timber-rafts. At this point the river está divided into two branches, the one wide, deep and rapid. The elevation of the confluence of the Kara-su and Murud-chai has not been ascertained. The elevation of the latter river at Palu is stated, by Mr. Glaeser, to be about 1200 feet above the sea; and the elevation of the break in the mountains by which the Murud-chai leaves the valley of Palu is...
far to the south-west. The sources of the Toghnum-sa, of the Keumen-sa, and of the stream rising near Karun-kulah, indicate the direction of the watershed at this part of the drainage basin of the Euphrates and Tigris. All these do not, however, first have a course of more than 100 miles; the second probably of about 60, and the third of 30; and the course of the Euphrates, from the mouth of the third to the mouth of the first (upwards of 290 miles), is nearly from north-east to south-west.

Near this point the river flows through a gap in the mountains which extend from east to west between the Murad-chai and the Upper Tigris, and the Tigris joins the Euphrates, from which point to Gergen-Kalehsi, a distance of about 45 miles. In this part of its course the stream is hemmed in by lofty precipices and interrupted by rocks and small rapids, but whirlpools have been formed downwards on the stream. The subsequent course of the river as far as the mouth of the Sakhanwiya canal (about 33° 25' N. lat. and 40° 50' E. long.), where it may be considered as having entered the central plain, is through an upland country, furrowed by alternate ridges and depressions, with a general declivity to the south-east.

From Sumisiat (the ancient Samosata), 45 miles below Gergen-Kalehsi, the Euphrates is navigable without serious interruption to the sea. From Sumisiat to Rum-kalehi, a distance of 51 miles, following the river, its course is by a river, flows S. 69° W. Its course then to Balis (31° 1' N. lat., 38° 7' E. long.), a distance of 114 miles, winds along a line running north and south. Fourteen miles below Rum-kalehi, at Onum, the channel of the Euphrates is much narrowed, and the river divides and has two channels, each about 5 miles wide, 2 miles below of the Persian Gulf (distance 1117 miles), assuming the level of this sea to be the same as the level of the Mediterranean. Twenty-five miles below Bir the Euphrates receives from the west one arm of the Saflur, and 3 miles lower down another; this is a considerable affluent, the lowest of any that falls into it on that side. Thirty-nine miles below Bir the river passes Kalat en Nejm (Star-castle), the ruins of an ancient castle, and it receives the left bank of the river rises at the ruins of the castle of Balis. At Balis the river is 101/4 miles distant in a straight line S. 70° W. from the nearest point of the Mediterranean: the course of the stream turns here to the south-east, a general direction which it retains both on the banks of the Persian Gulf. Near Rakka it receives on the east bank the Belik, which rises near Har-ran, to the north. After a tortuous course of 80 miles (or 41/4 in a straight line) S. 62° E., the Euphrates breaks through a chain of hills which comes on the west from Palmyra, and on the opposite side of the river, from the direction of Sinjar. In this pass the river flows in a small channel 250 yards wide and 7 fathoms deep, between precipices which rise abruptly 200 or 500 feet from the water's edge. Fifty miles from this pass, by the windings of the river, but little more than half that distance in a straight line, the Khabur (the ancient Chaboras, and the Araxes of the ancients), 70 miles long, joins it. About the 37th degree of N. lat., and between the 40th and the 42nd degree of E. long., is a range of heights (some of them 2500 feet above the sea) which extend from the Euphrates at Sumisiat to the Tigris north of Mosul, and form the southern boundary of the upper valley of the latter river. The streams which descend the south side of this range converge and unite a little to the north of the 36th degree of latitude, and form the Khabour below the Khabur. The southern boundary of this drainage basin is, on the west, the continuation of the range through which the Euphrates forces its way below Rakka; on the east, the Sinjar Hills, which extend in the direction of the river from the Tigris north of Mosul, to 28° 36' N. lat., 40° 27' E. long. From the Khabur to Werdia, 731/4 miles by the river, 451 in a straight line S. 33° E., the Euphrates has an average width of 400 yards, with an ordinary depth of 18 feet, and a current of 4 miles an hour during the floods; it forms many islands. Between Werdia and Anah (the ancient Anatho) (82 miles, 501 miles east in a straight line) the river has at the same season a breadth of 2 miles, a depth of 10 feet, and a current of 4 miles an hour. About half this distance below Anah, the river, known as the Shatt el-Hilt, well known for its bituminous furnaces, which are mentioned by Herodotus (i. 178) under the name of Is. Seventy-five miles below Hit, at the mouth of the Sakhanwiya canal, it enters the general plain. Proceeding along the mouth of this canal a range of hills extends at a distance of some miles along the north-eastern bank of the Euphrates, the opposite declivity of which sinks to the bed of the Tigris. Some little distance above the Tigris, which rises in the Sinjar Hills, and flows south by east till it loses itself in the plain north of Bagdad. The high ground on the south-west side of the Euphrates extends a few miles farther to the south than that on the opposite bank; and at its termination, curving round to the north-east, approaches nearer the river, and terminates in an abrupt cape, surrounded on all sides by the level plains of Babylon.

Some discrepancy exists among travellers as to the exact portion of the course of the Euphrates to which the name Frat is applied by the natives. Morier states that the Karum-sa is called the Frat in the neighbourhood of Mamma-khuban; Brunt, that the name Karum-sa is retained till its junction with the Murad-chai, and that the united stream is known by the name of Frat as far as the mount Kurnah, at the junction of the Euphrates and Tigris, the name Frat prevails. Probably different names are applied to the river by the different races resident on its banks.

The Tigris.—Running from the source of the Tigris, through the southern declivity of the mountain-range which forms the southern wall of the valley of the Murad-chai, between Musul and Alshian, and not much more than 10 miles distant from the most easterly point of the junction of the Euphrates, between Malatiya and Somisiat. The Tigris runs from its source 23 miles to the north-east, and its level can nowhere in this part of its course be lower than 4588 feet above the sea. It then flows southward for nearly the remainder of its course, and makes an angle of 12° with the Anah. Maden a small stream from the west, adopts the course of this tributary, and flows towards Diar-Belk (about 37° 55' N. lat., 35° 50' E. long.), distant 40 miles in a straight line. Opposite Diar-Belk the Tigris is about 220 yards wide on the season of floods, but it is only used to float timber rafts from the mountains. At Diar-Belk the Tigris turns suddenly round to the east, and continues to flow in that direction as far as Anah, a distance of 210 miles, and rises on the south side of Nimmud-tag, a little to the west of lake Van. In this part of its course the Tigris flows parallel to the high mountains which separate its valley from that of the Murad-chai, an extensive plain intersected by the river. On the south the river has the hill range, on the opposite side of which are the sources of the Khabur: these hills rise immediately from its bank. Forty miles below Diar-Belk the Tigris receives from the north a large stream, which some have regarded as the main river: 35 miles farther on, in the direction of the Bitlis-chai, it is joined by a considerable affluent from the south. The elevation of the bed of the river in the valley from Diar-Belk to the junction of the Tigris and the Bitlis-chai has not been satisfactorily ascertained; but the climate and vegetable productions are such as lead to the inference that it cannot be great.

From the point of junction of the course of the Tigris bends round to the south-west, and continues nearly in the direction of south-east to the mouth of the greater Zab (36° N. lat., 43° 20' E. long.). For the greater part of this distance the range of hills which separates the valley of Diar-Belk from the basin of the upper Khahour according to its course to the south-east: they terminate on its banks a little to the north of Mosul (36° 29' N. lat., 43° 15' E. long.). Between the mouths of the Bitlis-chai and the greater Zab, the Tigris receives affluents of considerable size, the most important joins it about midway in this distance from the north, and is called, like the affluent of the Euphrates, which has been repeatedly mentioned, the Khabur. The Khober. The junction of the Tigris and the Khabur, 26 miles farther up, comes from the north; of its upper course nothing is known, except that it must rise high up among the mountains which bound the southern shores of lake Van.

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The main branch of the greater Zab has its sources at Konyeih, Karsan, and Kushen, on the slopes of the Sar-balagh range, about 36° 30' N. lat., at an elevation of about 7000 feet above the sea, nearly midway between the lakes of Van and Urumiyah. From the opposite side of the high divide of the Euphrates, south-west of the mountains, which are here not less than 1000 feet above the sea level, the water rushes down to the Aras or to the lake of Urumiyah. The highest peaks of the mountains south of lake Van are to the east, Rowandiz (11,000 feet above the sea), the loftiest summit of the Jazmack, is to the east of this river. At first the Zab flows south-east to the south, but about 37° 15' N. lat. it turns to the west-south-west. Near the village of Kiyau (about 37° 55' N. lat., 43° 28' E. long.), it receives the Herdizali (called also by the inhabitants the Lesser Zab), which is said to rise in the English-tongue, a few miles below the termination of lake Van, and which descends to the principal stream in a succession of cataracts. After the junction the Zab flows south-east till about 12 miles east of Amadiyah, from which point its course is rather to the north of east, to 10 miles west of Rowandiz, where it receives a large affluent. Between Amadiyah and Rowandiz, the Zab has on the north the colossal mountains in which it has its rise; on the south a range of hills which stretch from near the mouth of the (Tigris) Khabur eastward to the base of Mount Rowandiz. A lateral valley, which may almost be considered an extension of the valley of the Tigris from Diar-Bekr to below its junction with the Khabur, separates these great mountain ranges to the north. The ground between the base of Rowandiz and the eastern extremity of this ridge, the Zab crosses a hill-range parallel to it on the south (apparently a continuation of the high range which extends west abroad), it enters the plain north of Mosul, and flows south-west to the Tigris, which it enters with a deep stream 60 feet wide.

About 84 miles below the mouth of the greater Zab the Tigris forces its way through the Hamrin hills, the stream of which in an extending from north-west to south-east, which is cut diagonally by the river in its course from Mosul. About 12 miles below the greater Zab there is a ford in the Tigris; 20 miles farther down it receives from the west another branch of the Zab, which is 38 miles below this it is joined by the lesser Zab from the north-east. The main branch of this tributary rises 20 miles south-west of the south extremity of lake Urumiyah; it flows 30 miles to the south-east, and then turns abruptly to the south-west; about 20 miles onwards it receives four affluents from the mountains to the south-east, and carries to the Tigris, after flowing parallel to the greater Zab for the last 50 or 60 miles of its course, a deep stream 25 feet broad, and at the mouth of just above 2000 feet. Beyond these mountains the Zab spreads itself over a width of 500 yards. Below the passage of the river through the Hamrin hills, high grounds, which separate its valley from the valley of the Tigris, extend close to the termination of the range of mountains which calls the great wall of the Tigris (about 38° N. lat., 44° 6' E. long.). Here the Tigris issues from the hills into the great central plain. Between Diar-Bekr and Mosul (256 miles) the river is navigable for rafts at certain seasons, and below Mosul it is navigable throughout the year: in 1838 the 'Euphrates' steamer ascended it to within 20 miles of Mosul.

The Diyala.—This river, known in its upper course as the river of Shurwan, rises among the mountains, of which Mount Elwend is the best known, if not the highest summit, about 34° 40' N. lat., 47° 30' E. long. It flows for about 30 miles from east to west; then, turning at first to the north-west, for nearly 100 miles in a semicircular curve, it receives on its left the base of Mount Amadiyah, and then, after this part of its course, on its south bank, a number of streams, which, rising near the centre of the mountain-mass, flow like rafts to the circumscribing stream. Some of the summits of this mountain-group rise, by the estimate of Major Rawlinson, 5000 feet above their base. At the most northern part of its course the Shurwan receives the waters of the Tij, one of whose branches comes from Solema-nah. It then flows south-east for about 30 miles, till it issues into the plain through a gap in the mountains, which are here not more than 300 feet above its level. The Diyala receives in this part of its course the rivers from Zolah and Holvan from the east. Close above the Hamrin hills the Diyala is, according to the 'Euphrates of Palmyra' the desert appears to have a general slope from the west to south of the east. There are no permanent watercourses in this region to indicate the declivity, for the name of the river and the name of the desert, the Aras and the Elwend, are the same. The present site of this hamlet, near the bridge of the Aras, 1831, from Hit (33° 38' N. lat. according to Lieut. Murphy) to Darnacus (33° 33' N. lat. according to Niebuhr) is about 18 miles. The course of the river is 5000 feet above the sea level, and the point of observation is 1300 feet. In the latitude of Aleppo the summit-level is situated between that town and the Euphrates, and the declivity towards that river slopes from north-west to south-east. Below the Diar-Bekr (the range mentioned above as extending to the Mount Amanah) the river is very imperfectly known: and the little that is known of it leads to the belief that it is in the highest degree monotonous and uniform. The desert or great plains of Northern Syria, as this region is sometimes styled to describe it, is more than 400 miles wide, and 1300 miles long.

The Kerkeha.—The main branch of this river rises on the south side of Mount Elwend, nearly in the same latitude with the Diyala, about a degree to the eastward. It flows about 30 miles to the south-west, then receiving a stream from the east from Nahawad, adopts its course, and flows west for about the same distance. Major Rawlinson found the river fordable with difficulty at this part of its course. It here received the waters of the Kirmanshah on the north-west, and another from the high plain of Khawah, celebrated for its pastures, from the east and turns to the south. This direction it retains to Rowandiz (1831, from Hit to Darnacus, about 18 miles), a distance of about 40 miles. In this part of its course the Kerkeha receives two considerable affluents, the Kazghan and the Zal, from the north-east. The mountains on its east bank, which separate it from the great central plain of the Tigris and Euphrates, are not of sufficient breadth to admit of their torrents attaining to great size. At Pul-I-tang, the Kerkeha, in general about 80 or 100 yards in width, forces its way through a narrow chasm, which a bold sportsman can spring across with ease. The cleft is about 150 feet deep; the sides are honeycombed in the most fantastic manner; and the river boils and foams below in its narrow bed. A short distance below Pul-I-tang the Kerkeha enters the plain of Susiana; but just before reaching the ruins of Sus (about 32° N. lat.) it turns to the west, and, after a farther course of about 40 miles to the north, where it is connected in 40 miles from the plain of the Tigris near the summit, 30° 20' N. lat., 48° 50' E. long. The Kauran.—The Dizful, which has a much larger body of water than the stream which gives the name to the lower part of this river, is formed by the confluence of a number of streams in the neighborhood of Samandagh (about 34° N. lat., 49° E. long.), and flows through a difficult mountainous country to the town of Dizful (about 32° N. lat. and 48° 40' E. long.). Ten miles below Dizful, the river makes a water gap of about 320 feet, and then laters between them. From this point the Dizful turns to the south-east, and flows to Bund-i-kil (about 40 or 40 miles). Here it is joined by the Karun, which rises in the mountains to the east, about 32° N. lat., and 50° 4' E. long. The Karun flows at first to the north of east, but its course where it joins the Dizful is to the south-east, and this course it retains to Hawaz, where it enters the great plain. At the town of Dizful, the bridge which crosses the river is one of the peculiarities of this has a length of 130 feet.

The Jerahi is formed by the junction of the Zard with some other considerable torrents from the Mungash hills, which in 31° 4' N. lat. are said to have snow on their summits, and which, after a long series of summits advancing to the west, and gradually sinking to the level of the plain, forms the watershed between the Jerahi and the Indyan (which falls into the Persian Gulf in about 30° 4' N. lat., 49° 30' E. long.), and terminates the drainage-basin of the Tigris and Euphrates on the south.

The declivity which forms the south-west boundary of the drainage-basin of the Tigris and Euphrates, from the base of the lofty mountains through which the latter river forces its way above Mosul, is very imperfectly known: and the little that is known of it leads to the belief that it is in the highest degree monotonous and uniform. The desert or great plains of Northern Syria, as this region is sometimes styled to describe it, is more than 400 miles wide, and 1300 miles long.

The Kerkeha.—The main branch of this river rises on the south side of Mount Elwend, nearly in the same lati-
running water, flowing to the north-east at the rate of up to 475 miles an hour. After wading up to our knees in this for an hour, we reached a straight creek or direct line (W.N.W.). As the rain ceased the moving lake had passed away to the north-east, and was nearly out of sight. It was about eight miles broad, and extended in length as far as I could see. But I was unable to reach the river because the moving lake, I fancy, must continue its course till it is soaked into the soil, or till it settles in some low ground; the desert here is not even enough for it to stand.' On the following day, late in the afternoon, about 11 hours south of Palmyra, and the gradual ascent of the plain of Karkart, it ran a channel through the hills and into the Tigris. On the thirteenth day it arrived at the edge of a depression between the desert and the Syrian hills, which appears to be about 10 miles (25 miles) across. A similar scene has been observed by Addison at Palmyra, between the desert and the hills to the west. Burchhardt, when he reached the culminating point of the Jebel Hauran, south of Damascus, was told that the shadow which he was seeing was that of the west extended to the Euphrates. Colonel Chesney, who crossed the desert from Zohir, west of Basra, observed that its surface was furrowed by a number of parallel shallow depressions extending north-east in the direction of the Arabian peninsula from El-Khatif on the Persian Gulf to Medina (between the parallels of 25° and 30° N. lat.), observed that wherever he met with running water along this direction, he found the depressions. It is stated that these are the only indications of the extent of the basin of the Tigris and Euphrates to the west and south-west that we have been able to glean.

The extent and maximum elevation of the great central plain of this river system has been mentioned above. The Tigris, it has been noticed, quits the low hills in the vicinity of the north-eastern termination of the mound which contains the Medial wall (34° 3' 30" N. lat., 44° 6' E. long.). The mouth of the Shat-el-arab or outlet channel, which diverges from the Euphrates (about 33° 24' N. lat., 43° 45' E. long.), may be assumed as a near approximation to the point at which that river issues from the last low hills. Midway between these two points there appears to extend to the north of a straight line drawn from the one to the other, possibly along a continuation of the valley in which the Tigris flows. From the end of the Medial wall to the mouth of the Athen (5° to the south, and about 1° west), the course of the Tigris is a little to the south of west along the termination of the undulating ground which extends from the base of the Hamrin hills; this direction it retains for about eight miles farther, and then turns to flow south-east towards the Shat-el-arab. Thence, for about 60 miles below Bagdad the Saklawiyah joins the Tigris; the distance along this canal from river to river was found by Lieutenant Lynch (who sailed along it in 1836, in the Euphrates steamer) to be 45 miles. The current (in the season of low water) runs south-east and joins the Euphrates to the Tigris. On the parallel of Bagdad, the canal expands to a considerable lake, which again contracts into a narrow channel before it joins the Tigris. At 21 miles below the termination of the Saklawiyah, in the direction of S. 29° E., the Diyalah brings into the Tigris a large body of water. The Diyalah issues from the Hamrin hills about 16 hours north-east of Bagdad, and its course to the Tigris is extremely circuitous, describing nearly the figure of the letter S. A great canal called the Nahrawan, now broken and interrupted in its upper course, diverges from the east bank of the Tigris north of the Medial wall, and joins the Diyalah nearly on the parallel of Bagdad, in the vicinity of Karkart. The Diyalah and Tigris the course of the latter is extremely winding, but its general direction is south-east. About 975 miles in a straight line from Bagdad in that direction, it reaches Karkart, 98 miles nearly due east of the Shat-el-arab, and where the Diyalah and Shat-el-arab with Saklawiyah, sends a considerable stream to that river. The smaller branch, called Shat-el-hai, flows south and joins the Euphrates, after giving it a number of its smaller streams. It runs the distance of 140 miles from Kut-el-amara, and is navigable throughout for light boats. The main branch of the Tigris turns off at that town to the north of east, with an apparently undiminished stream (200 yards broad), and flowing in that direction 28 miles, and then south by east 32 miles, reaches Imam Gharbi, the most distant part of its course in the plain from the Euphrates (60 miles south-west of Bagdad). The river takes from Bagdad to S. 57° E. of Imam Gharbi, a channel called Hud flows off on the east bank, and joins the Kerkhah near Ha- wzah; Mr. Rich's pilot had sailed along this branch. Ten to 15 miles above Imam Gharbi the Tigris is somewhat narrow, and makes a number of abrupt bends through a marshy plain for 40 miles to the tomb of Ezra. It has its former breadth, and winds in a general south direction to its junction with the Euphrates at a distance of about 123 miles by the windings of the river. The current of the Tigris in the plain averages one mile and a half in the hour.

From the Saklawiyah, the Euphrates flows south-east, through a pastoral country, 423 miles, to the Mounds of Mohammed; it is here only 18 miles distant from the Tigris at the mouth of the Saklawiyah, and the ground has a gentle slope to the east. Within these 423 miles may be traced the remains of three parallel canals, branching off from the Euphrates to the east. From the Mounds of Mohammed the river flows across a flat barren country to Hillah (32° 28' 38" N. lat., 44° 28' 40" E. long.), 904 miles by water, Mr. Rich reported, it has a large basin of the mouth of the Saklawiyah. Hillah is almost due south of Bagdad, and between 50 and 60 miles distant from it. In this part of its course the stream has an average breadth of nearly 1 mile, and an average depth of 35 feet. The course is shortened by two small branches (at this point reunite at Karayen (334 miles S. 48° E. from the bifurcation), after flowing in short bends through a marshy country. On issuing from these marshes the Euphrates suddenly re-appears on its former large scale, closed between high banks covered with jungle. At 563 miles from Karayen the Euphrates is joined by the Hai, the branch which diverges from the Tigris at Kut-el-amara; and 79 miles farther on it receives at Kurnah the waters of the main branch. The distance (by river) from the remotest sources of the Tigris to Kurnah is about 1146 miles, little more than half the length of the Euphrates. The Euphrates and Tigris now form one tidal channel, known by the name of the Shat-el-arab, about half-a-mile wide, which flows S. 37° E. almost in a straight line. Five miles below Kurnah, it is joined by the Kerkhah, which, near Hawzah, where it leaves the hills, receives the Hud and two branches of the Shat-el-arab. Thence the Euphrates send off one or more canals to the Karun. From Kurnah to Basrah is 309 miles by the river (36° 34° E. in a direct line); and thence to Mohammah, where the river joins the Shat-el-arab, 224 miles by water, or 28° direct S. 35° E. Between these two points and Basrah, the average breadth of 600 yards, with a depth of 21 feet; between Basrah and Mohammah, a breadth of 700 yards, and a depth of 30 feet. The current below Kurnah is two miles an hour during the flood and three during the ebbe. Between Kurnah and Mohammah the river forms five islands, all large.

The steamer 'Euphrates' sailed up the Karun in Novem- ber, 1837, as far as Hawzah, where the progress was arrested by a ledge of rocks and an artificial hedge. On descending the river, the Euphrates took three days to pass from Hawzah to Mohammah. From Hawzah to Bundak-i-ali (mentioned above in describing the course of the Karun before it enters the plain) the expedition was occupied two days in a country boat, high up stream, and one down stream. From Mohammah to Sablah the course up the stream of the Karun was 20 miles nearly east; from Sablah (still ascending) to Isma'il, about 10 miles, and the current then takes a southerly direction, east-north. At Sablah the Karun is joined from the east by the Dorak, a canal from the Jerahi; between Sablah and Hawzah there are no traces of canals, artificial or natural, joining or quitting the Karun on its course. The Dorak is joined by a canal coming apparently from the Kerkhah. From Sablah a channel, called Karun-el-ama, formerly carried the waters of the Karun to the Persian Gulf, in a direction a little to the east of south. There is still a scanty stream in the channel, but it is supplied by the Dorak canal: the waters of

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of the Karun are conveyed along the canal called Haffar to Mohamar. The Karun, descending from the sea by two mouths—the eastern is called Khor Musa, the western Khor Sellej. From Sablah, ascending the Dorak canal to the village it takes its name, is 30 miles in a direction north of east; seven miles east of this settlement is the Maden canal, which runs north and east. The country between Dorak and the Jerahi is irrigated by six other canals, in which most of the water of that river which does not find its way to the Karun appears to be dissipated. No ancient river-bed, through which from this point the waters of the Jerahi appear to have found their way to the Persian Gulf, immediately to the north of Ras Tuloop, along a distance of about 40 miles nearly in the direction of the Karun, remains only. In the Karun there is a bifurcation of the waters of the Shat-al-Elab: the Bahamshir, the lesser channel, has not been navigated throughout; the Mohammah branch, the real Shat-al-Elab, flows south to the bar, which is 40 miles from Mohammah, with an average width of 1200 yards, and an ordinary depth of 30 feet. The delta land between the western headland at the mouth of this channel and Ras Tuloop is almost entirely unknown to Europeans: of the ramification of the channels which connect the extensive gulf called Gubbet Nakada (between Khor Musa and Ras Tuloop) with the Jerahi or Karun we are quite ignorant. To the west of the Shat-al-Elab, a broad sound, cut out, as it were, stretched from the north-west to the mainland and the island of Boukko, into the Persian Gulf, the sea some have supposed that the Pallasocapis discharged itself, the artificial channel which in antient times commencing above the city of Babylon (on the site of Billah) consisted of a succession of oha; or blue terraces, covered with the superfluous waters of the Euphrates into the flat country to the west. What seems the dry bed of a river, running parallel to the Euphrates, has in fact been traced at various points between Zebel (west of Basra) and Billah.

The physical structure of the region, the superficies of which has now been described, is varied and interesting, but as yet very imperfectly investigated. The mountains extend along the banks of the Euphrates, and extend far into the island of Boukko, to the north of the Shat-al-Elab, west in the direction of the sounds of the Shat and Tamah-su, east to the sources of the Bilis-chai, and the chain which extends thence between Lake Van and the Murad-chai to the sources of the river Zab, form the southern boundary of the portion of the high table of Armenia, which belongs to the drainage-basin of the Euphrates. The geological structure of these mountains and of the whole basin north of them is pretty uniform. Granite rock is the prevailing material, the igneous rocks believed to long to later formations predominate. Metalliferous deposits exist at various places. At Divrigi on the Keumer-su, boulders of native iron, some three feet long and one broad, or a half of a cart-wheel, are found. At Keban-Maden, two hours below the confluence of the Lake and the Euphrates, are silver-mines. The ores are—argentiferous galena; a sulphur of lead, silver, antimony, and iron; a sulphur of antimony and silver. The ores are found in veins intersected by two different kinds of rocks—micas or chlorite slates, and limestone. At Arghama-Maden, near the sources of the Tigris, are copper-mines. The annual produce of these mines was, in 1837, to be 150,000 maunds (2,250,000 lbs.). There are silver-mines farther east, in the same range. The mountains which from the sources of the Bilis-chai extend westwards to the south of Lake Van, the mountains of which the lofty peak of Rowandiz appears to be the nucleus, and the mountains which from this point southwards form the east watershed of the drainage-basin of the Tigris and Euphrates, as far as they have been explored, present a similar conformation to the mountains just described. This eastern range terminates the high table-land of Iran and Azerbaijan to the west, as the western terminates the high table-land of Armenia to the south. Veins of lead are worked in the upper valley of the greater Zab. The subalpine country intervening between the two and the central plain on the Euphrates and Tigris is pretty uniform. A highly-worked region, Durr. From the base of the western mountains, as far as Rum-kalah on the Euphrates, and extending north of a line passing from north to north-east through that point from the Tigris to the western boundary of the plains and supercristate deposits prevail, interrupted here and there by Porotine rocks. The same formation extends east of the Tigris as far as the lesser Zab. Soft white chalk with flower veins along the Euphrates to Basla; gypsum and marl predominates as far as the hills west of Palmyra, where they are covered with breccia; to the south limestone rocks, alternating with sandstones and clays, compose the elevated plain of the Syrian desert. At Hit are the celebrated four promontories of the Euphrates, which is still in the possession of the Turks. Around Mosul on the Tigris, and as far south as the west prolongation of the Hamrin hills, are red sands and sandstones. South-west of the lesser Zab are the Kufri hills, composed of sandstone and green clay, with deposits of bitumen, naphthas, sulphur, and salt. They contain the burning fountains of Kerku-baha. There are also naphtha lakes where the Tigris breaks through the Anti-Taurus mountains near the lines. The country from the Karan at Hawaz, is composed of saliferous red sand and sandstone. The great central plain from its northern termination to near the parallel of Bagdad has a slight but well-defined inclination to the south. The soil is pebbly. It is rare to find any deposits of pebbles farther south. A clayey soil succeeds, consisting partly of humus, partly of calcareous clay, covered with mould, or sand, or the tenacious clay of frequent inundations. Many local depressions occur in the plain between the Tigris and Euphrates, in all of which are marshes. The Lemun marshes on the Euphrates are for the most part of a soft alluvial clay or mud containing only river and lacustrine shells. The plain south of these marshes rise only a few feet above them, and are marked by deep furrows and blue terraces. Places with a layer of sand, with marine shells. The marshes on the Tigris, below Imam Ghabri, are similar to the Lemun marshes. Between Basra and Zobeir the valley is completely filled with deposits, and the whole marine origin and contains shell-shells. The tract of alluvium between the Karan and Jerahi, and between the latter river and the sea, and extending as far west as the Bahamshir, is a nearly uniform plain, inundated during one-half of the year. In some places the earth is a compact calcareous clay, in others a loose soil full of saline particles. To the south the surface is covered with salt, which in some places lies on the earth like snow to the depth of an inch.

In the south the climate is of great importance to vegetation and wintering animals. In the summers the day's temperature, extending to the extreme points of the basin to the Tigris, there is an increase of cold in the same parallels; east of that river the plains sheltered by the mountains have a more temperate winter. At Bagdad the temperature of July is about 80°, and of the thermometer generally rises during the day to 115° in a shaded place. Rich mentions having seen it as high as 120° in the middle of the day and 110° at night. The intense heat of the Persian Gulf is notorious. The basin of which that and the gulf are a part in its southern termination are the maximum depression, is landlocked on every side, and the depression lies within the 10 parallels of latitude next adjoining to the tropic of Cancer. The extraordinary heat experienced by the want of the sea breeze on the lower less confined regions, the immediate vicinity of mountains covered with eternal snow to the north and east, and the comparative depression of the elevated land which separates this basin from the Mediterranean, account for the occurrence of those tremendous storms some of which overwhelmed the Tigris steamers in the Euphrates expedition. The high plains at the source of the Kara-su and Murad-chai are destitute of timber-trees. The valley of the Murad-chai, in the vicinities of Kermanchah, there are oak forests in the recesses of the southern mountains. From Palu to Shayk there are extensive forests of oak along the bases of the mountains which bound 11° to the hills of Tabaristan. In the valley of the Kara-su oaks grow in considerable numbers. The forests of the Murad-chai are white mulberry woods. The lower valley of the Tabaristan and Yezd province is a garden; dwarf oaks flourish nearly to its upper extremity.
The vine is cultivated with success as high as Egin or the Kura-su and Minsh on the Mesopotamian plains. Wherever a site of fine quality is grown in the plain of Erzerum. The soil and plants around Dyadyn is rich, but principally pasture. Forests occur at intervals along the road from Bir to Mosul; nowhere as far south as the Zagros-Maden there is no wood. Along the bases of the mountains subject to the influx; and, at a few miles the Blitsh-chi the country is at intervals well wooded. Pines, oaks, and ashe comprise the prevailing forest-trees in this region and among the Persian mountains. All over the southern deserts subject to the influx of the Persian and Arabian peoples. The Euphrates consists entirely of tamarisk, poplar, and white mulberry. There is an extensive forest on the west bank of the Tigris between Mosul and Kalaah-Sherikart (about 30° 30'. lat.). In this region there are few annual and tender plants; the tough stems of perennial alone seem able to withstand the excessive variations of temperature: wormwood is the characteristic plant east of the Euphrates, carmotillo and the camel-thorn to the west. The ground is gray in spring with bulbous and liliaceous plants and Orchidaceae. In the central plain the date-palm is the only important tree: as far north as Bagdad the supplies of building timber and firewood must be floated down from the upper Euphrates and Tigris. The most northern date-groves are at Anah; the number of the trees is increasing in number and quality to the southern terminations of the basin. That they are unequally distributed over the surface is solely owing to the cultivation: for the rivers and the position of the Tigris and Euphrates. The forest-trees are great trees which are over 200 years old; and modern experience confirms, that careful irrigation alone is required to make any part of this region produce them in plenty. The woody and swampy plants of the region interspersed between the mountains and the central plain give place in the latter to succulent species, a great part of which belong to families indicating a strong saline admixture. Mesembryanthemum and Asteraeae are naturalized; and Euporbia grows as far south as Susiana. The marshes have a luxuriant vegetation of coarse grasses, rushes, and reeds. The shallow sheets of water dispersed among the reed-marshes are covered with the broad leaves and in their season with the flowers, of Nymphaeaceae and Ranunculaceae. The river-banks are fringed with tamarisks, asacias, and occasional groves of a species of poplar (sharah), which from the form of its leaves has been called el-Arabi. On the sea-shore is found a species of Mariscus, which in the spring season presents a rich green carpet relieved by the glistening somewhat sombre colours of its spikelets. The roots of this plant are fibrous, and take a strong hold of the crevices of the rocks and shores of the sea, and where the Mariscus has spread the land may almost be regarded as permanently gained from the sea.

In the mountain-region the animal kingdom has not yet been subjected to the observation of scientific inquirers. Wolves, bears, lynxes, sables, and foxes are frequent; there are large herds and flocks of the common domesticated animals; all kinds of capreolus and several owls abound. In the hill-country and the plain the lion is found from the mouth of the Khazar northward. A species of the hunting tiger and a great variety of allied species are met with on the lower Tigris and Euphrates. The lynx inhabits the woody districts, in which squirrels are also numerous. From the mountain-troglodytes of their pileus to the repairable animal: a white variety has been observed. The otter is found in the Euphrates, Tigris, and Karun. Wild bears are numerous in all localities adapted to their habits; and an animal called the wild horse is met with among the uplands beyond the Diyar-Bek, and plains. The falcon-deer is common in some districts, and gazelles are numerous in the Syrian desert, over all the subalpine country, and as far as the delta land of the Euphrates. Deer are abundant near the Nilus and in that of the plain. The bat tribe are numerous. The camel, two breeds of horses, and a fine race of asses are the most important domestic animals. Vultures are common in the mountains and are brought down to the plains by the Parthians. The thrush, lark, and bullfinch are common; the hulbul of Syria is the English nightingale; the Persian bullbul is a kind of thrush. There are some brilliant and peculiar species of kingfishers. Pleasants and various varieties of partridges are common; the great scarlet, Repiles of all kinds are numerous. The fish and insects have been very curiously examined.

In no region out of Europe have the original races of men been more intermingled and confused than in the lower Euphrates basin, the Persians, the Parthians, and the conquering dynasties of the Assyrians, Medes, Persians, Greeks, Parthians, and Arabs, have all fixed here the central seats of their power, and shifted and blended the tribes of a dozen different languages. But during which the frontiers of great empires have intersected the region—in old times the frontier of the Roman and Parthian empires—in our own day that of the Ottoman and Persians. The Turks have been scarcely less efficacious in producing this confusion. Among the mountain-complexes of the Armenian plain, a relic of the race from which it derives its name, has continued to be pure from the earliest times. Their neighbours the Kurds are probably the representatives of the old Carduchian, but more mixed. The Chaldese on the upper waters of the greater Zab are also to all appearance a primitive race. The now dominant races within the basin are the Arabs (tolerably pure), the Turks (the nomadic tribes, not much mixed; the town settlers, a race of multilavarian lineage), and the mixed race called Persians. The districts in which each of these races predominate are pretty sharply defined. The Arabs preponderate to the south of Bir and Mosul, and extend south of the Tigris to the Persian mountains. The Turks preponderate to the north of the Arabs, and are numerous among the haunts of the Kurds and Armenians. The tribes called Persian prevail south of the Dyialah and Woot, and extend to the Euphrates. From the Euphrates the greater part of the population appears to be composed of clans of this mixed race.

Remell and D'Anville have done for the comparative geography of this region all that is absolutely necessary to bring the power of divination could do with the materials they possessed. The progress that has been made since they wrote, in extending and rectifying our notions of its actual condition, render it desirable that the date of old and corrected. But the progress, the comparative and positive geography of the country, in order to correct their conclusions. The first lesson to be learned here is what our actual knowledge amounts. The tract of which the geography may be considered as accurate and well made to any thing approaching to certainty extends, it has been seen, from the delta of the rivers to Bir or Susiana, to the Euphrates, to Mosul on the Tigris, and to Howar on the Karun. On account of its position, between Arabia and Ar- menia, and with the west slope of the table-land of Iran, it has been extended and corrected, but not to the same extent. For the purposes of comparative geography the actual condition of this tract has to be compared with the most ancient account of Xenophon; and the Parthian, the Armenians, and the Arabs, taken in connection with the light surviving monuments throw upon them. The first thing to be looked to is the river courses. The channels of the Tigris from Mosul to the delta, and of the Euphrates from the delta, may be considered as identified with the rivers so named by the Greeks and Romans. The Euphrates, there can be no doubt, is the ‘great river’ of the Hebrews. The Karkhah may be held to be identified with the Choaspes, the Karun and Diyala with the Pactia and Coprates, the Shapur with the Euacesus. These lines being determined, give us Babylon at Hillah; Is at Hit; and Susa or Shusun on the Shapur, between the Diyala and Karkhah, at the point where the rivers from their positions of their respective positions of the province of Susiana and Elamnia to the east of it, and the city of Ecbatana to the north-east. The route of Xenophon enables us to identify the Khabur (the affluent of the Tigris) as the Motal, and its parallel canals as the district where the battle in which Cyrus fell was fought; some mounds north of Bagdad between the Khor and the Tigris as the approximate position of Sitace; the mouth of the Aaspis as the Zabata (as of Xenophon); the vicinity of Mosul as the place where roads diverged west to Syria and Cilicia, south to Babylon, east to Ecbatanu and Susa, and whence the Ten Thousand passed with the Persians. The Persians, however, in order to fix, with something approaching to precision, the relative positions of the Babyloina, Medes, the countries of the Kar- duchian and Armenians of his time. The routes of Ammim-
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anus Marcellinus enable us to identify the Khabur (of the
Euphrates) with his Aboras, and the town Circesium with
the ruins in that vicinity ; to ascertain the site of Ctesiphon,
25 miles below Bagdad on the Tigris ; to identify Hatra
with the ruins on the Tharthar, which have been visited by
Dr. Ross and others ; and to fix approximately the posiThe history of
tions of his Singara, Nisihis, and Amida.
Zenobia enables us to identify Tadmor (Palmyra) and
Zenobia on the Euphrates (the modern Zelebi). Around
the central district here indicated there are materials for
identifying other scenes of antient history, but the work
has yet to be done in a judicious and critical spirit.
It would be unjust to conclude this article without intimating our obligations and expressing our gratitude for the
liberality with which Colonel Chesney, the commander
of the Euphrates expedition, has complied with our request for information respecting the regions explored by
it.
We may also be allowed to express an earnest wish
that the publication of the results of that expedition's labours will not be much longer delayed. In spite of many
obstacles, the expedition succeeded, in the course of the
years 1833, 1836, and 1837, in running a line of levels from
the Mediterranean to the Euphrates ; collecting materials
for a correct map of northern Syria
exploring northern
Mesopotamia surveying the Euphrates from Bir to the
sea ; exploring the Tigris for 400 miles above its junction
with the Euphrates ; exploring the great delta of Susiana ;
running a second line of levels from the Tigris to the
Euphrates across the plain of Babylonia ; and traversing
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several routes. Valuable obserradepartments of zoology and geology,
were made by the naturalists attached to the expedition
Numerous astronomical observations were made by Lieut.
Murphy (who fell a martyr to the zeal with which he devoted himself to the task), and have been reduced bj the
Rev. R. Sheepshanks ; an important series of pendulum cxEeriments were made at Basra by Major Estcourt and
ieut. Murphy.
The last-named gentleman was unfortunately not the only member of the expedition who fell a
victim the loss of the officers and great part of the crew
of the steamer ' Tigris,' in a hurricane near Salahiyeh, had
also to be regretted ; and Colonel Chesney suffered severely in his health, though his high spirit carried him
through. The publication of the fruits of all this toil and
loss of life will be valuable, not only as an addition to
science and historical geography, but as a means of corroborating or correcting the East India Company** chart

the Syrian desert

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U.

U is at one extremity of the series of vowel sounds, lying next to the vowel o. In the Hebrew alphabet it does not appear, and was probably originally wanting in that of the Greek tongue. For the different forms of the letter see Hebrew.

1. The close connection between this vowel and the vowel o might be inferred from their relative position in the vocal gamut, and has been already the subject of remark by Guelphs. But in the Latin, as in the Greek, and in the English of the Renaissance, it was evoked by the Romans. Thus during the Middle Ages, and also with aestas, aestas, as well as Vestas, Vesperus. In the same way foetus, foecundus, are formed from the old verb foio, by the addition of the common suffixes tus and cundus, which are so often attached to verbs. Again the variation in the forms of Poeni and Punicus is an example of the same principle. It may be added, that all the words munitus, monito or monito, are connected both in form and meaning with the Greek words, such as μυονον, denoting division.

2. u with aw, as in the Latin forms claudio and eludo, and the Latin mus compared with the German maus, a much the same form.

4. A short u with å. Thus those who represent the Arabic article in English characters are divided between al and ul.

5. A short u with å. Thus the Greek tongue, or rather pen, prefers the syllable el where the Latin writes ul, particularly in the penult syllable: so Σελος, Siculus: compare also the ευλαλιων with the Latin ululare. The Greek form el. Hence the Latin labia, fabul, appear in German as tafel, tafel. The vowel u is also preferred by the Romans before n, if a or ot follow. Hence rediens has a genitive reduentis, and faciundus is as common as faciendum.

6. A short u with t. See L. a, 2.

7. For the interchange of du with b and r, see B. D.

8. For the interchange of l with u, see L.

9. Ou not frequently results from on, particularly in the Greek language, as ομος for ονος; τομος for τομις; and the accusative plural of the second declension, ομος, is a corruption of ομος, being formed from the singular ομος by the addition of the suffix of plurality. Mr. Payne Knight appears to be wrong in inserting a digamma in this form.

10. For the loss of an initial e before u, see C. In confirmation of what is there stated, it may be observed that uer appears in an inscription which is determined by its contents to belong to the Augustan era, in the form cuter, at least neuter is written neuter. The copyist, scandalized at such a form, altered it into nec vero, to the utter annihilation of the sense, until Marini again restored the true reading of the stone.

11. The insertion of a y sound before u is not limited to an initial u, as in union, university; but occurs in the middle of words. Thus, in Norfolk 'true' is sometimes pronounced 'tryou.' It is probably in this way that the English have adopted the orthography ew in so many words, as new, few.

12. For the intimate connection of u with V and W, see the annexation.

UBEDA, a city of Andalusia in Spain, situated at the foot of a mountain called los Cercos de Ubeda, in 37° 50' N. lat., 3° 24' W. long., between the rivers Guadalquivir and Guadalimar. Since the new division of the Spanish territory into the provinces of Jaen, Alfonso IX. of Leon took it from the Moors on the 16th of July, 1215, immediately after the battle of las Navas de Tolosa; but the garrison which he left in it being too scanty to defend the city against the Moors, it was evacuated by the Christians, and set on fire. The Moors possessed possession of it until the 29th of September, 1230, when it was retaken by Fernando III. The inhabitants, together with those of Baeda and other cities which were reduced about the same time, betook themselves to Granada. The plain on which Ubeda stands is among the most fertile of Andalusia, and yields abundant crops of grain and oil, which are carried into the interior. The population amounted, in 1829, to 15,774 inhabitants, most of whom are occupied in agricultural pursuits; the rest find employment in the manufactures of coarse cloth, blankets, and hats. Ubeda celebrates an annual festival, which is not much frequented by the inhabitants of the provinces of Cordova and Jaen, on the 29th of September, in commemoration of the taking of the city, from the Moors. (Milano, Dizionario Geografico; Maʀarı, Hist. Gen. de España, lib. xvi.)

UBERTI, FAZIO DEGLI, of a Guibeline family of Florence, is believed to have been a son of Lapo degli Uberti and grandson of the great Guibeline leader Faziol degli Uberti, who after the defeat of the Guelphs at Montaperto, saved Florence from the fury of his own party which wanted to raze the town to the ground. Of the personal history of Fazio little is known, except that he lived in the middle of the fourteenth century, that he was an emigrant in consequence of his efforts by the triumphant Guelphs, and that he found an asylum at various Italian courts, among the rest at that of the Visconti at Milan, amusing his patrons by reciting verses and singing them in Latin and other small poems are found in various collections. He composed an Odes in terza rima, entitled 'Il Dittamondo,' from the Latin words 'dicta mundi,' the 'saying' or 'the news of the world,' in which, borrowing the plan of Dante, he represents himself travelling about the world in company with Solinus, the author of the 'Polyhistor,' and describes the various countries, their history, the contemporary sovereigns, and other things worthy of note. The poem consists of nine books, as follows:

1. The Odes,
2. The Youth,
3. The Youth and Senses,
4. The New Age,
5. The New Age and Senses,
6. The Hearing,
7. The Hearing,
8. The Senses,
9. The Senses and Senses.

It is written with graphic conciseness and energy of style, and is interesting as a memorial of the geographical information of that age, mixed with fabulous traditions and mythological lore.

The 'Dittamondo' was printed at Vicenza in 1474, and reprinted at Venice in 1501, both editions being however full of errors. An improved edition, with corrections by Monti and Perticani, was published at Milan in 1825. Fazio is said, by Filippo Villani, to have died at Verona after a quiet old age. (Tiraboschi, Storia della Letteratura Italiana.)

UBES, ST. [SETTULARI], UCAYALI, River. [AMAZON; PERU.]

UCCELLO, PAOLO, a celebrated old Florentine painter, contemporary with the sculptors Ghiberti and Donatello, who would, in the opinion of Vasari, have been one of the most remarkable painters that had lived. From Giotto until Vasari's own time, had he bestowed as much labour on men and animals as he did on perspective. Uccello was the first Italian artist who reduced the principles of perspective to rule: he was acquainted with geometry as a science, which he learned of his friend the mathematician Giovanni Manetti, with whom he used to read Euclid. He painted in fresco and in tempera, but most of his works are now destroyed. His pictures were generally of such subjects as admitted of the introduction of animals, and he delighted to display his power of foreshortening. His best works were those painted in Santa Maria Novella, in green earth, where he illustrated the histories of Adam and Eve, and of Noah, the creation, and told the stories of the pictures he painted numerous animals,—amongst them many birds. He acquired his name of Uccello on account of his predilection for painting birds. Vasari does not mention his landscapes, a circumstance by which he did not make his name given to him by Orlandi through misunderstanding paintings in Vasari. He was skilful also in landscape-painting, and the backgrounds of some of his paintings were the best that he attempted. A part of that art which had been produced up to his time.

Uccello painted also in green earth, in the cathedral, a colossal equestrian portrait of an Englishman, who was
UDI

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UDY

UFF
turn to his native place. He brought back with him up-
wards of 4000 rare and curious books, which he had pur-
chased in Holland. He was afterwards raised to the rank of a senator of Frankfurt, and distinguished
himself so much among his fellow-citizens, that in the
course of nine years he was twice elected mayor; in 1731
he was raised to the office of chief-justice. He died on
the 15th of January, 1734.

Uffenbach was a man of extraordinary diligence. As
long as his health permitted it, he devoted all his leisure
time to bibliographical and other studies, and to the com-
position of laborious works. He recopied and published
three different catalogues of his library; one in 1720, and
another in 1729, under the title 'Bibliotheca Uffen-
bachiana aeporeyca vel latens, hoe est, librorum in cor-
pus librorum Germanicum Varia,' another 'Adversaria, vel
catalogus.' The second catalogue was believed to have been made by the au-
thor with a view of disposing of some parts of his library,
as his official duties prevented his attending to it as
much as before. A third catalogue, in 4 vols. 4to., was
published after Uffenbach's death in 1745. Besides these
catalogues he commenced several other works, but was
prevented from completing them partly by his official en-
gagements, and partly by ill health. These works were,—
1. Commentarius de Vita proprius, that is, an autobiogra-
phi; 2. 'Selecta Historiae literariae et librariae,' the MS. of which formed several quarto volumes; 4. 'Adversaria, sive Excerpta Realitatis et Sem Librarum et Librariorum facsimile in
ninth quarto volumes.' The work most advanced towards
completion was Uffenbach's autobiography; but when in
the latter years of his life he lost all hopes of ever finish-
ing his works, he gave the MSS. of them to his friend J. G.
Schellhorn of Detmold. Schellhorn, lovingly preserving his
writings, correspondence, forming eighteen thick quarto volumes, and
allowed him to make any use of them he pleased. Schell-
horn did not indeed complete or publish the works thus
bequeathed to him, but he made much use of the materials
collected by Uffenbach for his 'Amoentiorum Literariae,'
in the ninth volume of which he gives an account of the
earliest printed works contained in the library of Uffenbach.
He also wrote a Life of his friend, which is prefixed to a
collection of Uffenbach's letters, 'Commerci Epistolae.
Uffenbachiani Selectae,' &c., 1753, &c., 5 vols. 8vo.

UGGIONE, or UGLONE MARCO, called also Marco
of Oggione in the Milanese, was one of the best scholars
of Leonardo da Vinci. He did not, like most of the dis-
creples of that great master, confine himself to easie pic-
tures, executed slowly and highly finished, but became
an eminent painter in fresco, and his works in the Place at
Milan, and the Assumption in our own church, are un-
paired. Some of them are in the body of the church,
but the most remarkable of them is in the refectory: this
is the Crucifixion, which is equally admirable for the skill
evinced in the composition, the spirited execution, the
natural expression of the figures, and the beauty of the per-
ories. For the refectory of the celebrated monastery of
the Certosa, near Pavia, he made a copy of The Last Supper
of Leonardo da Vinci, which is peculiarly valuable on
account of the raisin condition of the masterless original.
The church of St. Ulpinness, at Milan, contains one of
his masterpieces, representing the Virgin and Saints. He
died in 1580, but his age is not known.

Ungkning, Poulet, Dictionary of Painters; Mariana

UGHELLI, FERDINANDO, born at Florence about
1695, entered the order of Citeaux, in which he rose to the
dignity of abbot. He is chiefly known for his great work,
'Italia Sacra,' published at Rome, in 9 vols. fol., 1625-28,
in which he gives the history of the various Italian seas,
with the stories of their respective bishops, and illustrates
them by numerous documents from the episcopal archives,
which also reflect much light on the general history of
the country. As it was impossible for the author to examine
himself all the archives of the numerous Italian seas, he was
often obliged to employ others; and the consequence is,
that the work is unequal. Still Ughelli's history is very valuable, and has served
as an authority for the compilers of the new
editions of the 'Italia Sacra.' He died at Florence, 1746.

UGHELLI, Giov. Batta, another famous historian. A
ewdition of Ughelli's work was published at Venice, in 10
vols. fol., 1717-33, with considerable additions, and with
the 'Sicitia Sacra' of Rocco Pirro.

UGGIO, a little village of the province of the Medici,
with the second seat of the family of the Colonna, 'Imagines Columensium Familiae Cardini-
lum,' Rome, 1650; and another work in Italian, entitled
'Albero e Istoria della Famiglia de' Conti di Marcellino,
Rome, 1645. Ughelli died at Florence, in a hospital.
('Tirarchici, Storia della Letteratura Italiana."

UGOTZ, a small county in the kingdom of Hungary,
in the circle beyond the Theiss. It is bounded on
the north and west by the county of Beregh, and on the
east by the counties of Conti and Marges; the distance
is 848 square miles, and the population (in 1832) 40,645,
whom two-thirds are Hungarians, and the remainder
Wallachians and Rumanians. In the northern and eastern parts
of the county there are many mountains, cultivated with a very slight declivity, on which account the Thess
flows very slowly and with many windings, and forms
numerous islands: there are also extensive marshes,
and the frequent inundations are injurious to the productivity
of the soil: in dry seasons it is more fruitful. The moun-
tainous part is sterile. Of the productive part of the land
(166,394 acres), above one-half is covered with forest.
60,000 are arable, 6327 meadows, and 1318 vineyards. The
principal productions are timber, corn of all kinds, hemp, flax, tobacco,
and fruit. In the woods there are bears, lynxes, stag,
turkey, and hares. The soil is generally very fertile and
abundant, especially in the Thess, and are a chief
source of wealth to the inhabitants. There is no considerable town
in this county. Nagy Szollos, the capital, has only 250 in-
habitants. (Oesterrichtische National Encyclopädie; Ungarn, Cr-
tien, Slawenien, und der Ungarische Militär Gränz-
Leipzig, 1834, anonymous.)

UGLI, the name of the larger Helis, [Helisaur.,
belonging to Inversins-shire [Inversia-shire]], and
distinguished as North Uist and South Uist. North Uist
is separated on the north from the southern extremity of
Loch Island by the Sound of Harris, in which are a number
of small islands; and on the south from the island of
Benbecula by a narrow strait without name, dry at low-water.
South Uist lies south of Benbecula, from which it is
separated by a narrow strait, and at its other (southern)
extremity is separated by a long strait of so much
breadth that it can hardly be crossed in any direction without making
a circuit. The erection of wooden bridges over some of
the inlets has diminished this inconvenience. Some of
the inlets of the sea on the east side, especially Loch
Maddy, form commodious harbours. There are hills on this side
of the island from 300 to 700 feet high; Mount Eval, near
the south-east coast of the island, is above 2000 feet. More
to the west are barren moors, then other hills covered
with heath and rough pasture; then on the west side of
the island lie the principal pasture and cultivated lands, with
a shore generally low, but having a few bold rocky head-
lands. The tillage land yields good crops of barley or barley;
the pasturage is covered with white and red clover.
The sands on the west coast are composed of fragments of shells
ground to powder, and being earned inland by the wind, they
form a extensive manure that tends to improve the land.
The island is chiefly formed of blond sandstone; the source
of Loch Maddy are two basaltic rocks rising out of the sea.
Aquatil birds are numerous on the freshwater lakes,
in which trout are found. Some of the islands in these lakes
are covered with but a few species of plants; the forest
except shell fish, especially eels, which are abundant.
The otter and the seal are found on the shore.

The whole island belongs to Lord Macdonald: it con-
tained in 1831, 31 inhabited houses; 893 families,
of which 602 were employed in agriculture and 28 in manu
The parish church is dedicated to the Virgin Mary.

Some of these are united to North Uist at low-water.

South Uist is about 22 miles long from north to south, and about 8 broad from east to west. The eastern side is low and rocky, and the western side is high and rocky. The highest mountain in the island is 2500 feet high; other mountains are from 1200 to 1300 feet high. The eastern coast is bold and irregular in its outline; its three principal bays are without shelter. The western coast has a more regular outline, and has, except about some rocky headlands, a low sandy shore. There are numbers of lakes; the largest is Loch Varr, in the north of the island, into which the sea at spring-tides.

The island of Benbecula and a number of smaller islands along to the parish of South Uist. Benbecula is about five miles long from east to west, and seven from north to south. It is a rocky island, and the interior is very barren. North and South South Uist; it is marked by a bold coast and deep inlets on the east, and a low coast on the west, with numbers of lakes. The area of the parish is 50,508 acres, or about 120 square miles.

The islands of South Uist and Benbecula are formed of coarse granite, and the inhabitants are mostly Gaelic. The island is inhabited by a few families who speak Gaelic, and though generally well shaved, are not cleanly in their habits: the extreme poverty of some leads to petty thefts. There is no parish church, but there are two or three chapels in missionery districts, and three chapels for the Roman Catholics, who form two-thirds of the population. There are ten schools, the parishional school and nine others, most of them connected with charitable societies. There are four mills in the parish and four inns. There are some remains of a tower or two towers and some relics of a monastery, chiefly in Benbecula.

UKE. (Ukraine) A name probably derived from the Polish, in which it signifies boundary, a term which has been in general use since the conquest of Kiev by the Lithuanians, and at that time designated the frontier towards the Tartars and other neighbours. The word was applied to the extensive and fertile tract of land on the banks of the Dnieper, together with the territory of the Cossacks, with rather indefinite boundaries. These countries, which at the time of Peter the Great were a constant source of trouble to Russia, have constituted the greater part of Little Russia, that is, the four governments of Kieff, Podolica, Poltawa, and Slobodzha Ukraine. This tract is remarkable for its rich pastures, and the fine breed of horses and horned cattle that are reared in the country, the soil, natural productions, and other particulars are described in the articles on the four governments.

YLEC. (Inflammation.)

YLEEBOURG. (Finland.)

ULEA. (Ulema) A private name of the body of learned men in Turkey, is the plural of the Arabic 'Afrm, 'wise,' and signifies originally the 'wise men.' The learned men in Turkey form a corporation which received its organization from Maimud Pasha, grand- vizir of Mohammed II., the conqueror of Constantinople. In the larger meaning, the word ulema comprehends all the divines, the jurists, and even the priests (the imams, the sheikhs, the muezzins, the kahibs, and the kalims), as well as the scientists. But ulema comprehends only professors of divinity, of law, and of some other sciences, any one of which is easily connected with divinity and law, on account of the Koran being the source of all ulema's instruction. This science has great political influence. No one can become a mufti (professor) or 'kadi (judge) except a member of the ulema, nor can any one be appointed chief judge or mufti unless having previously occupied a subordinate place as judge or professor. An individual belonging to the ulema is called by the general name 'mollah,' or 'a man of the law.' In important cases, the multi assembles the ulema, or as many of them as the judges consider convenient, and takes their opinion on the subject.

(D'Ohsom, Tableau de l'Empire Ottoman; Hammer, Des Osmanschen Reiches Staatsverfassung und Staatsverwaltung.)

UX. A genus of plants belonging to the section Lotea, of the natural order Leguminosae. The species of this genus are branched evergreen shrubs, furnished with spines and bearing yellow flowers. The calyx is 2-parted or 3-toothed; the legume oval-elongated, turgid, scarcely longer than the calyx, containing but few seeds; ovate, numerous.

UXE. (Europeus) has linear lanceolate leaves, villous branchlets, oval loose bracteas, and a subescent calyx. This is the common inhabitant of the plains and hills of Great Britain. It is an erect evergreen shrub, with beautiful yellow flowers, which appear in the greatest abundance from February to May, although in some years it may be seen in blossom all the year round. It grows wild in many parts of Great Britain, and is a common inhabitant of the plains and hills of Great Britain. It is of great value when planted, and is freqently seen in the hedgerows. It is often cultivated for its ornamental value, and is a common plant in the hedgerows. It is often cultivated for its ornamental value, and is a common plant for hedges.
flowers. Furze is a useful plant as a shelter in plantations where young trees are sown, as the oak, beech, &c. When the young plants are strong enough, the furze may be cut and moved, and it will have served as a cover for game in the mean time. This plan has been adopted by the government in the New Forest and the Forest of Dean. Where furze is cut it is broadcast; and Ulloa, the Frenchman, who makes an excellent mansion. The ashes contain a large proportion of the salts of potassa, and are used in many parts of the country as a lye for washing. The seeds, like most of the Leguminosae, contain a large quantity of nutritious matter. The double-flowered variety of *Europæus* was first found in Devonshire, and is now not uncommon in gardens and shrubberies. The double flowers add very much to the beauty of the plant. It can only be propagated by seeds.

*U. namus*, the Dwarf Furze, has the teeth of the calyx lanceolate, spreading; the bracteates minute, close, pressed; the leaves linear and smooth; the branches smooth, reching. This plant is native of Britain, also of the west of France, in poor gravely soils, but not common on the Continent. It is also found in Ireland. It grows at a greater elevation than the last species by 200 or 300 feet. It flowers from the end of August till the beginning of December, and not at other seasons. It may be at once distinguished from the last, by its smaller and more delicate structure and reching habit. It seldom attains a height of more than two feet.

*U. vulgaris* has few or no spines, with an erect, narrow, and compact habit. This plant was discovered in the county of Down in the Marquis of Londonderry's park. It is an upright plant, seldom flowering; its branches are long and slender; and in size and character it stands between the two foregoing species. This plant has never yet produced seeds, so that it requires to be propagated by cuttings; and from this and its want of more definite structural characters, it has been supposed to be only a variety of the last. But subsequent character renders it much more fit for a forage-plant than the common furze, and it has been used for this purpose with great success in different parts of Wales. It requires no gravel or previous preparation to its being used as fodder. There is yet another species, *U. provincialis*, the Provence furze. It has a pubescent calyx, with distant, lanceolate teeth. There are considerable doubts as to whether this is anything more than a variety; as such however it deserves attention in cultivation.

In the cultivation of the furses little care is required in this country. When grown in open fields, the seed may be sown broad-cast, and the young plants for the first year or two should be sheltered from winds. They do not flourish in wet or clayey soils, but prefer those which are dry, rocky, and gravelly. The common furze is sometimes killed down by severe winters, but it springs up again at the approach of spring.

(Loudon, Arb. et Frut. Brit.; Cyclopaedia of Plants; Hooker, British Flora; Burnett, Outlines of Botany.)

**ULLIGEA.** A name given by growers to the part of a cask which is not filled with liquor: thus, if a cask, capable of holding 90 gallons, have only 80 gallons of spirits in it, there are 10 gallons of ullage.

**ULLSWATER.** [WESTMORLAND.]

**ULLMANNITE.** Phosphate of iron and Manganese.

**MANGANESE.** Ore of.

**ULLOA, ANTONIO DE,** was born in Seville on the 12th of January, 1716. He was educated for the naval service, in which more than one member of the family from which he sprung had distinguished themselves. He was admitted in 1733 into the company of royal marine guards. In 1735 he was selected in consequence of the distinguished progress he had made in mathematics and in the theory of his profession, along with Jorge Juan, to accompany the French Academicians to South America, to measure a degree of the meridian at the equator. Both the (Ulloa) was at this time only in his twenty and Juan in his twenty-third year; they were promoted to the rank of lieutenant in the navy on receiving this appointment.

The squadron in which Ulloa and his companion embarked sailed from Cadiz in May, 1735, and landed the 15th of June at Cartagena on the 9th of July. They did not return to Spain till the year 1736. The whole of the intervening period was not however devoted to scientific measurement. They were detained five months at Cartagena waiting for the French convoy, which carried the Academicians here, and this time was spent by Ulloa in studying the natural history of the district. The geographical operations commenced in the neighbourhood of Quito, in June, 1736, and the scientific arrangements were made when they returned to the scene of their labours, which were almost immediately interrupted by a summons to Guayaquil, where the lack of Payta by the English had spread terror. After this the security of the province had been adopted, the terrified inhabitants insisted upon one of the officers being left, to superintend their execution. Ulloa returned to Quito without his companion, and his reception was such that when he was recalled to Lima. Two frigates were placed under the command of himself and Juan, with orders to cruise along the coast of Chili and off Juan Fernandez. At last the arrival of reinforcements from Spain set them free. They then sailed to the Carolines, where they found the Academicians had departed, with the exception of Godin, along whom they observed the comet of 1744. Ulloa and Juan embarked in October of that year, and from the islands of Juan Fernandez, which carried Ulloa sought refuge from an English privateer in the harbour of Louisbourg in Cape Breton, but by the time it entered, the town had fallen into the hands of the English, and all on board were made prisoners of war. Ulloa was conveyed to London, where he received with marks of distinction, made a member of the Royal Society, and by the intercession of his scientific friends set at liberty. He arrived at Madrid, in July, 1746, after an absence of eleven years and two months from his native country.

Ulloa's reception at court was flattering; he was appointed to the command of a frigate, and created a commodore of the royal navy. The receipt of the first items of the scientific observations devolved upon Jorge Juan to write the history of the expedition was the charge of Ulloa. Two years were consumed in preparing the narrative for publication: it appeared in 1748. The work was comprised in four volumes: the first relates the adventures of the expedition from the time of its departure from Cadiz till the conclusion of the geological measurements; the second contains a description of the provinces of Quito and Guayaquil; the third is the result of Jorge Juan's and Jorge Juan's journeys to Lima and cruise along the coasts of Chili while a deserter on the part of Anson was apprehended; the fourth, the return voyage from Callao to Lima, with an appendix containing a chronological account of the rules of Peru and the boundaries of the Inca empire.

The work shows that the necessity of the case, as well as personal tastes, had contributed to devote the account of the strictly scientific operations of the expedition to the exclusive care of Jorge Juan. Ulloa's work, however, though deficient in method and accuracy, is amusing and suggestive of thought. He and Jorge Juan may be regarded as the characters of their intellects stood in somewhat the same relation to each other as La Condamine did to Bouguer. But to the honour of the Spaniards, no paltry jealousy interfered with the progress of the enterprise, but every effort was made to promote the success of their mission. The two volumes which profess to contain the 'Secret Report,' made by Ulloa and Ulloa to the minister Ensenada, of the condition of the Spanish Americas: it could have been wished that the author had given a more complete account of the history of the MS. and the manner in which it came into his hands.

Ulloa subsequently made tours of observation, by order...
of the Spanish government, in several countries of Europe. During the reign of Ferdinand VI., however, he appears to have been kept in the background. Upon the accession of Charles IV. his situation became for a time fashionable at court, and the inquiring and enterprising spirit of Ulloa found itself in a more congenial element. After Louisiana was ceded to the crown of Spain, in consequence of the peace of 1783, he was nominated to take possession of and to organize the new province. He conceived this plan in 1789, but his attempt to play the part of governor was an entire failure; it was necessary to supersede him by the appointment of O'Reilly. Ulloa after his return to Europe published (1792) his travels, in which he described the islands and antiquities of America. They bear, even more strongly than his narrative of the expedition to South America, the impress of a dilettante spirit of inquiry. In 1778 he published his memoir entitled "The Marine, or the Naval Forces of Europe," a work which met with. In 1778 he published, at Cadiz, "Observations of a Solar Eclipse, made at Sea."

In 1778, having by this time risen to the rank of lieutenan-general in the naval service, he was placed in command of a squadron fitted out to intercept and capture an English merchant fleet off the Azores, and then to repair to Havana, to join a larger force destined to make a descent on Florida. Wholly engrossed by his speculations, he forgot to open his despatches, and returned to port after an unsuccessful cruise of two months. He was arrested, tried by a court-martial in 1780, allowed to retain his rank and titles, but never again employed on active service. He passed the remainder of his life in the ministry of the marine, but was only employed in examining the pupils of the school of naval artillery.

Ulloa died in the isla de León, on the 3rd of July, 1785. He retained his constitutional gaiety and activity to the last. Visitors found him surrounded with papers, antiquities, mathematical instruments, engravings, in short all the jimmicks of science. But if not himself a great philosopher, Ulloa sided materially in promoting that temper of mind which was preparing for the enlightenment of the spirit, which characterised the second half of last century. He contributed greatly to the establishment of the observatory at Cadiz. Spain is indebted to him for its first cabinet of natural history, and its first laboratory of experimental metallurgy. He was a most zealous preacher of the arts of printing and engraving. He superintended the construction of the maps of the Peninsula. He originated the canal of navigation and irrigation of Old Castile, commenced re-awakening the spirit of art in Spain, and was, in general, a most active aid of his times.

Ulloa superintended the establishment of a cloth manufacture at the expense of the government at Segovia, which was intended to set an example of improving the domestic manufactures of Spain; and upon his urgent representations young Spaniards were sent to acquire the liberal and mechanical arts in various countries of Europe.

The materials for this sketch have been found in the writings of Ulloa, and in his biography by Messrs. Audebert and Viguet, in the "Biographie Universelle." Ulm, the capital of the circle of the Danube, in the kingdom of Württemberg, is in 48° 24' N. lat. and 10° E. long: it is situated in a beautiful and fertile country at the south-eastern foot of the Swabian Alps, on the left bank of the Danube, which here forms the boundary between Württemberg and Bavaria, and is joined by the Iller, which flows through the town. By the junction of this river and the Iller, which falls into it on the right bank a few miles above Ulm, the Danube becomes navigable, being about 200 feet broad and 12 feet deep. The city is nearly of an elliptical shape, and the ground on which it stands is tolerably level. Previously to the year 1805, it was strongly fortified, but the walls have been nearly demolished. Like most of the old German towns, it has in general irregular and crooked streets, and antique-looking woodem houses; there are however some broad handsome streets, with flag-pavement for foot-passengers. Within the city there are three town and two wooden bridges, over the Iller but the handsomest is a stone bridge of three arches over the Danube, which connects the town with the Bavarian village of New Ulm, on the right bank of the Danube, and was commenced in 1833, at the joint expense of the empor of Württemberg and Bavaria. Many buildings worthy of notice. The Minster, a very fine specimen of ancient Gothic architecture, and one of the largest and loveliest churches in Germany, is 430 feet long, including the choir, 200 feet broad, and the middle side 150 feet high. The steeple is 837 feet high, and, though not completed, is a splendid monument of German art in the middle ages. This Minster was 111 years in building (1877-1888). It contains many curious monuments and works of art; paintings by old German masters, admirable carved-work, painted-glass windows, and a remarkably fine organ. The town-house is a very antient and spacious edifice, not remarkable for its architecture, but it contains many fine paintings, among which is a portrait of Gustavus Adolphus, king of Sweden, and in the vaults underneath are the archives, with many valuable historical documents. The German-house (des Deutschen-haus), containing the principal public offices, is considered the handsomest and most regular building in the city. The theatre is adorned externally with Corinthian columns. Besides the Minster there are two Lutheran and two Roman Catholic churches. There are in Ulm a gymnasium, a museum, a city library, a large and rich hospital, and numerous charitable and useful institutions. The city has now 10,000 inhabitants, who manufacture linen, silk, snuffs, tobacco, tobacco-pipes, porcelain, &c. This city has a very considerable trade; great quantities of manufactured goods and of the productions of the country are sent down the Danube in barges built at Ulm, which do not come back, but are sold at Vienna. Being placed in an important military position on the Danube, Ulm is well known in the history of the wars in Germany. In 1805, after the victories of the French at Eichingen, on the 14th and 15th of October, it capitulated on the 17th to Napoleon. General Mack and the Austrian garrison of 26,000 men being made prisoners of war.

(Brockhaus, "Conversations Lexicon: A. Fischer, Das Königreich Württemberg; Stein, "Geographische Lexicon; Cannabich, Handbuch der Geographie.)

ULMA/CE/a, a natural order of plants belonging to Lindley's rectembryste group of incomplete Exogena. The essential characters of this order are as follow:—Flowers herbaphroditic or polyandrous, never in clusters; calyx divided, campaspan, inferior, irregular; stamina definite, inserted into the base of the calyx, erect in sessivation; ovary superior, 2-celled; ovules solitary, pendulous; stigmas two, distinct; fruit 1-2-celled, indescensus, membranous or drupaceous; seed solitary, pendulous; albumen none, or in very small quantity; embryo straight or curved, with foliaceous cotyledons and superior radicle. (Lindley.) This order consists of trees or shrubs, which have scabrous, alternate, simple, deciduous leaves and stipules. The genera belonging to it are Planera, Abeliceus, Ulmus, &c.
Celtis, Sponia, Mertensia. The species are natives of the north of Asia, the mountains of India, of North America, China, and Europe. This order is by most botanists made a section of the natural order Ulmaceae. It was hitherto placed on a separate footing by other writers, who have been followed by Lindley. They differ from Ulricaceae in the possession of a 2-celled fruit and hermaphrodite flowers. In all other respects they resemble Ulricaceae, and their affinities are the same.

Most of the species of this order are trees, the timber of which is often very valuable. The bark of the Elm is used in medicine. [Ulm.] A proximate principle called ulmin has been obtained from the Elm, but the other principles of which it is composed have yet been examined.

The genera Planera and Celtis, like the elm, have species which are handsome ornamental trees, and yield useful timber. The genus Planera is known by being polygamous, hermaphrodite and single on the same plant. The pistiliferous and hermaphrodite flowers have a bell-shaped calyx distinct from the ovary, green, of one piece, and furnished with 6 ciliate lobes. The stamens of the hermaphrodite flowers are four or five in number, and less developed than those of the flowers which bear stamens alone. The ovary is villous, with 2 sessile, diverging, white, pimpled stigmas. The fruit is roundish, 2-celled, each cell containing one seed. The stamens have a similar number, and the stamens are inserted opposite its lobes. Anthers of two lobes, which have the appearance of four. The species of this genus are trees inhabited by Asia and North America. Their fruits are quite hardy, and will grow in the climate of Great Britain. The leaves are alternate, and the flowers are small.

Planera Richardsi has its flowers solitary in the axil of its leaves, and both are borne on a branch developed in the same year with itself. The petiole of the leaf is not obvious, and the disk is elliptical, unequal at the base, and dentate. This tree is the Zelkous of Siberia, and is native of the country between the Black and Caspian seas, between 42° and 50°, and was introduced into Europe about the year 1780, when a specimen of it was planted by L'Emmar, professor of botany in the Jardin des Plantes, in his garden at Montreuil near Versailles. This tree was cut down in 1823, and it was found to be 70 feet in height, and the trunk was 7 feet in circumference at 5 feet from the ground. In its native districts the Zelkous attains a height of from 50 to 80 feet. The trunk is straight and very upright, and in large trees it often measures 30 or 40 feet in circumference. It is adapted to the purpose of its branches. A remarkable character of the trunk of this tree is that it is as thick at the point of ramification as it is near the surface of the ground. The head of the tree is large, tuffed, and very much branched, and the branches are of a much older age than most other trees. The flowers are small, and are of a green colour, and have the smell of elder. The fruit is about the size of a pea; but although this tree appears to bear well the severest winters of Europe, it does not ripen its seed. The leaves strongly resemble those of the elm, but they have a drier and firmer texture, and their creations are equal, which is not the case in the elm. The Zelkous yields good timber, and in its native countries is employed for the same purposes as oak. It is a very compact, and the grain so fine, that it is susceptible of the highest polish. It is said never to become worm-eaten, and also to resist the influence of water and damp earth better than elm. Both the wood and the bark may be used: the latter is of a reddish-brown colour, and very hard and heavy; the former is white and elastic, resembling the wood of the ash. Fine specimens of this tree are growing at the Royal Gardens of Ken and at the Duke of Northumberland's at Stone-House.

P. Gmelini. Gmelin's Planera, has its flowers in heads, opening before the leaves are protruded, and borne on branches developed in previous years; its leaf with an obvious petiole. It is a native of North America, in Kentucky, Tennessee, the banks of the Mississippi, and in all the Southern states, especially on the borders of the Savannah in Georgia. The wood is hard and strong, but it appears to be more esteemed in America than it is here. It has been introduced in 1820.

The species of Planera may be propagated by grafting on the common elm, or by seeds when obtained from the native forests of the plants.

The genus Celtis has the following characters: The flowers are borne upon the shoots of the year, in the axil of the leaves, either solitary or 2 or 3 together, and each upon a peduncle; the calyx is well-shaped, distinct from the petals, which are united, and inserted into the base of the calyx, opposite to the lobes and shorter; the anthers 2-celled, opening at the sides; ovary ovate, 1-celled; stigmas 2, sessile, acuminate, long. The fruit is a 2-celled drupe, downy, seed solitary, pendulous. Upwards of 19 species of this genus have been enumerated. They are handsome, branched, deciduous trees, varying in size and the character of their foliage, and bearing a fruit which is edible. The common bird-cherry, and the cherry plum; fruit all drop off the tree about the same time. They are natives of the temperate parts of Europe, Asia, Africa, and America.

Celtis Australis, the European Nettle-tree, has ovalate, 4 to 5 feet long, 3 or 4 inches broad, heart-shaped, and having a very small stalk. It is native of Europe, and is found in forests of the south and west of Great Britain, where it is very plentiful. It has a straight trunk and a branched head. The fruit, when ripe, is blackish, about the size of the fruit of the bird-cherry, and its edible qualities are much improved after a frost. This fruit is sweet, and is supposed to be the Lotus of the ancients, and the food of the Loto- sap. The fruit is delicious, and also very nutritious. It justly the character given of them in the 'Odyssey,' ibi, ver. 93, in which they are said to make those who eat them forget their country. The Spaniards eat these berries, and are particularly fond of them. It is said by Sibthorpe that in Greece they are called at the present day honey-berries. The wood of this tree is highly prized. It has a character between the oak and the box. A cubic foot weighs 70 lbs. 3 oz. It is very elastic, and a piece 6 feet long may be bent to a circle without breaking. It is used for making furniture, also for carvers for making images; but the great use of this tree is for making pitchforks. For this purpose large plantations are cultivated, and the wood is one of the largest and most vigorous shoots are used for making handles to compasses, rakes, and walking-sticks. In Narbonne the tree is cultivated for this purpose, and, under the name of B occurrence, is used extensively throughout Europe for the above purposes. The root also of this tree is used for dyeing yellow; the bark contains an astrin gent principle when renders it useful in dyeing; and an oil is expressed from the seeds. Although in many respects a valuable tree, it has been almost entirely out competed in Great Britain. Specimens at Mitcham, Ken, and Ken Wood, Highgate, have attained a height of 30 feet.

C. occidentalis, the North American Nettle-tree, has ovate-acuminate leaves, unequal at the base, serrated, and having a short stalk. The fruit is dark red or purple. This is an American species, and is found in woods and near rivers from Canada to the Carolinas. This species was introduced into Europe as early as 1565. It has a very handsome tree for the worst parts of Europe, and does not ripen its seed. It is however readily known by its leaves being larger, and of a lighter and more shining green. The fruit, like that of the last species, is edible, but not very grateful to the British palate. It is a very ornamental tree, and many, if specimens of it are existing in this country; but neither in this country nor in America does the timber appear to be used, although, from its resemblance to the European species, there can be little doubt of its value.

C. crus-folii, the Huckberry, has ovate-acuminate leaves, 6 inches long and 3 or 4 inches broad, heart-shaped, and unequal at the base, serrated and rough on both surfaces; flowers one or two upon the peduncle; fruit black. Many years ago it was introduced in Britain in 1820, and allied to the last, and some botanists even think them identical. It is a native of the banks of rivers and fertile valleys in Kentucky and Tennessee. It sometimes, in its native forests, is from 80 to 100 feet high, but as a shrub not more than 18 or 20 inches in diameter. The leaf is much larger and broader than any other species of nettletree. The flowers are small and white, and the fruit is about the size of a pea. It grows very rapidly, and, on account of its two leaves and slender trunk, is well adapted for ornamental planting. The wood is not of much value, on account of the small size of the trunk; but
ULM

in America it is used for making the bottoms of chairs, and also for baskets. There are several of the other species of Colita that might probably form useful trees were they introduced into Europe. Some of the East Indian species occur at elevations that render it probable they might be successfully cultivated in this country.

ULMIC ACID, or ULMIN. Some trees, and more especially the elm, when it is old, secrete a liquid which dries as it exudes, and its adhering parts principally of mucilage. This mixture, with some carbonate or acetate of potash, and eventually the mucilaginous matter undergoes a change, and, combining with the potash, forms a substance which was first examined by Vauquelin and Klaproth, and Dr. Thomson gave it the name of ulmin. This name was changed by Berzelius to that of geic, because on treating soils with alkalis a considerable quantity of a similar compound is obtained.

Ulmin, or ulmic acid, may be artificially obtained, according to Berconnet, by the following process:—heat in a silver crucible equal weights of potash and sawdust, with a little water; the mixture is to be continually stirred: the mass softens and swells rapidly, and is then to be removed from heat at its appearance; it probably acts as a poison; oxygen is absorbed from the air, owing to which the ulmic acid is formed. When cold, the product, which contains ulmate of potash, is dissolved in water, filtered, and treated with dilute hydrochloric acid, which combines with the potash, and precipitates the ulmic acid from combination with it: the acid thus obtained is to be washed and dried. The properties of this ulmic acid are, that it is of a deep brown colour, very brittle, and breaks in angular fragments, and forms bryo-buds of Elms. It is dissolved in an alkali, it is in the state of hydrate, and it then dissolves in 1500 times its weight of boiling water, in 2500 times between 60° and 70° Fahr., and in 6000 times at 80°. The solution in cold water is brownish-yellow; that in hot is deep brown.

It is insoluble in acidulated water or in saline solutions: sulphuric acid dissolves it without apparent alteration, and becomes blackish: water precipitates it from this solution. Ulmic acid redissolves in water. It is dissolved in alcohol, from which it separates in crystalline scales by spontaneous evaporation.

It has been already mentioned that ulmic acid may be obtained from soils: it may also be procured from rotten leaves, bog-earth, wood-soil, or turf, by digesting them in a weak solution of potash: by this a brown-coloured solution of ulmate of potash is formed, from which acids throw down ulmic acid.

According to Boullay, ulmin consists of—

| Hydrogen | 4-70 |
| Carbon   | 57-64 |
| Oxygen   | 37-66 |

100.

Malagutti and Boullay, by treating sugar with dilute sulphuric acid, obtained two substances, which they supposed to be identical with ulmin and ulmic acid; but, according to Liebig, they are of a different nature, and he has given them the names of sacchulmin and sacchulnic acid.

Ulmic acid plays an important part in manures and soils, and what is called moss-soil owes its peculiar peculiar properties, and is a useful manure, especially when combined with lime or with ammonia.

ULMUS, a genus of plants, the type of the natural order Ulmaceae.

Species of the Genus Ulmus.—All the species of the genus are trees, some of them attaining a great size and age.

The flowers are small and the leaves are alternate.

In most of the species the flowers appear earlier than the leaves, their identity, and is an incidental fact. The calyx is of a reddish colour, distinct from the ovary, imbricated in estimation, with from 4 to 8 segments, which remain until the fruit falls. The stamens are as numerous as the segments, and are inserted opposite them. The ovary is a simple, composite flower, composed of two segments at the summit, 2-celled, and 1 ovule in each cell. The fruit is a samara, the wing-like appendage being broad and present all round, except in a notch. Only one of the cells of the ovary develops its seed, so that the fruit is one-seeded.

The embryo has no albumen, and its radicle is straight and appendage.

The leaves are stalked and unequal at the base, serrate, and almost round or rough at the apex of the primary nerves beneath are tufted with fine hairy filaments. The various species of elm are wild in Europe, North America, India, and China. Nearly 20 species have been enumerated, but it is not certain that these are true species. This uncertainty arises from the fact which is now generally recognised by the cultivators of the elm, that the seeds of the elm do not significantly differ in any way from those of most other species of trees. It is on this account that there are so many recorded varieties of the species which are cultivated for ornament or timber. Linnaeus referred all the species of Ulmus to his U. campestris. Sir W. T. Smith admitted 5 species of British elms alone, and Dr. Lindley, in his 'Synopsis of the British Flora,' has admitted 7 species.

Other writers, as Loudon, in the 'Arbercertum Fluctueum Britannicum,' and Delby, in the 'History of British Forest-Trees,' are inclined to reduce a number of species of the type, the Ulmus campestris and U. montana. Koch, in 'Flora Germanica,' admits but two species, U. campestris and U. effusa. To the former he refers all the British elms except those with the seeds and large white fruit, and to the latter the remainder. The difficulty of recognising them is still greater, and some which have been named as distinct species, growing in India, China, &c. are only varieties of U. campestris et U. montana. To the classification of the American species, a careful revision is necessary: but all the species must be made on living plants, and through a period of several successive years. The elms, whatever may be their species, have been for a long time the most generally cultivated timber-trees, and are grown in all countries where the climate is sufficiently mild to allow their growth. They have been cultivated, especially in Great Britain, with the object of obtaining timber suitable for the more durable and attractive timber, and the timber is very valuable for the more durable and attractive timber, and the timber is very valuable.
tinent generally the elm does not appear to have been culti-
vated in England although it has been planted as a tree for
so time immemorial. It was first introduced into
France for adorning public walks by Francis I., in 1540.
The elm was sent from England to Spain during the reign
of Mary, for the purpose of forming the avenues at Madrid,
the elms for the great avenues of the city, and is held in
high estimation in Spain. In planting and cultivation of the
common elm, two objects are held in view, ornament and use. Speaking of it
as an ornamental tree, Gillpin says, in his 'Forest Soeery', 1735: 'In
the cultivated woods in the plain of the Thames, a
great part of the soil is ash. It partakes so much of the
ash that, when it is rough and old, it may easily at a little distance be mistaken
for, though the oak (I mean such an oak as is strongly
marked with its peculiar character) can never be mistaken
for, almost any other tree. We see them sometimes in the elm, for
strong characters are a great source of picturesque beauty.
This defect however appears chiefly in the skeleton of the
elm: in full foliage its character is more marked. No
tree is better adapted to receive grand masses of light
in this respect it is superior to the oak and ash: nor is its
foliage, shading as it is, of the heavy kind. Its leaves
are small, and this gives it a natural lightness: it
commonly hangs loosely, and is in general very picturesque.
These leaves and young shoots are used for thatching or
as soil it loves, rises higher than the generality of trees; and
after it has assumed the dignity and hoary roughness of age,
who has forest brethren (though, properly speaking, it
is not a forest tree), has a leaf that is green in
superior height and luxuriance. The elm is the first tree that salutes the early spring with its
down green and cheerful green, a tint which contrasts agreeably
with the oak, whose early leaf has generally more of the
warm tint. We see them sometimes in fine harmony to-
gether, about the end of April and the beginning of May.
We often see also the elm planted with the Scotch pine.
In the spring its light green is very discordant with the
gloomy hue of its companion; but as the year advances,
the elm tree turns on a darker tint, and unites in harmony
with the pine. In autumn also the yellow leaf of the elm
mixes as kindly with the orange of the beech, the ochre of
the oak, and many of the other fading hues of the wood.
A great recommendation of the elm is its endurance of a
smoky atmosphere, and it will thrive in the vicinity of
large towns. The noble elms of the parks of London are
living testimony of its value in this respect. Many of
the public avenues in France, Holland, and Great Britain
are composed entirely of this tree: and its growing in
almost every variety of soil, and requiring but little prun-
ing, are, in addition to its ornamental qualities, strong
recommendations.

Timber.—The uses of the elm are very considerable.
The wood loses a great deal by drying; a cubic foot weighing
70lbs., is, according to Selby, only 28 lbs. when dry, but
according to Loudon 483lbs. The wood is of a brownish
colour, and is hard and fine-grained. It is used extensively
for the making of window and ship-bottoms, being
soon coloured, and made to look like mahogany, when used by
cabinet-makers. It withstands well the action of water,
and on this account it is used for making pumps, water-
tight, and is much used for making the keels of ships.
In districts where there are salt-springs this wood is used as
a substitute for writing with; and these springs were called
the 'wych-elm,' which is now given to one species, the
U. montana, applied to all elms. In some places
the young shoots are made into 'spear' for
beating. In Russia the leaves are employed as
a substitute for tea. They formed also a large proportion of the article
called 'herb-tea,' the sale of which was prevented by the
Protector. The inner bark of the elm is very tough, and may
be used for making mats and ropes, in the same manner as
the lime. Amongst the Romans the elm was employed for
training the vines. Thus Virgil reproaches Corydon for
the condition of his vines and elms, the one being half
pruned, the other quite neglected.

1 Scrupulis et flosibus usque in limen ostium.-Guz. 11.

It also appears to have been the tree selected by the
Romans for making their bires, or hough-nails:-

*Continua in stylo magno viris domus.*

In beira, et evertis formam sequenti caritatis.-
Guz., 1. 1664.

The English elm frequently attains a great age. Some
trees that were planted in the Luxembourg at Paris during
the reign of Henri Quatre were standing till the first
French revolution. A tree was cut down by Sir Hans
Sloane, at Lambeth, not far from London, and it is stated
that the trunk, which is about 70 feet high, has a
breadth of the trunk is 3 feet. The compass of the

top is 34 feet. 4. The dole in height to goe in is
6 feet 2 inches. 5. The height of the trunk is 33
feet. 6. The lights in the tree is 16. 7. The steps to go
to up 42. 8. The seat above the steps six may sit on,
and rounde about roome for fourenge more. All the
way you goe up in the hollow tree. Several other elms
of great age and size have been recorded by writers on
arboriculture and botanists. The

The recorded varieties of Ulmus campestris are very
numerous, and Loudon enumerates eighteen. Some of
these have been constituted species by various botanists.

U. c. vulgaris. This variety is very twiggy, has pale
smooth bark, and is irregular in its growth, and its branches
are almost horizontal. The wood is of inferior quality, and
care should be taken to exclude it where timber is the
object. It is found in the counties of Norfolk and Suffolk.

U. c. variae, is a variety that is almost evergreen,
and is commonly called the Kidbrook Elm: it is a delicate
tree, and often becomes injured by the frost.

U. c. cornubiaeus, the U. stricta of LINLEY, the
torish elm, is a lofty tree, with small, strongly variegated,
concolor leaves; the branches bright brown, smooth, rigid,
reap, and very compact. This tree is a fothergill
than the common elm in producing its leaves. Some of
these are arranged in two rows, and it is one in
Bagshot Park 70 years old, and 90 feet in height.

There are several varieties of the U. campestris,
which are planted as ornamental or curious trees. Amongst
those that have been noted, and which are generally
distributed. It is found in Great Britain whenever
U. campestris grows, and in many districts it is
abundant, as in Scotland, where this tree is very seldom seen.
It is now becoming quite naturalized in Ireland, and is
frequently met with on the borders of fields, and in pastures.
In regard to form, beauty, and picturesque effect, this tree is
decidedly inferior to the last, and its timber is very much
less valuable, but still it deserves attention on account of its
hardness, resistance, and durability, and its ability to
grow in very inferior soils. It forms also a good stock on
which to engraft the English elm, and Mr. Selby recommends it
to be planted as a nurse for other trees in cold and exposed
sites where the soil is indifferent, and also as a fence
around arboricultural gardens. These of this tree are known to arboriculturists, varying in their
shape, size, form, and colour of their leaves, &c.

U. majus, the Greater or Dutch Cobb-barked Elm,
is considered a species by Smith, and recognised by
Lindley
Ulmus and Hooker. It has rough ovato-elliptic leaves, very oblique at the base, sharply and doubly serrated, pubescent below, with dense tufts of white hairs in the axils; branches spreading, bright brown, winged with corky excrescences, when young nearly smooth; fruit ovate, slightly cuneate, naked, deeply cloven. This tree is native of Britain, occurring in the greatest abundance in the county of Essex. It ripens its seeds as U. montana, but does not throw up suckers as U. angustifolia. The species of the elm have been raised from this species. That known as the Huntingdon or Chichester Elm (U. g. vegeta) is one of the finest. It is one of the most rapid-growing trees of the genus, and its timber is said to be excellent. It is a coarse upright tree, than the U. montana. The Scampston Elm is also another variety, which is common in some parts of Yorkshire and Nottinghamshire. It is a tree of very rapid growth, but the trunk becomes rotted at the heart sooner than the others. The Wych Elm, a weeping variety, also belongs to this species. Loudon enumerates seven other varieties known in nurseries.

Ulmus americana, the American Elm. The period of the leaf is 1½ inch in length, covered with short hairs; the disk unequal at the base, four or five inches long, serated, and mostly doubly so; axils of the veins joined by a membrane; the flowers are seated on peduncles, the peduncles short; the stamens, of the species, are not so naked as the other Elms; the flowers resemble those of U. effusa.

This tree is found in North America, growing in few woods from New England to the Carolinas, where it attains a height of from 80 to 100 feet. It was introduced into this country in 1772, but not until after 1800 has it been brought to superior to the European species, so that very few specimens are now to be seen in this country. There are some small trees of this species in Loudon's Botanical Society's garden, and some very fine ones in the garden at Trinon in France. The wood of this tree is used for the same purposes in the United States as the English elm in Europe. Ulmus silesia, the Slippery Elm, has rough whitish branches; ovate-oblong acuminate leaves, nearly equal at the base, serate with unequal teeth, very rough and hairy on both surfaces; the leaf-blades tomentose, scales of flower-buds downy; fruit not cloven. This tree also is a native of North America. It is less abundant than the last species, but Michaux states that, except the maritime districts of the Carolinas and Georgia, this species of Elm is found in all parts of the United States and Canada. The wood is of a darker colour than the last species; hence in America they are known as the white and red elm. The wood is not so good as that of U. americana, but it is used for a variety of useful purposes. The name Slippery Elm has been given to this species on account of its leaves, roots, and branches, which are more or less thick and abundant mucilage. It is often thus used as a demulcent drink in cough, and otherwise as a substitute for the marsh-mallow.

Ulmus alnus, the Shaba, or Cork-winged Elm, is another American species. It is a small tree, seldom exceeding thirty feet in height, and is characterized by the bark dilating on each side of the branches between the leaves, and giving them a winged appearance. This plant was introduced into this country in 1801, and is cultivated in account of its singular branches and not for the value of its timber, which is inferior. Cultivation of the Elm. The English Elm (U. campestris) does not perfect its seeds readily, and cannot be propagated as readily as other species. In the South of England the usual way of propagating the elm is by layers, or suckers, which are thrown out in great numbers by the superficial roots. Layers are said to produce finer trees than suckers. Some gardeners fill the beds with the seeds, and when they have time, plant suckers. Some gate the English elm by grafting it upon a stock of the Wych elm; but Selby condemns the practice, and thinks it has led to the stunted growth of the English elm, as U. montana always requires a better under stock. Ulmus campestris grows and thrives on soils of a very inferior description, both of a light and heavy kind. After it has attained a considerable size, there is no tree that hears removal so well as the English elm. When once planted, it never requires to be moved, although none will bear lopping better. This fact is made painfully apparent by the hideous figures that a majority of the elm-trees around London are called upon annually to make, from the practice of lopping off all their side branches. This practice is pursued for the purpose of
making the timber straight, but it cannot be too generally known that it effects no such object, materially diminishes the growth of the tree, and disfigures the country into the bargain. When planted in masses, the young trees ought to be kept wide apart, as they require both space and air to attain a degree of vigour of which they are not otherwise susceptible. The cultivation of the Wych-elm more care is necessary: if planted on an inferior soil, it will not flourish, and this will account for the disappointment of many who have planted these trees. It grows better on the first, even on poor soil, but it will never attain any perfection as a timber-tree. As a general rule this tree does not grow well or profitably in masses; but by the banks of rivers, and in steep declivities which cannot otherwise be cultivated, it may be growed to very great advantage. If planted as an ornamental and hedgerow tree it may be introduced in all districts with a rich soil. The Wych-elm may be propagated by seeds. These ripen about the middle of June, and should be gathered from the tree. If sown directly they frequently vegetate the same season, and may be run into nursery-rows, the following spring, and may be again transplanted when they are a year old. The Wych-elm does not send up suckers, but its layers strike very readily, and it may be thus conveniently propagated.

Diseases and Insects of the Elm.—The Elms are all very subject to a disease called ulceration. It appears on the body of the tree, at a height generally of three or four feet from the ground, a whitish bark, commonly shaving, and the disease extends gradually to the interior of the tree. The spot discharges a great quantity of sap. The process which goes on appears to be a combination of the elements of the disease and of the wood, which has yet been pursued that will arrest the progress of decay. Another disease to which the elm is liable is the deposit of cambium between the wood and the bark, without the formation of additional tissue; the consequence is, that the cambium becomes putrid, and comes out in a cavity in the bark.

The insects that feed and live upon the elm are very numerous, but none of its assailants produce any serious injury. The except of the Expugnator, a little beetle belonging to the family Bostridae of Leach. It was at one time supposed that wherever elm-trees were found decayed, with the larvae and ovls of the Scolytus in the wood, this insect had produced the decay; but it was proved by experiment that the Scolytus did produce the decay, but that they had recourse to decayed or diseased trees for the purpose of depositing their ova. M. Audouin however states that the perfect insect of this family is found in the wood of an old, and that it will attack young elm-trees, and induce in them that state of decay which the female selects as the appropriate place for the deposit of her eggs. A knowledge of this fact is of great importance, as sometimes thousands of trees may be attacking a single tree, and instead of cambium on the whole forests being thus destroyed. The remedy proposed by M. Audouin is the examination of the trees, for the purpose of ascertaining whether the Scolytus has attacked them. Where there are holes and furrows, such as the larvae of these insects make, the trees are secure; but where the presence of larvae is detected by the holes or furrows, the tree must be cut down, and entirely destroyed by fire. Where there are only holes made by the insect for the purpose of eating, the tree may be saved; but if it be over with gas-tar, which will prevent any further attack of the insect. These are only recent suggestions (1836) of Mr. Audouin, and there has not yet been time to prove their efficacy.

For further information on the elm, consult Loudon's Arboretum et Fruticietum Britannicum; Selby's British Forest-trees; Lidley, Synopsis of the British Flora; Gilbert Phillips, Forest Trees; The Cyclopedia of Plants.

ULMUS CAMPESTRE. This Elm is the species most generally cultivated in the United States. The bark of this species is officinal: it should be collected in spring from branches not too old: the outer bark is removed, and the interior, or fiber, retained for use. When recent it is of a whitish-yellow colour, but when dried it is externally of a cinnamon hue, and curled up; the inner surface smooth; it is from a quarter to half a line in thickness, tough, fibrous, not easily powdered, devoid of smell, with a mucilaginous, white, astrigent taste.

The cold watery infusion becomes green on the addition of a solution of sesquichloride of iron, and a precipitate is thrown down by a solution of gelatin. Rinck's analysis gives in the 100 parts—resin, 0·63; gum and mucous, 20·2; impure gallic acid (tannins, 6·5); oxalate of lime, 6·3 (?); chlorides of sodium (7·4); 46: what the remaining constituents were is not stated. Sir H. Davy (Phil. Trans., 1821) states it contains a large proportion of tannin, as judged by the number of grains of tannin. From the sap collected in May, Vasquin obtained acetate of potash, acetate of lime, vegetable matter, carbonate of lime, and tallow, carbonic acid, astringent properties, and other substances of a similar kind. To do good it must be persevered in for many months, and the greater its action on the kidneys the greater the probability of ultimate benefit. Its agreeable taste reconciles many to the prolonged use of it, which would reject less pleasant medicines. It is commonly administered in the form of decoction, but as the bark contains much starch, this objection is unobjectionable. An infusion made with cold water is the most preferable. A pint or more of this is to be taken daily.

The Ulmus fulva, twaddny-budded or slippery elm bark of America, is a very valuable demulcent, tonic, and astringent, and is the species of the native Ulmus of the southern parts of the United States. It is thought that a good substitute for sarsaparilla. As an emollient this bark is of great service as an external application to wounds, bruises, chilblains, and cutaneous eruptions, and for these it is generally made into a poultice. The bark of this tree is probably that which is termed cortis unguintarius, which is in high repute with the arborignes for the cure of wounds. The slippery elm bark, from the quantity of mucilage and sugar it contains, can alone sustain life for many days. The large proportion of mucilage in other elm-barks causes them to be used in the West Indies to clarify sugar.

ULMUS TETRASPERMA. (Tetrasperma Lancastria.)

ULMUS TRAJANA. (Ulmus Langsdorfiana.)

ULPINA TRAJANA. (Ulmus Langsdorfiana.)

ULPINA NUS, DOMITTIUS, a distinguished Roman jurist, was either a native of Tyre in Phoenicia, or his ancestors were of that place. The year of his birth is not known. Tyre was made a Roman colony by Septimius Severus, as appears from that emperor's edicts (Racae, Lexic. Rei Numant. 'Tyre'); but if that was the first Roman settlement at Tyre, Ulpius could owe nothing of his Roman education to that city, even if it was his native place; however, we have evidence that he only proved to be a citizen from that place. In the reign of Septimius Severus and of his son Antoninus Caracalla (A.D. 199-212), he was a writer on law, but more particularly under the sole reign of Caracalla, who placed him on commissions of inquiries where he speaks of Severus as 'divus,' a term which implies that Severus was then dead, and of Caracalla as 'imperator noster,' or the reigning prince. Ulpius was banished by Elagabalus, but the elevation of Alexander Severus to the imperial power (A.D. 222) opened him the road to new honours. He became scrinorium magister and prefectus annonae, and was a particular favourite of the emperor. He also held the office of prefectus praetorio under Alexander Severus; Lampridius doubts whether he received this appointment under Elagabalus or Alexander Severus, though it is stated that he certainly held it under Alexander. If he held this office under Elagabalus, we must assume that he was deprived of it on his banishment. Ulpius was a confidential adviser of Alexander, and exercised great influence over him. Xiphilinus, the epitomator of Dion, fixes on Ulpius the imputation of clearing the way for his promotion to the dignity of praetorius praetorio and caesarii imperii. He was, in fact, not mentioned by any other ancient authority, and it is inconsistent with the character which Lampridius gives Ulpius, whom he calls a good man. Ulpius was murdered by his slaves, in his home, in the night-time, by the praetorian soldiers, in the palace of Alexander, and in the presence of the emperor and the emperor's mother. (Dion. lib. 80.)

Ulpius was one of the meanest of the Roman writers on law. His chief works, as they are known to us, are the 'Florentine Index' and the excerpts in the 'Digest.'
The great work "Ad Edictum," in four books at least, was probably founded on the edicts of Julian, and itself was almost the basis of Justinian's "Digest." This work, with the fifty-one "Libri ad Digest," and the twenty books "Ad Leges Juliani et Papiani," as well as four books "De Officio Preconisulii," the six books on "Fideicommissa," two books of "Institutiones," and others, was in the reign of Caracalla. This work, which is still extant, entitled "Domitii Ulpiani Fragmenta," was written either in the reign of Caracalla, or during the pontificate of Victor, and is a source for our knowledge of the Roman law. Amongst a long list of books, the "De Officio Praetoris," "Institutiones," and "Fideicommissa," are mentioned in the "Vatican Fragments." Of Ulpian is clear, but more diffuse than that of his contemporary Paulus. He was a man of law, and an accomplished jurist. Ulpian and Paulus, Julius Scevola, are called by Modestinus (Dig., 13), who was Ulpian's pupil, the chief of jurists (praeceptor magistrorum). His superior merit was evidenced in the writings of Justinian, whose great labour (Dig., 11) was to adapt the fragments of Ulpian and Paulus, as far as possible, to the needs of contemporary practice. Ulpian, as he is called in the Greek argument of his "Epitrephes," is one of the speakers in the "Table of Contents," and he is mentioned (p. 686, ed. 1837) as dying happily, "without having given occasion to the sorrow of his friends," or, according to the circumstances of the case, to his death, if the circumstances were fatal. But it is not certain that this is the case.

ULSTER, the northernmost of the four provinces into which Ireland is divided. It is bounded on the north and west by the Atlantic Ocean, on the east by the Irish Sea, and on the south-west by that of Connaught. It is comprehended between 53° 45' and 56° 22' N. lat., and between 5° 29' and 8° 50' W. long.

Three northern counties, including the town of the county of the town of Carickfergus:
- Antrim (including Carrickfergus) 761,862
- Londonderry (formerly Coleraine) 531,067
- Donegal 1,193,443

One central county:
- Tyrone 896,296

Five southern counties:
- Fermanagh 466,531
- Cavan 477,360
- Monaghan 319,840
- Armagh 328,079
- Down 611,918

Ulster is mountainous. Two mountain groups cross the province from east to west. The northernmost, which extends through the counties of Londonderry, Ulster, and Donegal, is divided into three parts by the valleys or depressions through which the Burn and the Foyle reach the sea. The mountains of Donegal are the loftiest; several of the peaks rise to the height of more than 2000 feet; and one (Erigal) is 3400 feet above the level of the sea. The coast of Donegal is very rugged, marked by deep inlets, as Lough Swilly and Lough Foyle (between Donegal and Londonderry), stunted cliffs, bluff headlands, and numerous islands. The mountains of Donegal and the adjacent parts of the province are low and indistinct; through the counties of Monaghan, Cavan, and Fermanagh. A lower and comparatively level district intervenes between the northern and southern mountains, and occupies a considerable part of the counties of Down, Armagh, and Tyrone, extending from Lough Belfast and Lough Strangford on the east, to Lough Erne and Lough Derg on the west. Lough Neagh is in this central low country: it is less than 90 feet above the level of the sea, and has low shores. [Nick, Lodge.]

The mountains of Donegal and Londonderry are chiefly of mica-slate, except in the north-west of Donegal, where they consist of granite and quartz rock. The mountains of Antrim are of tabular trap. The best known is the Giant's Causeway, on the north coast of Antrim.

The Mourne Mountains are granitic. The other southern mountains consist of grauwacke, grauwacke-slate, clay-slate, old red-sandstone, yellow conglomerate (the lowest member of the carboniferous limestone series), or millstone-grit.

The principal rivers flow from south to north, rising in the southern mountains, crossing the intermediate low country, and pouring through openings in the mountainous coast of the Atlantic. Several flow in different directions into Lough Neagh, of which the Ban is the outlet. Others unite in the Foyle. The principal lakes are Lough Neagh, in the centre of the province; and Loughs Erne (upper and lower) and Lough Macneill, on the south-west. Belfast Lough, and Loughs Strangford, Larne, Foyle, and Swilly, are land-locked inlets of the sea.

The population of the province at different epochs was as follows:
<table>
<thead>
<tr>
<th>Date</th>
<th>How ascertained</th>
<th>Inhabited Houses</th>
<th>Families</th>
<th>Families chiefly employed in Agriculture</th>
<th>Families chiefly employed in Manufactures, Manufacturists,</th>
<th>Families not placed in the preceding classes</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1792</td>
<td>Estimated by Dr. Beaumont</td>
<td>214,800</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>1821</td>
<td>Under Act 55 Geo. III. c. 120</td>
<td>369,801</td>
<td>390,079</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>1831</td>
<td>Under Act 1 Wm. IV. c. 19</td>
<td>402,005</td>
<td>425,314</td>
<td>256,664</td>
<td>...</td>
<td>88,421</td>
<td>68,029</td>
<td>1,113,084</td>
<td>1,173,526</td>
</tr>
</tbody>
</table>

Ulster was one of the five provinces into which, at an early period, Ireland was divided. In this province the northern Hy Nialls, or O'Neill's, had their seat. Upon different tenures, in condition that they should build on each of the largest (or 2000 acres) grant a castle, and on each of the other grants a brick or stone house, each castle or house surrounded by a strong court-yard or ‘bawn,’ and should settle or ‘plant’ a certain number of tenants, who were to be Scotch or English, except on the lands of the Irish servitors, who might take English or Irish tenants at their choice. Large grants were assigned to the corporation and some of the trading companies of the city of London, from which the town and the county of Down received the distinctive prefix of their name, London-derry. Conformity in religion to the laws of the realm was required from the undertakers, except perhaps from the Irish, who were to be made freeholders. There were to be a convenient number of parish churches in each county, towns were to be incorporated and markets established, and free-schools to be instituted for the education of youth. Though the plan was but imperfectly fulfilled, and the town and county of Ulster in 1614 did not reach the specified size, yet so many English and Scotch settlers were permanently established as have stamped a peculiar character on the population of Ulster, which is at present the greatest seat of manufacture in Ireland, and the part in which the Protestant religion (Episcopal and Presbyterian) is most prevalent.

(Ordnance Survey; Parliamentary Papers; Ware's Historical and Antiquities of Ireland, by Harris; and Moore's and Leland's Histories of Ireland.)

**Tuberculosis.** This is a genus of shells, type Ouelville gibbons, Bulla gibbons, Linn. (Cypripedid, vol. viii., p. 256.) The only reason for this designation that we can perceive, that this genus is the last in the Conchologia Systematica.

ULTRAMARINE, a well-known blue pigment of extraordinary beauty and great permanence. It was originally, and indeed until within a few years, entirely prepared from the lapis lazuli, or lapislauri. (Lazurite.)

This colour is now prepared in France at a very moderate price, and is a usual beauty to that obtained from the lapislauri. M. Gmelin of Tiibingen considers that sulphur of sodium is the colouring-principle both of the natural mineral and the artificial products. The artificial ultramarine is stated to be prepared by adding freshly precipitated silice and alumina, mixed with sulphur, to a solution of caustic soda, and the mixture is to be evaporated to dryness: the residue is put into a covered crucible and exposed to a white heat, by which, when the air has partial access to it, a dark grey product results. When the product is then reduced to impalpable powder. The proportions of materials to be used are, about 35 silice, 36 alumina, 24 soda, and 3 sulphur.

ILLUMINATION. The real name of this prince was Miram Mohammed Targari, but he is better known by the surname of Ulug (or Ulugh) Beg. He was the grandson of Timur, the son of Shah Rehak, the son of Timur, and was born A.H. 786 (A.D. 1394). He governed his father's territories as regent, his capital being Samarqand, from an early age until A.H. 851 (A.D. 1447), when he succeeded to the throne by his father's death. His life was marked by the usual military successes, without which few Oriental princes would have achieved the same time that could keep their thrones; but as they are of little interest, and form none of his title to fame, we may omit the detail of them. He is said to have had the weakness to cast the horoscope of his eldest son Abdallâh, and, from some suspicions of his fidelity derived from the stars, to have preferred his younger brother. The consequence was that the elder son revolted, defeated and took his father, whom he caused to be put to death. Ulug Beg reigned in his own name only two years.

The astronomical labours of this prince have been handed down his name. He was the founder of an observatory, and the patron of some of the best astronomical tables among those which preceded the invention of the telescope. It even appears that he was himself a diligent observer, and in some, perhaps a great degree, the author of the tables which bear his name. According to D'Herbelot, the tables were constructed, under his name and authority, first by his former instructor, Safâheddîn Câdî Ahmed, and after the death of that astronomer by Gâshaheddîn Mohammed Gâshaheddîn al Couschâgh. But the expressions quoted by Hyde, from the prefixed, are difficult to reconcile with any supposition except that of Ulug Beg being actually an observer.

The astronomical works of Ulug Beg were written in Arabic, but were afterwards translated into Persian, from which language the principal of them were translated into Latin by Greaves and Hyde. Greaves published first the astronomical tables, under the title of Astronomica, Chronologica, Historica, Chaldaica, Syriaco, Syro-Grecorum, Arabum, Persarum, Chorasmiorum, usitate, ex traditione Ulug Beigis, London, 1660. He afterwards published the geographical part as an appendix to his *Astronomica,* entertaining the idea, that a very interesting appendix having the title *Bima Tabula Geographica,*
common with *U. lactuca*, the Lettee Green Laver, it is gathered and eaten in the same way as the purple laver. It is also known under the name of *Oyster Green*. This plant is more regularly supplied for sale than *U. lactuca*, and is sometimes applied to the forehead to relieve headache in fevers, and also to procure sleep. *U. bullata*, the Blistered Green Laver, is the fresh-water species. It has an obovate, acute from, which is gelatinous, and at length lacerates and expands, widened, and becomes bulging. It is a very frequent plant in stagnant pools and ditches of fresh-water, often covering the whole surface of the water, and giving it the appearance of being in a state of fermentation.

The genus *Ulva*, named from the quinary arrangement of its granules, includes fresh-water and includes two British species. The fronds are tubular or inflated, and gelatinous.

*Enteromorpha*, the Water-Gut, has a tubular, hollow, membranaceous frond, of a green colour and reticulated structure; the reproductive granules are arranged in threes or fours in the reticulations. Seven or eight species of this genus have been described as British. They are all inhabitants of the sea, of pools, and of fresh water, with the exception of *E. intestinalis*, which is also found in fresh-water pools. All the species are long, varying from two or three inches to three feet in length, and when floating in the water very much resemble the intestines of an animal—hence the name.

*Bangia* was named after Hoffman Bang, a Danish naturalist, who wrote a work on the Conferveae. It has a flat, capillary, membranaceous frond, of a green, reddish, or purple colour. The situation of this genus is doubtful. Greville refers it to Ulvacaceae, but most botanists place it in or near Conferoeae.

The tribe *Siphonocladaceae* consists of plants which are found in the sea, in fresh-water, or on the damp ground: they are generally of an oblong, green colour, and which have a thin, tender, membranaceous, reticulated structure, rarely gelatinous; they are generally furnished with a very minute secaliaceate roof, which is either expanded or tubular. The reproductive organs consist of roundish, mostly quaternary granules, or minute opercular grains, which are imbedded in the delicate mem- branous part of the plant. This tribe contains about ten genera, of which the five following are British: *Porphyra*, *Ulva*, *Codium*, *Bryopsis*, and *Botrydium*. *Porphyra* (from *Porphyra*), the Purple Laver, has a plain frond, exceedingly thin, and of a purple colour. The reproductive organs are of two kinds: 1. Roundish granules arranged in fours, and imbedded in the whole thickness of the frond. 2. Granules which are scattered without order, chiefly towards the margin of the frond. Four species of the Purple Laver are enumerated. The most common is the *Porphyra laciniata*, which has its fronds aggregated and deeply cloth, the segments dilated, and variously cut and waved. This plant is common in the sea from spring to autumn, and grows on rocks and stones, from whence it is often torn by the violence of the waves, and thrown on the shore. The frond of this plant abounds in a viscid gelatinous matter, which is very nutritious. On this account this plant, under the name of Laver, is much eaten in many places, especially the south of England. When collected, it is kept in jute sacks and soaked in brine, and is then sold in markets with lemon-juice. Dr. Lightfoot states that in the Western Isles it is gathered in the month of March, and that when pounded and macerated with a little water, the laver is made into roasted bread, or is mixed with stewed peas, in which is added the juice of lemon, and butter. It is sometimes stewed with eggs and onions. But although this plant is abundant enough, it is only very partially used as an article of diet.

*Ulea* (Green Laver) has a membranaceous frond of a greenish-blue colour, with reproductive granules arranged in fours. There are seven British species of *Ulea*: three growing in the sea, one in fresh-water, and three in ditches on the land.

The Broad Green Laver, *Ulva lactuca*, has a plain widely oblong or roundish frond, waved, and of a green colour and tender substance. It is an abundant plant on the rocks and stones of the sea in summer and autumn. In

P. C., No. 1614.
UMB E L

(Smith's English Flora, vol. v.; Burnett's Outline of Botany, vaucher, histoire des Confmences; Lindley's Natural System, 3.

ULVERSTONE. [Lancashire.]

ULYSSES, ULYXES, or ULYXES, is the name under which the Greek hero Odysseus (Odisseus) was popularly known to the ancients. Homer is the author of the Odyssey, a name given to his poem 'Odyssey,' was a son of Laertes and Anticlea, king of Ithaca, husband of Penelope, and father of Telemachus. Homer's 'Odyssey' was by some, attributed to Homer, and as such, his works are held in high esteem. Homer is represented as the model of a prudent warrior, as a man of great experience and cunning, ready to devise means of avoiding or escaping from difficulties, superior to all men in eloquence and intelligence, in wisdom equal to the gods themselves, and in adversity courageous and undaunted. Later poets, on the other hand, describe him as a cowardly, false, and intriguing person. When the Greek chiefs had resolved upon their expedition against Troy, Agamemnon went to Ithaca to invite Ulysses to join them, but it was not without difficulty that he was induced to assist in the enterprise. He joined the other Greek chiefs in the port of Aulis, with twelve ships. During the war against Troy he served as a general, and his companions suffered from the storm in the Mediterranean, in the youthful age of the son in 127 years, during which time his father was absent from his home, he always enjoyed the especial protection of the goddess Athena (Minerva), and it was she who at last enabled him to reach Ithaca. His father Laertes was lived in solitary retirement, and Ulysses, without being known, was hospitably received by Eumaeus, the swineherd. Telemachus, the son of Ulysses, who had in the meantime grown up to manhood, was absent: he had gone to Pylos and Sparta to gain information concerning his father; but he returned while Ulysses was staying with Eumaeus. His father made himself known to him, and a plan was formed to get rid of the insolent suitors. Ulysses in the disguise of a beggar followed his son to the town, where he was insulted by the suitors and some of his own servants, but was welcomed by Penelope and recognised by his aged nurse Euryklea. With the assistance of Athena, Ulysses, his son, and some of his faithful servants began a contest with the suitors, all of whom lost their lives. Hereupon Ulysses made himself known to Penelope, and went to his aged father Laertes. The news of the fall of the suitors excited their friends and relatives to take up arms against Ulysses, but Athena in the disguise of Mentor restored the wretch to all the people to their lawful king. Respecting his death the 'Odyssey' (xi, 119, &c.) only contains a mysterious prophecy of Tiresias, according to which he was to die a gentle death in his old age. According to later traditions Ulysses was killed by Telephus, his own son by Circe, who had been sent out by his mother in search of his father, and was thrown into a storm on the coast of Ithaca, where he was attacked, while plundering the country, by Ulysses and Telemachus.

(Hyginus, Fab., 127; Horat., Carm., iii, 29, 8; Diotys Cretenis, vi. 15.)

UMBEL, in Botany, a form of inflorescence in which there are several flower-stalks all radiating from a common point, and having an equal length. When only a single flower is seated on each pedicel, the umbel is said to be simple, as in Eryngium, Butomus umbellatus, &c. If the primary pedicels have other smaller pedicels, which form of umbel is usually called compound, as in Heracleum, Parnicum, Daucus, &c., the umbel is said to be compound, and the smaller umbels are called umbellules. The whole assemblage of the umbels is called the umbel; when such pedicels, or umbellules, are called partial umbels. The pendent, which form the partial umbel, are called radii. The base of the pedicels of the simple umbel is usually surrounded by bracts, which are then called involucre. When they are present at the base of the primary pedicels of a compound umbel, they are called a universal involucre. The pedicels of the umbrellas are also often surrounded by bracts, which are called a partial involucre, or an involucellum. The possession of this form of inflorescence is the character of the large natural order Umbelliferae, to which there are no exceptions. The characters which were affected by the possession of the forms of the umbel, with the absence or presence of the involucra and involucellae, formed at one time the principal means of subdividing that order. But at the present day the characters of the fruit and seed have quite superseded other modes of distinction. [UMBELLIFERA.]

UMBELLIFERAe, a natural order of plants. This is one of the best marked families of plants, so much so, that Jussieu says the whole order may be looked upon as a genus, and the various subdivisions and genera as arrangements of the species. All the species are well marked, and have good distinguishing characters, and their inflorescence is always that of the umbel. [UMBELL.]

The possession of an umbel was early made the combining character of the genus crops, which are systematic botanists, and they were called Umbellatae on this account. In addition to the distinguishing character, they have also others, as the possession of five stamens and two stigmas, by which they were all brought under the class Pentandria and order Dignya of Linnaeus.

Most of the species are herbs, seldom shrubs, with flat, furrowed stems. The leaves are, in most cases, divided; sometimes they are simple; they are alternate, and all of them embrace or clasp the stem by a sheathing petiole. The flowers are white, pink, yellow, or blue, and are seated on umbels, which are either simple or compound, and these are with or without bracts at their base, which are called involucre or involucellum, as they surround the umbels or umbellules. The calyx is superior, either entire or 5-toothed. The petals are five, and are inserted on the outside of a fleshy disk, which is placed on the top of the ovary; it is crowned by the disk, on which the petals are seated; the styles are 2, distinct, with simple stigmas. The fruit, which is ordinarily called the seed, consists of 2 carpels, which are united by a common axis, the part 1 of which unites being called the commissure; the external part of each carpel is traversed by elevated ridges, which are divided into primary and secondary: there are five of the latter, and four, between them, of the former; the

1. cutting showing umbels with flowers and fruit; 2. flower enlarged; 3. fruit; 4. transverse section of fruit; 5. seed removed from pericarp, with small umbels and large allomous.
ridges are separated by channels, below which are often placed, in the covering of the fruit, little receptacles of coloured oily matter, which are called vitae. The seed, which is pendulous, usually adheres to the sides of the cell of the fruit, and this has led to the confounding the seed and fruit together. The embryo is invaginated in the midst of a horny albumen, with the radicle pointing to the hilum.

Lindley places this order in his alburninous group of orders, on account of the large quantity of albumen in proportion to the size of the embryo contained in the seed. In this manner it is brought into close connexion with Ranunculaceae and other orders from which it is mostly separate in other systems. The order agrees with Ranunci-

The arrangement of this order has always been a matter of difficulty, arising from the circumstance of the whole family being connected together by so many peculiar characters. The same difficulty arises in the subdivision of oil, especially as the primary characters are well marked, as Composite and Gramineae. Many early attempts were made to constitute the genera of this order from the general characters of the plant, and it is not till lately that the fruit had been studied with sufficient attention to show much advance. Morel, Tausch, Lindley, and Adanson founded the genera upon various distinctions of structure in the entire plant. Russon first pointed out the value of the structure of the fruit in the making the genera, and his suggestions were adopted by Jussieu, in his 'Genera Plantarum.' Sprengel and Hoffmann have given arrangements of this order; the former founded his genera entirely on the fruit, whilst the latter employed the fruit and petals. Of the genera formed, Sprengel describes 63; Don, in 'Miller's Dictionary,' gives 17; and Lindley, in his 'Natural System,' 189. The following conspectus will show the subdivisions and tribes into which these genera have been distributed by De Candolle:

Spermaceti—Orthopterases. Allamum seed flat on inner surface, neither involute nor convolute.

Spermaceti—Campionerases. Allamum rolled into the edge.

Spermaceti—Campionerases. Allamum curved inward at the edge.

Tausch has more recently proposed another arrangement, and objected to the albumen being made the basis of the primary divisions of the order.

The genera included above 1000 species. These are principally inhabitants of the northern temperate zone, and the greater number of them are found in the old world. The proportion of species in the southern half of the globe is less than one-fourth, and the proportion of the new to the old world, as 1 to 3. Very few of the species are found in the tropics, and about 50 are enumerated as inhabitants of Australia.

The properties of this order are variable, and very important. One of the distinguishing characters of the order is the possession of an acrid principle which finds its full development in such plants as the Hemlock (Conium), the Cow-lane (Cicuta), Eqnelse, Holocentum, Althusa, &c. This renders the whole order suitable for edibles, especially the vegetation, in which the poisonous principle is most developed. The acrid properties of these plants seem to depend upon the possession of a peculiar principle, with which so little has been examined that none of the existing properties alkaline properties. This is the case with Conia, a principle obtained from the Hemlock [Conium], which has been examined with the most care, although other plants of the order have been found to yield similar principles, but not possessing so much activity. Conia is remarkable amongst the vegetable alkaloids, for being fluid, volatile, and easily decomposed, and it is probable that most plants whose poisonous properties are dissipated by heat possess a principle of a similar nature. In this respect there is also another analogy between the Umbelliferae and the Alburninaceae, the poisonous qualities of the species of the last order being in a great measure annihilated by heat. It is not improbable that all the Umbelliferae may possess a principle similar in nature, though not in intensity, to the Conia, and that it may coexist with some measure of the poisonous properties of the Alburninaceae as the parsel, samphire, and celeriac desirable as articles of diet.

Another important secretion of the Umbelliferae is a volatile oil. This is found in all the species, with the exception of Comium, deposited in the canals of the pericarp, which are called vitae. In some of the species it is more abundant than in others; and on this account the fruit, which is commonly called the seeds, is used frequently in diet as a condiment, and in medicine as an aromatic and carminative. Of these the caraway, the anise, the dill, the cumin, and coriander are best known. The secretion of oil does however not appear to be confined to the vitae of the fruit, for many of the species have an aromatic odour, which is exhaled from their leaves and stems. It has been asserted by Lindley, Don, and other writers on Umbelliferae, that the fruit 'is in no case dangerous'; but it is evident, as the umbelliferous plant is more of the active poisonous principle than any other part of the plant, and this on account been introduced as a distinct article of Materi Medica in the New London Pharmacopia, and it is generally supposed that it is not properly occurred in the fruit of hemlock and other Umbeliferae, but the Pereira, is given in the 'Pharmaceutical Journal' for 1842.

A third secretion of these plants is a gum-resin. This probably, like the two last secretions, is common to the whole order, but is fully developed in only a few species. The gum-resins produced by this order have been the subject of attention in medicine, and many of them are still looked on as valuable remedies. The Laser, or Siphon of the antients, is secreted by plants belonging to this order, and assafeto-
da, galbanum, gum-ammomum, and senna-pennum are much used as stimulants medicines to nervous diseases at the present day. Many of the species when wounded exude in small quantities a gum-resinous matter.

A fourth secretion, which also on account of its occasional effects renders this family more important, is gum. This gum, which forms some large portion of the food of animals, is deposited in largest quantities in the roots of the carrot, the parsnip, the skirret, and the arancela of the South American. From this account it has been extensively cultivated. Most of the roots however contain this principle, and might be used as articles of diet, but that they also contain the poisonous principle of which we have before spoken. Heat will dissipate this, and some of the roots which are deadly poisons when raw, it is said may be eaten with impunity when cooked. The roots of some of these plants resemble that of the horse-
dradish, and in winter, when the leaves are gone, may be dug up in gardens in mistake for it. The only discove-

Jussieu, 'Dict. des Scienz Naturelles; Lindley, Nat-

UMBER (Ornithology), a name of the Scopus um-

bretta, Ombrette of the French.

The genus Scopus, Brisson (Cephus of Wagner) is ge-

The Arbire (Herons) of Mr. G. R. Gray form the third
subfamily of his Ardeidae, and are arranged by him between the Gruidae (Cranes) and the Ciconiidae (Storks).


Scopus is distinguished from the Storks by its compressed bill, whose tranchant culmen is expanded towards the base; the nostrils are prolonged into a groove which runs parallel to the culmen to the end, which is slightly hooked.

**Bill of Scopus.**

**Generic Character.** — Bill straight, broad, much compressed: the tip of the upper mandible abruptly hooked, and of the lower truncated. Culmen and gonys carinated. Nostrils linear, closed, wings long. Tail short. Legs moderate. All the toes united by a membrane. The inner shortest. (Sw.)

**Example, Scopus umbretta.**

**Description.** — Size that of a crow, colour that of umbor: the male with an ocellary crest.

**Locality.** — Africa, generally.

**UMBRELLA (Ardeola, Conchology).**

**UMBRELLA (Italian, Ombrella, Umbrello), from the Latin Umbra (Italian, Ombra; French, Ombre), a shade, a portable dome-like canopy, carried over the head as a shelter from the rays of the sun, or from rain and snow. Although the name is applicable in either case, and perhaps most strictly in the former, the term umbrela is usually applied in this country only to such as are used as a protection against the heat of the sun, as parasol, from paras, to carry or ward off, and sol, the sun, is given to the light kind of umbrella carried by ladies as a defence from the heat of the sun. The French have a better distinction between the two kinds of umbrela, using the same parapluie for those used to ward off the rays of the sun, and parapluie (from plate, rain) for those used as a defence against inclement weather. Umbrellas were introduced into Europe, in comparatively recent times, from the East, where they have been used as shelter against the sun from time immemorial. They are alluded to in the plays of Ben Jonson, and of Beaumont and Fletcher: and in Gay's 'Trivia,' the following notice of their adaptation to English use:

> "Let Persian dames the umbrela's ribe display To guard their beauties from the sunny ray, Or sweating slaves support the shaddy head Whose form to turn moments show their state aloud. But in winter only known its aid To guard from chill the walking maid."

While, as implied by the above lines, umbrellas were pretty well known in London more than a century since, they did not come into general use for many years later. Jonas Hanway is said to have been one of the first men who commonly used an umbrella in England. At first they were kept in the halls of genteel houses, for holding over persons as they stepped to their carriages; and even long after they began to be used by pedestrians, they were considered signs of effeminacy if carried by men. Increased attention to comfort, and the reduced price of umbrellas, owing to competition and improvement in their manufacture, have now rendered them almost as essential as articles of dress, even to the humblest classes.

The construction of common umbrellas, and the contrivances by which they are made to expand or collapse at pleasure, are too familiarly known to need description; and it is unnecessary to do more than mention some of the ingenious improvements which have been devised, of which several are described in Herbert's 'Engineer's and Mechanic's Encyclopedia,' vol. ii., pp. 820-851. In umbrellas of the ordinary construction the ends of the ribs are connected with the fixed ring upon the end of the stick, and the ribs, which are the principal struts in the structure, are attached to the sliding-tubes, by rings of wire; so that the axes upon which they turn when the umbrella is opened and closed form axes of a circle, instead of straight lines, by which excessive friction and destructive wear are occasioned. The outer ends of the struts, when connected with the ribs by means of axes or pins passed through the latter, by which they are so weakened that they frequently break. These defects are remedied in the improved umbrellas above referred to by the invention of ingenious though simple joints. Another joint for connecting the struts with the ribs, allowing the framework to collapse into less space than usual, and preventing the freeing up of the cover at the ends of the strutters, is described in the 'Transactions' of the Society of Arts, vol. xxxviii., pp. 72, 73. Very light and compact umbrellas are made with ribs of steel instead of whalebone or cane, which latter material, stained to resemble whalebone, is used in those of the commoner sort; and some of

**UMBILICUS (Conchology).** When the inner sides of the whorls or volutions of a spiral shell do not touch each other, so that its axis is hollow, that hollow is termed the umbilicus. (Troccheus; Terminus.)

**UMBILICUS.** This word has sometimes been applied to the focus of an ellipse; but, in modern works, it stands for a point of a surface through which all its lines of curvature pass. At such a point the two principal curvatures are equal. (Differential Calculus, L. U. K., p. 440.)

**UMBRO (Conchology).** The name for that point in a conchifer or bivalve shell which constitutes the nucleus or apex of each valve, and which is generally situated above the hinge, or line joining the two, and always near it. (Conchologia, vol. iv., p. 433.) From this nucleus or umbro the longitudinal rays of the shell diverge, and the lines of growth, commencing immediately around the nucleus or umbro, increase in gradually enlarging concentric layers to the outer margin of the valve. In the freshwater bivalves the umbones are generally eroded. (Naiades.)

**UMBRA (Latin, Umbrella).** The Latin word has been used to signify the shadow of the earth or moon in an eclipse: the word porcupine is derived (Eclipso) to signify that portion of the heavens which is partially shaded.

**UMBRELLA (Italian, Ombrelina, Umbrello).** — A shade, a portable dome-like canopy, carried over the head as a shelter from the rays of the sun, or from rain and snow.
UMBRELLA, [Scheffyllidians, vol. xxi., p. 217.]

UMBRI, OMBRI, or OMBRICI, are mentioned by Dionysius, Pliny, Florus, and other historians, as one of the oldest people of Italy, of which the arbitrary connection to have been living at a very remote period, near the Sabini, in the highlands of the central Apennines, whence they descended into the valleys of the Tiber and the Nar, where they built the towns of Spoleto, Norcia, and others already mentioned above. The kingdom of the Umbri extended from the confines of Macedonia, Nuceria, Nequinimum, and others. The Umbri spread also beyond the Apennines, towards the coast of the Adriatic. Sarsina, on the river Sapis, and Sentinelium, were towns of the Umbri, north of the Apennines. The Umbri continued to live in this country, and were esteemed as worthy assistants in the war against the Romans, and took many towns from them. (Phily, iii. 19.) The epoch of this event is not authenticated, but it must have occurred previous to the fall of the kingly government at Rome, at which period the power of the Etruscans was at its greatest height, and their territory extended from sea to sea, including part of the country of the Umbri. The Umbri, like the other ancient nations of Italy, formed a number of distinct communities or tribes, each of which was independent in the passage above quoted. Some of these became incorporated with the Etruscans, whilst others, particularly those who lived between the Tiber and the Nar, retained a separate existence. The former were unable to maintain their independence, and the Etruscans took possession of their territories. The latter, however, maintained their independence, and the Etruscans were unable to conquer them. (Cato, Cat. 12.)

The Etruscan language, was enabled thereby to converse with the Camerets Umbri, and enter into negotiations with them. The language and customs of the Umbri resembled those of the Etruscans. They were described also from the bronze tablets, called the Eugubian tables, which are partly written in the Etruscan and partly in the Latin characters, and which, according to Livy, relate to the religious rites of the Etruscans. The Etruscan tribe, is mentioned as having participated. (Micaele, Storia degli Antichi Popoli Italiani, vol. i., ch. 5.)

The charge of senility brought against the Etruscans has also been applied to the Umbri. (Cato, Cat, 12.)

After the defeat of the Etruscans, the Umbri made, too late, an effort to check the advance of the conquering Romans. The consul Decius, who had advanced into Etruria, must be certain of the success of his movements. It was the other consul, Fabius, who was fighting against the Samnites, was ordered by the senate to march round against the Umbri, who had assembled at Mevania. This joint movement damped the spirits of the Umbri, and their army dispersed to their several strongholds. Only one tribe, called Materini, kept the field, and attacked the camp of Fabius, but was defeated, n.c. 307. In a short time most of the communities of Umbria submitted to Rome without much resistance. Sarsina, however, was one of the last to submit.

Umbria, under the Roman republic, was one of the divisions of Italy proper, extending from Orculanum on the south to Arborium and Pisaurum on the Adriatic coast. On the north, it was bounded by the Apennines and Picenum, and the Nar from the Sabini. On the south, Umbria bordered upon Latium, and on the west upon Etruria. The Rubicon formed its boundary towards Cisalpine Gaul.

After the fall of the Western empire, the name of Umbria was restricted to the country between the Tiber, the Nar, and the Apennines, and constituted the best part of the duchy of Spoleto. Since the annexation of that duchy to the kingdom of Sicily, it is commonly considered as the same region, which now forms the administrative province of Spoleto proper, as distinct from the name of Spoleto, which is considered as part of the Sabini. (Spro-

UMBRIA. [Umbria]

UMBRIAN SCHOOL OF PAINTING. [Roman School of Painting.]

UMBRA-ELF. [Bothenia.]

UMBRAPOORIA, or Amanapura, l. 413.

UMPIRE, AWARD. The word umpire is sometimes used to denote the person who in the first instance decides a controversy; but in its legal sense it means a person named in the Submission, or under its authority, by the arbitrators [Arbitration] to decide the matters referred, which one or other of them may be sent to settle. The rules which govern an arbitrator regulate the conduct of the umpire also. Two questions however often arise out of his proceedings. The act 3 & 4 Will. IV., c. 42 § 30, which gives leave to a judge of the court named in the submission to enlarge the time for doing the work required of the umpire, has practically disposed of one of these questions, viz., whether, the time for making an award being limited by the submission, an umpire could, to the exclusion of the arbitrators, make his award. The other question, that had expired within which, although they had expressed their intention not to proceed in the reference, were nevertheless competent to make their award. The second question, and one of far greater practical importance, is, whether an umpire is free to alter matters which he has been named to alter, or whether, in any of the conditions essential to their validity. Of late years however it has been the policy of the superior courts to support awards to the utmost. Thus, although a certain ambiguity (cf. 155.) is required on an award, yet the absence of it may be amended by such words as the court may adopt and incorporate in its umpire the former, and may himself decide upon the latter. Again: If arbitrators are unable to decide matters concerning which they have the evidence, they may report that evidence to the umpire, and the umpire may then decide, which is of course much better than that before it was delivered neither party required of him to hear the evidence at all.

In former days courts of law interpreted awards most strictly, setting aside any if they were defective in any of the conditions essential to their validity. Of late years however it has been the policy of the superior courts to support awards to the utmost. Thus, although a certain ambiguity (cf. 155.) is required on an award, yet the absence of it may be amended by such words as the court may adopt and incorporate in its umpire the former, and may himself decide upon the latter. Again: If arbitrators are unable to decide matters concerning which they have the evidence, they may report that evidence to the umpire, and the umpire may then decide, which is of course much better than that before it was delivered neither party required of him to hear the evidence at all.

The main quality required in an award is, that it shall finally dispose of the matters referred. For this purpose it must be clear, that either party shall pay to the other such a sum as certain goods are worth; or that he shall deliver up to the other several books without naming them or otherwise specifying them: but it may be in the alternative, as that A shall vacate a house on a certain day, or pay 1000. The award must dispose of all the matters referred. It must not leave anything to be done in these matters by a party foreign to the submission, unless for some merely ministerial purpose: thus an award would be bad which gave to A the moiety of a certain field in issue, and in the possession of B (these being the litigants), provided that C found A’s title to the moiety to be good: but the award would stand if it gave the moiety to be measured by C. An award must not reserve to the arbitrators to decide the question, that if A shall not pay a sum on a future day, then that the parties shall come before the arbitrators for their further award. For the mode of enforcing an award, see Arbitration, vol. ii. 191.

UNA. The intimate connection of the Slits with the Megatherioids, admitted by some zoologists, but strongly denied by others, is in our opinion set at rest by Professor Owen’s ‘Description of the Skeleton of an extinct Megatherioid, and its relationship, in both its External Form and its Bones, to the modern Monotremata, and to the Proboscidea. On the Osteology, Natural Affinities, and probable Habits of the Megatherioid Quadrupeds in general,’ published by direction of the council of the Royal College of Surgeons in London, and forming the second of a series which we hope to see from the same quarter.

Our limits will not permit us to follow the Professor through the minute, necessary, and satisfactory detail of...
the comparative anatomy of this gigantic extinct South American animal, which has been followed out with patient care by him till the remains form a complete skeleton, one of the principal ornaments of the noble museum in which it is preserved, a monument of the liberality of the council of the College of Physicians, and of the talent of the distinguished physiologist, who built it up bone by bone, described it, and directed the admirable lithographic plates which illustrate the description.

In the article Megatheriidae will be found all that was known of the genus Mylodon when that article was written; in Professor Owen's book, just published, and above alluded to, the history of all the known Megatherioids is completed. And although we cannot, for the reasons already given, follow the work step by step in his investigation, we shall endeavour to lay before our readers the substance of his physiological and zoological summaries, and attempt to give them some idea of his well-digested 'Conспектus' in an English dress. With regard to the Summaries, we regret that our limits compel us to abridge that which is already so closely condensed by the author.

**Physiological Summary**

Professor Owen, after stating that it has been his aim, in the work above referred to, to place the new facts yielded by the study of the skeleton of the Mylodon in a clear and intelligible light, and in their true relations to those before acquired from the osteology of existing and extinct forms, proceeds to deduce the consequences which flow from them.

The Sloths are characterised by a dentition still more peculiar and extreme in its modification than that of the Rhinoceros, which has been already referred to. The increase of growth of their teeth, which are especially adapted for acting on buds and leaves. The dental characters of the Sloths co-exist in the extinct Megatherioids with the brachyodont modifications of the jaws and cheek-bones, implying the same development and disposition of the masticatory muscles.

The extinct large Phyllophagas have peculiar modifications of structure and enable them to obtain leaves. The whole frame, and particularly the long neck of the Giraffe, enable it to browse on branches far beyond the reach of its congener the Deer, and its muscular extensile lips, and long, flexible, prehensile tongue, admirably cooperate with the skeleton in the act of acquiring its leafy provender.

The strongly-contrasted short thick neck of the Elephant, with its massive proportions, is aided by the wonderful power of extension of its long toes, and the differently organised, is thus enabled to obtain a similar food.

The skeletons of the Megatherium and Mylodon also manifest remarkable peculiarities, and the significance of these is first inquired into.

The great quadrupeds of approximate bulk to the Elephant and Giraffe, but neither normally proboscidian nor of towering height, a modification of bodily frame was required which might endow them with ability to browse on leaves or twigs. Their next in living congener, the light and diminutive sloth, clings for sustenance. Prehensile as well as locomotive powers were gained by the modifications of the oesophageal frame-work of the Mylodon, as is most strikingly manifested in the clavieulate and ungual modifications of the feet, the curving of the slightly inverted hind-foot, and the great and curved claws. A comparison of the fore-limbs of Mylodon with those of other beasts proves that this Megatherioid had its antecedent relatives formed not on that of the Elephant, but on that of the Mammal, with its powerful, upright digging a way soil, nor for climbing, nor for seizing, but for all these actions. Their true use is to be made out by the rest of the skeleton. But before we refer to that, it is necessary to consider the construction of one of the most beautiful bones in the fore-limb, the large curved claws, whose feet are best organized for displacing the dense earth, as the Mole, the Mole-rat, the Condylure, and Echidna, the claws are long and broad, of nearly equal size, and can be extended in the same manner as the hand, which is of considerable breadth. In those Armadillos which are most remarkable for their rapid perforation of the soil, as the Dasypus gigus and uni-cinctus, the three outer claws, which are principally developed for that office, are scarcely less remarkable for their great breadth than for their length, but are of unequal size. The breadth of the long fosorial claws of the Orycterope also surpasses their depth. In the Sloths, on the contrary, the depth or vertical diameter of the claws, which are unusually long, much exceeds their transverse diameter in breadth; their hands and fore-arm are, in this respect, like those of burrowers, and are much restricted in their movements, especially in that of extension. The fore-foot of the Sloths is likewise long and narrow, and only three fingers in one species and only two in another species are furnished with claws, which are nearly of equal length. The claws of Ant-eater (Myrmecophaga didactyla), which destroys the tree-termites, has its two toes shaped nearly as in the Sloth.

The Great Ant-eater, which breaches the strong fortresses of the woods, has its fore-limbs, both fore-foot and hind-legs, of equal breadth and depth, and the chief power of the fosorial extremity is concentrated on one digit, which is much superior in size to the rest. In the work to which this modified digging instrument is put, the soil has not to be displaced in great quantities, as in the excavation of a hiding-place or burrow, but it needs only to be partially disturbed in order that something which is hidden may be exposed.

In the investigation of the nature of the collateral uses of the anterior extremity of the Megatherioids, to which uses all that is superadded to the ordinary mammalian ungulate limb relates, we must consider these supraductions independently, or exclusively, of the parts which were merely concerned in progressive motion. The unguate portion of the fore-foot, thus viewed apart from the ungulate portion, agrees with the scolopala type, being long and narrow, with long and curved claws, which appear to have been habitually in a state of flexion, and could hardly be extended in the same plane as the hand. These characters are exhibited in the Sloth, and even more so in the Mylodon, who was evidently a footed-bear better fitted for grasping than for digging. Such a foot is not however an instrument unfitted for clearing or displacing the earth: but rather, in so far as it differs from that of the Sloth, it is better adapted for digging. It may be justly inferred from the diminished curvature and length, from the increased strength, and from the inequality of the claws, especially from the disproportionate size of that of the inner long fore-claw, that the primitive Megatherioid was occasionally applied by the short and strong fore-limb in the act of digging; but its close analogy with that of the Ant-eaters teaches that the fosorial actions were limited to the removal of the surface-soil in order to avoid the obstacles of the superficial soil, and to prevent the idea of burrowing. Such an instrument would be equally effective in the disturbance of roots or ants; it is however better adapted for grasping than for digging. But what other and peculiar power for grasping the hand of the Mylodon might have been applied, the bones of the fore-arm, of the arm and of the shoulder, alike attest the prodigious force which would be brought to bear upon its execution. The general organization of the anterior extremity of the Megatherioids, and the idea of them having been a strictly fosorial or burrowing animal, and at the same time both teeth and jaws decidedly negative the supposition that it was an eater of bread. For the depth length of the jaws are presented by the phyllophagas and Mammals, and the excavating species of the Edentate order; and the anomalous breadth of the face, which characterises the leaf-eating Sloths, is repeated even to exaggeration in the Mylodon.

Having thus received the answers, so to speak, given by
the osteological characters of the fore-limbs, we must proceed to interrogate the rest of these gigantic remains, and refer to the organization of the hind-limbs to ascertain whether they will afford any further light as to the functions of the fore-feet and the general habits of the Megalonyx.

When, after a review of the pelvis and hind-limbs in existing sciaenoidal, fossorial, or semi-fossorial quadrupeds, the same parts of the skeleton of the Mylodon or Megatherium are contemplated, the sudden and extraordinary increase of the muscles, the arbor-quadrapeds, and astonish the beholder, and imply powers and actions peculiar to the gigantic animals when living. We find in the enormous pelvis indications of unmounted muscular powers applied to the fore-legs and hind-limbs, and of the pelvis itself being retained by a large powerful trunk, tail, and hind-legs. The enormous pelvis of Mylodon,' says Professor Owen, 'proclaims itself the centre whence muscular masses of unmounted force diverged to act upon the trunk, tail, and hind-legs. These muscles originating from the sacrum and the broad and extended hip of the ilium, as the sacro-humbal, the longissimus and ilioburiti, &c., and which pass forwards to extend the fore-limbs and hind-limbs, with the marked evidence of their size and energy of action in the long and strong spinal crest of the sacrum and in the broad, rugged, and anteriorly produced margin of the ilium. The fore-limbs being well adapted for grasping the tree and supported on a trunk many feet long, and the forces concentrated upon them from the broad posterior basis of the body are manifestly adequate, and are precisely such as might be expected to have cooperated in the act of uprooting the tremendous trees of the forest, to displace the boulders, and that the pelvis should possess stability and resistance equivalent to the due effect of the forces acting from it and so applied, it was necessary that it should be bound down as it were, and supported by members of corresponding strength.

Accordingly, we find a thigh-bone, which, though surpassing the humerus in length, is yet not less than half as broad as it is long, and provided with trochanters and ridges of insertion, and muscles of a kind, which would only be found peripheral with the peculiarity of the Megatherion animals; since, if they attained their food by climbing, the fore-limbs would be the fixed point when the muscles attaching these to the pelvis were called into action, and the hind-extremities, no longer supported by the body, and thus bearing the whole weight of the animal, would be insufficient to resist the increased force which must have been employed by the boulders, and the force-power of the pelvis. It is evident that the pelvis should possess stability and resistance adequate to the due effect of the forces acting from it and so applied. If the pelvis and hind-legs were all forced in this way, the whole body would be thrown towards the trunk, and the fore-limbs to draw forwards the pelvis and hind-legs. The unproportioned weight of both these parts, and the extraordinary power of the muscles connecting them, would be sure to produce the scapular hypothesis of the Megatherion animals; since, if they attained their food by climbing, the fore-limbs would be the fixed point when the muscles attaching these to the pelvis were called into action, and the hind-extremities, no longer supported by the body, and thus bearing the whole weight of the animal, would be insufficient to resist the increased force which must have been employed by the boulders, and the force-power of the pelvis. It is evident that the pelvis should possess stability and resistance adequate to the due effect of the forces acting from it and so applied.

A palaeontologist, who has earned a just celebrity by his successful exertions in the discovery of the fossil Mam- malia of Brazil, has pushed the hypothesis of the climbing habits of the Megatherioids so far as to hazard the conjecture that the Megalonyx, in its rightness of the fore-limbs and hind-limbs, bore the same relation to the placentiferous as the ant-eaters to the artiodactyls, and the fore-limb to the hind-limbs as the ant-eater to the artiodactyls. The compressed or unpressed form of the claws, which detracts from their power as burrowing instruments, adds to their fitness for penetrating the inner parts of woods for securing their prey or exposing any other object from the attacked soil. This operation having been duly effected by the alternate action of the fore-feet aided probably by the ungulate digits of the hind-feet, the long and curved fore-claws, which are habitually fixed and, being the posterior parts of the animal, are the outstretched arm of the ant-eater, and thus the force and the resistance of the animal is reduced, being thrown against the branch or tree, as it were, with the whole weight of its body, which is comprehended in the animal, enabled to break the branch as it were, and the weight of the animal, which is increased by the act of the muscles towards the grasped branch, as to a fixed point. The stouter proportions of the prehensile hands of the Mylodon accord with the structure of the pelvis; the stouter proportions of the fore-limbs and hind-limbs, and the arbor-quadraped, are manifest in the structure of the prehensile instruments of the existing and extinct Sloths extending as far as was compatible with the different degrees of resistance to be overcome. In the small climbing Sloths, the long and slender, having proportioned their body and the weight of the animal to the light body, which is approximated by the action of the muscles towards the grasped branch, as to a fixed point. The stouter proportions of the prehensile hands of the Mylodon accord with the structure of the pelvis; the stouter proportions of the fore-limbs and hind-limbs, and the arbor-quadraped.
The tree being thus partly undermined and firmly grappled with, the muscles of the trunk, the pelvis, and hind-limbs, animated by the nervous influence of the unusually large spinal cord, would combine their forces with those of gravity in an effectual manner.

And now let us picture to ourselves the massive frame of the Megatherium, convulsed with the mighty wresting, every vibrating fibre reacting upon its bony attachment with a force which the sharp and strong claws of the Mylodon were fitted for striking the base. The Megatherium, whose teeth and jaws were adapted to the comminution of the coarser parts of tree-foliation, appears to have been endowed with a short proboscis, as an assistant to the tongue; and since, with lips and a nose modified to gain prehensile power, there would have been less need of an inordinate development of the tongue, the evidence of the proboscis of the Megatherium harmonises with the smaller size of its hypoglossal nerves, and with the diminution of the capacity of its mouth, occasioned by the narrowing of the palate and the mutual approximation of the lateral series of grinders. The elephant, highest of existing phyllophagous quadrupeds, is characterised by a much greater length of the proboscis, as well as of the whole skin-tube, than the Mylodon.

Both a prehensile tongue and proboscis, but of moderate size, coexisted in the Megatherium. The Mylodon, which had no proboscis, was compensated for its absence by the large development of the tongue, and is in contrast with the almost toothless elephant.

It will at once occur to the reader that these Megatherian animals must from their habits of life have been unusually liable to blows from heavy falling bodies; and, to meet such danger, they were provided with the most efficient protection: the length of the flat bone of the skull, and the thickness of the periosteum, were as much the result of selection as they were of descent by preference. The coarse matted hair with which their light body is densely covered is well suited to break the force of such falls, whilst any injury to the brain seems to have been provided against by the firm wall of bone which, as the result of the long-continued growth of the brain and the appearance of the hair, results from the extension of the air-cells from the frontal along the upper part of the head to the occipital region. But the same structure exists to an equal or greater extent in the Mylodon, which, according to my interpretation of its organization, was not a climber, not subject therefore to a fall. Yet the liability of the Mylodon, in the habitual practice of uprearing and protruding large trees, to be struck by the trunk or some of the large branches, must have been greater than that of the Mylodon to a fall from a tree; and therefore the advantage to the Mylodon of having a double brain-case would not be less.

Certain it is that the habits of life, or the conditions unconnected with the existence of a species, of the Mylodon existed, did not give it occasion for violent blows on the head, and that it was owing to the extensive and deep cellular diploë of the skull that they were not, in the present instance, death-blow.

It is at least not improbable that any large mammiferous animal would have been affected by a fracture and compaction of the mylohyoid, or fracture and depression of the mylohyoid table at the back part of the skull, as that which in the Mylodon is here confined to the outer table. Either of the blows, however, to the force of which that strong plate of bone has yielded, must have stunned and at least have temporarily disabled the animal; and, if inflicted by the paw of some sufficiently powerful carnivore, would have left the Mylodon its easy and unresisting prey. If the skull of an animal so destroyed had been preserved and afterwards discovered in a fossil state, the broken bones would not have presented any of those effects of the reparative processes which are so extensively manifested in the very remarkable specimen under consideration.

It is not very probable that the Mylodon, if disabled and its skull fractured by a blow received in conflict with another of its kind, would have been suffered to escape: the victorious assaulter would in all likelihood have followed up his advantage by a mortal wound, such as an animal so large as the Mylodon would have sustained, or by the sharp and ponderous claw, if excited by combative or destructive instincts. Nothing, however, that has yet reached us of the habits of existing Edentata would lead to the supposition that the extinct ones were actuated by these passionate instincts, which, perhaps, is the more surprising in the case of those of the Sloths, the Ant-eaters, and Armadillos of the present day. Only in self-defence against the carni-vorous Jaguar or Puma is the strong-clawed Ant-eater (Myrmecophaga jubata) reported to use successfully its powerful weapons, with the analogies of which a Mylodon or Megatherium might be conjectured to have produced the injuries in our present fossil, on the combative hypothesis of their origin. But in the conflict of the great Ant-eater with the jaguar, or of the occasional assault of the jaguar on a sloth, the projectile object does not afford the pertinacity of the grasp, not by the force of the blow. The only analogies, therefore, by which we can test the conjecture that the injuries in question were inflicted by a creature distinct from the Sloth, are the long and strong claws of an animal.

There is no certain or conclusive evidence that human beings coexisted with the Megatherian animals: but assuming a primaeval race of Indians to have disputed the dominion of the American forests with the Edentate giants, and to have been involved in conflict with their superior animals, a war of extermination, the same difficulty presents itself to the supposition of the recovery and escape of a stunned Mylodon from their deadly assaults with clubs and other weapons, we are compelled to refer those injuries to the effects of some inanimate force, which, having killed the Mylodon and temporarily disabled it, was spent, and could not follow up the blow. To a huge denizen of the woods what accident more likely to produce such injuries to the skull of a tree, which, by the action of the mighty leaf-eating, would be more obnoxious to such an accident than one destined by its organization to be habitually engaged in uprooting, and therefore in danger from the fall of heavy objects? If an Indian had shot in the back of the leaf-eating skull, in both of which the fissures diverge from a longitudinal, instead of radiating from a central depression, accords better with a blow from a branch or trunk of a tree than with one inflicted by the point of a largeawl. It must, therefore, be conceded that both the injuries, and the structure of the skull, by which their immediate fatal effects have been obviated, accord with the habits assigned to the Megatherian animals in the present memoir; while they can find no elucidation from, nor appear in any way connected with, the acts of digging the earth for roots, or ants, or for concealment, which have been severally conjectured to be the habitual labour of the Megatherioids by Cuvier, D'Alton, and De Blainville.

Zoological Summary.

The genera Bradypus and Cholopus have been usually regarded as forming one of the most abnormal and isolated groups of Edentate animals. Cuvier placed them in the lowest order of Ungulatae, and De Blainville has raised them to the highest or quadrumanous order, agreeably with an old opinion of Linnaeus.

With the advantage of our present knowledge of the extinct Megatherioids, the tardigrade and scissorial Edentata, which appeared formerly to be a very restricted and aberrant group, are now recognizable as the small remnant of an extensive tribe of leaf-devouring and tree-climbing animals, the larger extinct species of which, with their generally developed but modified ungulicate structure, formed the
lowest grade of mammals furnished with claws, and completed the transition to the Ungulata. 

Professor Owen observes that it would border upon the ridiculous to advocate the claims of the Mylodon to the quadrupedal character. It was built on a scale as great as the lion and as very much deeper, its muffle broad and truncated, its pelvis expanded, the head of the radius round and apt for rotation, the infection of the carpus and tarsus free, the long claws prominent, and the dice-echynuran, the vegetable. Yet the claims of the Megatherium to be associated with apes and lemurs are, he remarks, equal with those of the sloths.

The Megatheriids most probably, like the sloths, gave birth to a single and unusually large fetus: in that particular respect it would have been in the position of the elephant and whale as much as with the ape. If their uterus was undivided, as in the sloths, they would agree with the Armadillos as well as the Quadrupes. After other considerations of the probability of the brain, the system and structure, Professor Owen thus concludes his zoological summary:

'The degradation of the armature of the jaws in this order produces, especially in the truly edentulous Ant-eaters, a resemblance to the class of birds in one of their best-marked characters; and amongst the implacable Edentata we find the jaws themselves assuming the form of a duck's bill in the Omhithoryenchus.'

In order to observe the Sloths that they illustrate this affinity or tendency to the oviparous type by the supernumerary cervical vertebras supporting false ribs, and by the convolution of the windpipe in the thorax, in the three-toed species; by the lacerine character of three and twenty pairs of ribs and by the sacrum, the vertebral column, and the clavicle. The sloth is a terrestrial element, without branchial. All these indications of a transition to a lower class harmonize with the Cuvierian view of the zoological position of the Sloths, as members of one of the lowest and most aberrant orders of Mammalia; and all oppose themselves to the promotion of the Sloths to the Primates, and to their separation from the terrestrial Edentata, which afford in the Ant-eaters and Panzolinus, the Echidna and Omhithoryenchus, so many additional retrograde steps towards the oviparous classes.

The sloth is a peculiar and gradational affinities of the Mylodon and its congers to the different families of the Edentate order, since these have been so fully elucidated in the comparisons of the several parts of their skeletons. They establish the general conclusion that there is no place for them as Sloths constitute a primary division or type of the order Bruta, or Edentata, equivalent to the tribe Loricate, or Armadillos, and to the true Edentata, or the Ant-eaters and Tremes.

'The teeth and jaws give the essential character, and govern the alinement of the new primary group, of which the name Phyllophaga, here proposed, indicates the characteristic and peculiar diet.'

The characters of the tribe, of its families and genera, and of the extinct species especially noticed in the present Memoir, are given in the subjoined Synoptical Table.  

Conspicuous

Of the families, genera, and species of the Leaf-eating Bruta.

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The Phyllophaga (Leaf-eaters).

Teeth few, composed of vascular dentine, hard dentine, and cement; the vascular dentine forming the great axis of the teeth. 

A descending apophysis in the jugal bone. The aero- 

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A descending apophysis in the jugal bone. The aero-
Teeth 5 - 5, either contiguous or separated by equal intervals; upper ones trigonal; the anterior of the lower ones trigonal, the second and third subcompressed, the external face longitudinally sulcated; the last the greatest and bilobate.

Head of the femur impressed by the ligamentum teres; tibia and fibula distinct. Astragalus with two excavations anteriorly. Heel-bone long, thick. Falcular claw great and semicircular.


Teeth 4 - 4


In the Unau the number of cervical vertebrae is seven: in the Three-toed Sloth, Bradypus tridactylus, the number is nine.

The close approximation of the Sloths to the Birds in many parts of their organization calls upon us here to notice a discovery which will make the year in which we write (1943) a very remarkable one in the zoological calendar; and before we enter into the particulars of that discovery, we will just illustrate the close approximation above referred to, by observing that if nothing but the broken gigantic pelvis of the bird hereinafter noticed were laid before an experienced eye, it might fairly enough be taken on a superficial view to have belonged to the genus Mylodon, though a closer examination would detect certain minute characters which show that it could not have belonged to a quadruped.

In the article Struthionidea will be found Professor Owen's descriptions of the fragment of a femur said to have been found in New Zealand, laid before the Zoological Society of London in 1839. [Vol. xxiii., p. 147.]

On the 17th of May, 1842, the Reverend William Williams wrote from Poverty Bay, New Zealand, to Dr. Buckland, and his letter contained an extract from another, sent by way of Port Nicholson, in February of the same year.

It is about three years ago, on paying a visit to this coast south of the East Cape, that the natives told me of some extraordinary monster, which they said was in existence in an inaccessible cavern on the side of a hill near the river Wairoa, and they showed me at the same time...
some fragments of bone taken out of the beds of rivers, which they said belonged to this creature, to which they gave the name of Moa. When I came to reside in this neighborhood I heard the same story a little enlarged; for it was said that one of the large birds, a male, had been captured and killed, and that a considerable reward was offered to any who would catch me either the bird or its protector. At length a bone was brought from the river running at the foot of the hill, of large size, but the extremities were so much worn away, that I could not Affirm anything as to its nature or relationship. About two months ago a single bone of smaller size was brought from a fresh-water stream in this bay, for which I gave a good payment, and this induced the natives to go in large numbers to turn up the mud at the banks and at the bed of the same river, and soon a larger number of bones was brought of various dimensions. On a comparison with the bones of a fowl, I immediately perceived that they belonged to a bird of gigantic size. The bones of which I have given an account have been brought are the three bones of the leg, a few toe-bones, and one claw, which is in size, a few imperfect pelves, a few vertebrae of different dimensions, and one rib (belonged to) in size, considerably smaller. There are also a few broken pieces, which seem to be ribs. In the case now sent you will receive the largest specimens I have obtained, and also a few of smaller size. The length of the large bone of the leg is 2 feet 10 inches. I have a second case, which I shall send by another vessel, to make sure of your receiving them. If the bones are found to be of sufficient interest, I leave it to your judgment to make what use of them you think proper. But if the duplicates reach you, perhaps one set may with propriety be deposited in our museum. The following observations may not be devoid of interest:—

1st. None of these bones have been found on the dry land, but are all of them from the banks and beds of fresh-water rivers, buried only a little distance in the mud. The largest number are from a small stream in Poverty Bay, but they are also found in a similar position at Waiapu, Tolaga Bay, Wairoa, and at many inconsiderable streams, and all these streams are in immediate connection with hills of some altitude. In the absence of a bird, so common to these districts, it is easy to conceive that the bones might have been washed down the streams in the same manner as those of the Peruvian Condor.

2nd. This bird was in existence here at no very distant time, though not in the memory of any of the inhabitants; for the bones are found in the beds of the present streams, and do not appear to have been brought into their present situation by the action of any violent rush of waters.

3rd. That they existed in considerable numbers. I have received perfect and imperfect bones of no less than thirty different birds.

4th. It may be inferred that this bird was long-lived, and that it was many years before it attained its full size. Out of a large number of bones, only one leg-bone, now sent, is of the size of 1 foot 10 inches; two others are 2 feet 6 inches, one of which I shall send hereafter; the rest are all of considerable size.

5th. The greatest height of the bird was probably not less than 14 or 16 feet. The leg-bones now sent give the height of six feet from the root of the tail. I am told that the same given by the Malays to the Peacock is the same as that given by the natives to this bird. Within the last few days I have obtained a piece of information worthy of notice. By speaking to an American about these bones, he told me that the bird is still found in the neighborhood of Cloudy Bay, in Cook's Straits. He said that the natives there had mentioned to an Englishman belonging to a whaling party that there was a bird of extraordinary size to be seen at a little distance from the hill near the place, and that he, with a native and a sepoy, Englishman, went to the spot; that after waiting some time they saw the creature at some little distance, which they describe as being about 14 or 16 feet high. One of the sepoy apparently complained so exceedingly terrified, or perhaps both of them, that they were satisfied with looking at him, when, in a little time, he took the alarm, and strode off up the sides of the mountain.

This incident might not have been worth mentioning, had it not been for the extraordinary agreement in the size of the bird. Here are the bones which will satisfy you that such a bird has been in existence, and that is said to be the living bird, the supposed size of which, given by the natives, precisely agrees.

6th. Should I obtain anything more particular, you will fail to hear from me, and in the mean time may I request the favour of your opinion upon these bones, and also the information whether any others of similar character have been obtained, and that his specimens had been liberally placed in his hands for description.

Professor Owen remarks, that an entire femur, somewhat larger than that of which the shaft (the fragment above mentioned) was collected, and described in the Society's Transactions (vol. iii., p. 32, pl. 3), proves the specific identity of the remains sent with that fragment, upon which he had ventured to affirm three years ago, that a large Struthionidæ, * of a heavier and more sluggish species than the Ostrich, had become extinct, if it were not still living in New Zealand.

The femur, he observes, has very nearly the same proportions of thickness as length as in the Ostrich, but the shaft is less compressed; not only in the general form of the Apteryx, in being shorter in proportion to its thickness; but it resembles the femur of the Apteryx, and differs from that of the Ostrich and Emu in the important character of the absence of the air-hole at the back part of the tibia, and neck, and that it is larger than the air in the interior of the bone. It differs from the femur of the Ostrich and agrees with that of the Apteryx in the greater width of the anterior of the condyle. It differs from that of the Apteryx, not only in the general form of the shaft and case of the condyle, but also in the form of the distal extremity, which has a deeper posterior intercondylar depression, and a sharper and more produced posterior part of the outer condyle.

Professor Owen states that the length of the femur of the great bird compared is 11 inches, the circumference of the middle of the shaft 54 inches; but he adds, that the collection transmitted by Mr. Williams includes the shaft of a femur of another individual having a circumference of 74 inches.

The most perfect tibia in the collection under consideration measured 2 feet 44 inches, and apparently corresponded in proportion with the fragment of the largest femur; allowing, then, that femur 14 inches in entire length, the tibia is twice the length of the femur, while in the Apteryx the tibia is only one-third longer than the femur.

The larger Struthionidæ, the Ostrich and Emu for example, more nearly resemble the great New Zealand bird, Professor Owen remarks, in the length of their tibia, but it is not quite twice the length of the femur in those species. The tibia of the great New Zealand bird differs, he observes, from that of the Apteryx and all the Struthionidæ in the complete ossaceous canal for the passage of an extensur tendon in the anterior concavity above the distal condyles. This osseous canal is commonly found in the tibia of the Gallinaceous birds, but Professor Owen found the proportion of length to thickness of the tibia to be nearly the same in the Ostrich and the great New Zealand bird: the circumference of the tibia at its proximal end in the latter was 15 inches, at its middle 6 inches. But the most curious fact of the present occasion was a tarsal-metatarsal bone, showing that the gigantic bird was triadactyle, like the Emu, Rheas, and Casowary. The remains of the proximal end of the bone proved it to have been articulated with a tibia about an eighth part shorter than that above described, that is,

* This letter corroborates the statements of the Rev. W. Williams.
to a tibia about two feet in length. The length of this tarsometatarsal bone is one foot; or, as Professor Owen remarks, one fourth of the length of the tibia; and this is exactly the proportion which the tarsometatarsal bone of the Apteryx bears to the tibia. The tarsometatarsal bone in the Emu is as long as the tibia; in the Ostrich it is a little shorter.

Professor Owen gives the following comparative observations, showing the difference in the proportions of the tarsometatarsal bone of the gigantic bird of New Zealand and of the Emu:

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<tr>
<th></th>
<th>Dinornis</th>
<th>Dromius</th>
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<tr>
<td>Length</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Circumference of the middle</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Breadth of the distal end</td>
<td>3</td>
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and he observes, that the comparative shortness and strength of the trifid metatarsal of the gigantic New Zealand bird forms its most striking resemblance to the Apteryx, which it thus approximately more closely than any of the large existing Struthionidae.

The Professor then goes on to remark, that the proportions of the leg-bones, and their denser texture, especially that of the recent crasus, as in the Emu, Rhea, and Cassowary. Then the question arises, is it, likewise, generically distinct from the Apteryx, or is it a gigantic species of the same family? This question resolves itself to be decided by the examination of the bones of the tarsometatarsal bone. The Apteryx, he observes, is distinguished from the other Struthionidae, not more by its elongated bill, than by the presence of a fourth small toe, sometimes even accompanied by toes, the foot, and that to a slightly elevated surface of the tarsometatarsal bone, about a fourth of the length of that bone from its distal end. Now there is no trace of the articular surface for the tarsometatarsal bone of the gigantic bird, which was consequently tridactyle, as in the Emu, Rhea, and Cassowary. The Dodo was tetradactyle, like the Apteryx; the shorter proportions of the legs of the Dodo also distinguished it from the gigantic bird, whose career. Professor Owen remarks, in the North Island of New Zealand, seems to have been closed at a period apparently corresponding with the extinction of the Dodo in the island of Rodriguez. The results of the foregoing comparisons justify the reference of the Great Bird of New Zealand to a distinct genus of the Struthionidae family, for which Professor Owen proposes the name of Dinornis, with the specific appellation Nova-Zealandiae.

In conclusion, Professor Owen observes that the extraordinary size of this bird has been of great advantage, and, still more, that of the tibia, said to measure 2 feet 10 inches in length, obtained by Mr. Williams, prove the Dinornis of New Zealand to be the most gigantic of known birds; though he does not yield to the extreme hypothesis that it will ever be found, whether living or extinct, in any other part of the world than the islands of New Zealand or parts adjacent. At all events, he considers that the Dinornis Nova-Zealandiae will always remain one of the most extraordinary of the zoological facts in the history of those islands; and he thinks, most correctly in our opinion, that it may not be saying too much to characterise it as one of the most remarkable acquisitions to zoology in general which the present century has produced. (Zool. Proc.)

It is impossible to look at these colossal remains without acknowledging that there is some excuse for the fright of the adventurers who allege that they saw this feathered giant in the flesh. The bones are massive: fat stouter and broader than those of the other tridactylous Struthionidae, much stouter and broader, more mammalian, so to speak, than in the Apteryx, and the bulk of the bird must have been great. The femur of the Irish giant O'Donovan-O'Brien, as he was called, was said to be eight feet long, and is now in the museum of the College of Surgeons, eight feet high,—is not quite two feet in length: the longest tibia now sent is four inches and a half longer at the head, and we have a whole bone measuring two feet ten inches in length. Nor is it by any means improbable that the bones already found are the largest in existence. The variety in the shape of the remains already sent quite bear out the judicious remarks of Mr. Williams, and it is difficult to deter-

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* Professor Owen pointed out to us the strong resemblance of the pelvis of Dinornis to that of the Eustard.

mine what limit there was to the growth of Dinornis Nova-Zealandiae. The comparatively small bones now sent give a height of only 12 feet.

It is curious and instructive, with these wonderful bones before one, to look back to Professor Owen's description of the fragment of bone which first came under his notice, and to read the deductions which he drew from it. Entirely in the region of the bone with the extraordinary light which he extracted from that fragment (the mere shaft of the bone, be it remembered), every word that he then wrote has come true to the letter. Long ago he showed of the bone, which he drew with ends of this fragment of a femur ought to be; and it is but just to this acute and deep-thinking physiologist to say that if the drawing had been made from the perfect bone it would hardly have been more accurate.

We have been asked that this is instructive; and we think it will not be denied that it shows what may be done in the way of arriving at the structure of an entire animal from a single bone or even the fragment of a bone, notwithstanding the immense differences between the existing and fossil forms and a powerfully comprehensive mind. But because this instrument has been misspelled by the feeble, it is not to be deemed valueless.

1. New Zealand. Upon comparing the largest known fossil footprint of a bird with the comparatively small bones belonging to the gigantic bird of New Zealand now in the British museum, it was not a jot too large to have been impressed on the etymological toes of Dinornis. What a chapter this opens in the book of Geology!

UNCA'RIA, a genus of plants of the natural family of Rubiaceae, so named by Schreber from uncaus, a hook, the old or inferior sterile peduncles being converted into hooked stipules. Being closely allied, times considered only a subgenus of Nauclea. The flowers are aggregate, on a globular receptacle. Calyx tubularly urceolate, 5-cleft. Coroll funnel-shaped, with a slender tube and narrow throat. Stamens 5. Ovary 2-celled. Capsules pedicellate, clavate, attached at the base. Seeds imbricated, winged. Embryo inverse and furnished with a perisperm. The species are chiefly natives of India, but a few are found in America. They are permanent ciliated ramulus, hanging to different trees by a hooked peduncle. One is sufficiently remarkable, from its economical uses, to require a detailed notice. This is the Gambier plant, Uncaria Gambir of Roxburgh, a native of Java, Sumatra, Malacca, &c., from which the substance called Gambir, or the Malay gambier, is prepared, and is known in commerce by the names of Terra japonica and Catechu.

This plant was first described by Rumphius, *Herb. Amb.*, p. 17, t. 30, f. 2, and the name of uncaus angustifolius, but the process of preparing the extract was first fully described by Dr. C. Campbell, one of the early medical officers of the station of Bencoolen, who paid considerable attention to the useful plants of the neighbourhood. He states that it is obtained from the Malaya gambier mingled with betel leaf and areca-nut in the same way that estechu is used on the continent of India, and was solicited that a trial should be made of its power in the cure of dysentery. In the preparation he describes that certain sections of the shoot and leaves are shred and bruised in water for some hours until a feeculum is deposited: this inspissated in the sun to the consistence of a paste, is thrown into moulds of a circular form, and is called the gambier, is brought to market. In this mode Dr. C. saw it prepared in his journey to Cochin-China, at a small village where the sultan of Moco had established a colony for carrying on the manufacture to a considerable extent. Dr. Roxburgh states that in other places and on the island of the Barings, the process is carried on by boiling the leaves and young shoots; evaporating the decoction by fire and the heat of the sun. When sufficiently inspissated, it is spread out and put into little square laths and dried.'

Maiden says (Hist. of Sumatra, p. 243), that the gambier is a subgenus of Uncaria.

* Mr. Lyall just read a paper to the Geological Society of London on some interesting plant remains from the earth collected by him in America. Dr. Marsh has also called attention to some from the West Indies.
prepared from the leaves of a tree of that name, by boiling its juice in a porcelain dish on a steam bath for half an hour. It is then filtered and the filtrate evaporated in a steam bath, until the solid residue contains about 55% of the original weight. This is then ground to a powder, mixed with starch, and pressed into tablets. The tablets are then subjected to further purification by extraction with hot water and subsequent evaporation of the water. The final product is a white, granular, amorphous material that is odorless and tasteless. It is used in the preparation of various pharmaceutical products, including cough syrups and mouthwashes. The active ingredient in the leaves is a glycoside called picrotoxin, which has a bitter taste and is used as a medicinal herb.

The leaves of the picro-toxin plant are harvested in the spring and dried in the sun. They are then ground into a powder and mixed with other ingredients to make the final product. The leaves are used in the treatment of certain conditions, such as epilepsy and tremors. The leaves are also used in traditional medicine in various parts of the world, including China and India.
ethereal medium; therefore the values of $\lambda$ and $T$ differ for different colours: the values which cause the perception of redness are the greatest, and those which produce the violet colour are the least.

Undulations are conceived to be of various kinds; that which has been described is analogous to the movement in air by which sound is produced. A second kind may be supposed to be that in which the particles in each radiating line perform, without any movement in the direction of the line, oscillations of small extent alternately on each side of it; the oscillations taking place in directions perpendicular to the line and in one plane: the points where the particles are at the greatest distances from the line on either side are at equal intervals along the line; and each of these intervals constitutes the length of an undulation. This kind of vibration is nearly analogous to that which takes place on the surface of water when a stone has been let fall in it. Both of these kinds of vibration may be conceived to take place at the same time; and the last may be combined with a like vibration in a plane at right angles to the former plane. (Polarization or Louvre.) It must be observed that, whatever be the kind of undulation, the greatest excursions of a particle on each side of its mean place are supposed to be equal to a very small fraction of the length $\lambda$ of an undulation.

The vibrations produced on the fibres of the retina by the vibrations of the ethereal particles, are supposed to be the cause of the perception of brightness. A single impulse, or one repeated at irregular intervals, may not be capable of producing such perception, but if the impulses are repeated at the same point, corresponding motions may be excited in the fibres, and hence the perception may arise: differences of colour are conceived to depend on the times in which the successive impulses are repeated. From reasons founded on the fact that no gain or loss of light is experienced in reflection or refraction, so that the amount of its intensity remains constant however the velocities of the particles may be changed in quantity or sign, it is inferred that the maximum intensity of light in the eye may be expressed by the square of the whole amplitude of the vibrations of the ethereal particles.

In order to exhibit the manner in which reflection takes place at a plane surface, on the undulatory hypothesis, let the plane of the paper be perpendicular to that of the reflecting surface, and let $AB$ be the line of section; also let $MN, PQ, RS$ be three radii diverging from a luminous point, which, for simplicity, conceive to be at such a distance that the radii may be considered as parallel to one another: again, the successive fronts of the waves being supposed to be plane surfaces, let them intercept the plane of the paper in straight lines perpendicular to the radii. Then the waves which are in part arrested at $N$ and $Q$, would, if there had been no interruption, have continued their motion, and a wave front passing through $S$ would have cut the paper in the line $mQ$, the ethereal particles in the plane passing through that line being in the like phase.

But, in consequence of the interruption, let spherical waves diverge from $N, Q,$ and $S$: those moving with the same velocity as the original wave, the radii $NN', QQ'$ of the waves which diverge from $N$ and $Q$ will be equal to $NN', QQ'$ at the time that a wave begins to diverge from $S$; it is evident, therefore, that a straight line passing through $S$ will touch the spherical surfaces at $q$ and $n'$, and will be the intersection of the front of the reflected wave with the paper. This front will be a plane, and the line $NN'$ will make with $NS$ an angle equal to $NN$. Perpendiculars to this line, as $NN'$, $QQ'$ produced, will denote the direction of the motion of the reflected wave; and, from the equality of the triangles $SNN', SNQ, \ldots$, it follows, that this direction will make with a perpendicular to the reflecting surface an angle equal to that which is made by any of the lines $MN, PQ, \ldots$, that is, the angle of reflection is equal to the angle of incidence.

The manner in which ordinary refraction at a plane surface takes place on the undulatory hypothesis is thus explained. Let $AB$ be the intersection of the reflecting surface with the paper, and, as before, let $MN, PQ, RS$ be three radii supposed to be parallel to one another; also let $nQ$ be the front of a wave which would have been formed if there had been no interruption. In consequence of the interruption, let agitation be excited in the body within the body, so that $N, Q,$ and $S$ become the centres of spherical waves whose particular fronts $n', q,$ and $s'$ would be produced, if the surface of the undulations was equal to one another, but different from that of the original wave before incidence: let $Qq$ be to $Qq'$, and $NN'$ to $NN'$ in the same ratio as the velocities of the waves previously and subsequently, to the time of incidence (suppose as $m$ to 1); then $NN'$, $QQ'$ will be a straight line, and will represent the intersection of the plane front of the reflected wave with the plane of the paper. The angles $NSn', NSn$, are equal to those which the directions of the incident and reflected waves make with a perpendicular to the reflecting surface, therefore.

$NN$; $NN'$ ($m: 1$) : : sine of incidence : sine of refraction (see also Light, p. 476, col. 2), and the velocities of the waves before and after incidence are to one another in the ratio of the sines of incidence to the sines of refraction.

In order that the relation between the sines of incidence and refraction may be conformable to the results of experiment, it is necessary to assume that the velocity of the waves is diminished when they enter a medium more dense than that in which they previously moved; and in the circumstance the undulatory theory is opposed to the theory of emission: for, in the latter, the velocity of light is supposed to be increased when it passes from one medium into another.

When concave waves fall on the surface of a convex mirror, the points on the latter which are struck by the vibrating particles of ether become the centres of spherical reflected waves, the directions of whose motions, or, in short, the equality of the angles of incidence and reflection, tend towards the axis of the mirror; and the surfaces which touch all the reflected waves at points in the like phase become those of as many general reflected waves of spherical forms, having their convexities towards the mirror. These general waves go on contracting till they pass successively through some point in the axis; the form of the mirror being such as to permit the direction of the motions of the reflected waves to concur in a point from which the form of the surface of the medium is provided the form of the surface of the medium in such a manner as to permit the directions to concur in one point: this point is the focus, and from it, as from a radiant point, the concentric waves afterwards diverge.

When several undulations coexist, they are said to interfere with one another; and assuming that the displacement of a particle produced by any number of coexisting undulations may be expressed by the sum of the displacements
which the undulations would separately produce, the rules of integration will give the whole amount of the disturbance produced by the interference of any number of waves. Where, for example, two waves are superposed, the greatest amplitudes of vibration may occur at places which are at intervals from one another equal to \(\lambda, 2\lambda, 3\lambda, \ldots\); and if the amplitudes are equal, the whole amplitude of vibration will be double that of one particle alone: thus on this account, the depth of shadow produced by two waves will be twice as great as that which would be produced by one. On the other hand, if two equal undulations are transmitted in the same direction, and the one follows the other without variation in phase, the amplitude in one will coincide with the minimum in the other, and the effects will be destroyed, or the particles will be at rest, and on a screen darkness will be the result.

If the undulations follow at other distances, the destruction of the waves may be complete, and the brightness which brighten will be the result of some intermediate degree of intensity.

With respect to polarized light, the experiments of MM. Fresnel and Arago have shown that two waves of ordinary light, which are polarized in the same plane interfere with one another in the manner just mentioned, as if the light were not polarized: also that if two series of waves are polarized in planes at right angles to each other, and are in circumstances such as that one light would destroy each other's disturbances, their interference produces no effect.

On the corpuscular hypothesis, it is supposed that the particles of light are supposed to be distinct points or corpuscles, and that at the minimum point in directions strictly rectilinear, it must follow that the shadow cast on a screen by an opaque body would have a well-defined boundary; also that its magnitude would depend on that of the body and on the distance of the latter from the luminous point and from the screen. But before the year 1663 Grimaldi had observed that when a pencil of light was received in a dark room through a small circular orifice, the rays, instead of continuing to be parallel to one another, diverge in a conic segment, and therefore the shadow cast by an opaque body was bordered by coloured bands or fringes: he also observed that when light was admitted through two small orifices near one another, the rays diverging from thence became intermixed, and that the space on the screen on which the intermixed rays fell was darker than the part enlightened only by the rays from one orifice. A few years afterwards Dr. Hook, in this country, observed the like phenomena, and published in one of the first editions of Newton's works, the impossibility at that time of giving a satisfactory explanation of these appearances seems to have led Huygens to propose the theory of undulations.

Based on the experiments of Grimaldi and Hook, on the concentric coloured rings which are formed between the surfaces of two prisms or convex lenses of glass, by assuming that the particles of light in a refracting medium experience alternately, at the end of very small intervals of time, two opposite forces, he applied the principle to the passage of a ray through the edge of an opaque body. He conceived that by alternate fits of easy attraction and repulsion in the particles of light the rays may be produced in a serpentine form, and that from corresponding points in the flexures they might send off particles in lines which, crossing one another, would form series of points where the light would be more condensed than in the intermediate spaces. These alternate fits or alternations produced on a screen have a certain extent explained by Newton's hypothesis, but the theory of the interference of waves has been shown by Dr. Young and M. Fresnel to follow, according to the hypothesis of Huygens, the same laws; and therefore it follows that the corpuscular theory is incapable of affording an equally satisfactory explanation. [DIFFRACTION, col. 2.]

From the first principles of the undulatory theory it follows that the coloured rings between two lenses, when seen by reflexion, should be of the same kind and in the same order as the rings seen by transmission, beginning with a bright spot in the centre (for the interval between the waves reflected from both surfaces to the eye must be the same), whereas the central spot seen by reflection is quite black, and the waves must consequently destroy one another's effects. In order to reconcile this discrepancy, it becomes necessary to suppose that half an undulation is lost or gained by the waves reflected either from the first or the second glass. In the supposition that the loss or gain means improbable, since there may exist some variation from its general state, in the density or elasticity of the other at the surfaces of the lenses. It must also be observed that when light falls on the lenses at great angles of inclination, the phenomenon of the interference of the undulatory hypothesis, differs considerably from the results of experiment; no cause has yet been assigned for this circumstance, but it has been supposed that it may arise from some peculiarity in the general law of refraction when the incidences are great.

It was objected by Newton to the undulatory theory, that, if just, light passing by the edges of an opaque body ought to be interdicted into the shadow cast by the body, as was supposed in the case of a narrow strip of opaque body, then the light of these bands would be destroyed; but on inspecting the theory, it appears that the light, if passing through the body, would be divided into a series of opaque bands or columns of light, and it would act in a direction to one side of the body, the bands immediately disappeared. In order to account for the appearance of the bands on the undulatory hypothesis, it is only necessary to observe, that the waves of light from the edges of the body to a point on the screen opposite its centre being equal to one another, the fronts of the interfering waves must arrive at that centre in the same state; and their effects being added together, the intensity of light at that point is the same as it would be if the waves from the edges of the body to any other part of the shadow on the screen will be unequal; and at every place where the difference is exactly a unvane multiple of \(\lambda\), the waves must arrive in opposite phases, and thus destroy each other's effects, or produce darkness; between these dark bands the degrees of brightness will depend upon the states of the interfering waves at those places. If the incident light is homogeneous, or of one colour, all the intervals between them are black.

Besides the bands so formed within the geometrical shadow of the body, a series of parallel bands was also observed by Newton, and was explained by Huygens by conceiving that, like the fringes noticed by Grimaldi and Newton, are conceived to be produced by the interference of the waves of light which come directly from the luminous point with those which are deflected at the edges of the opaque body; but the facts are not altogether in accordance with the theory of the interference of waves, and the interference must therefore be a cause of some difficulty. Dr. Young found it necessary to assume that there is a gain or a loss of half the length of a wave in the paths of those which are deflected; and in the application of the principle of interference to the coloured rings observed by reflexion between glass lenses.

The gain or loss of half an undulation must also be allowed for in explaining the fan-shaped fringes produced by polarized light. Thus, when a series of polarized waves is made to pass through a lamina of sulphate of lime whose principal section is inclined at 45° to the plane of original polarization, the waves become divided into two series, which, though proceeding at different velocities: that, if a thick tinfoil and gold plate is placed so as to receive the 'ordinary' and 'extraordinary' waves when transmitted through two lenses placed in the plane of one orifice, where there are present the two sets of coloured bands. But when there is so placed a thin plate of sulphate of lime whose principal section is inclined at 45° to the plane of original polarization, the waves become divided into two series; one of which is reflected by the plate, and the other, which is transmitted, is polarized in planes at right angles to one another, so as to
be prevented from assuming the state of interference by which coloured bands would be produced.

The situation of the light in the volume of the medium may depend on the refracting medium may depend on, and on that account it may give rise to unequal refrangibilities by producing different velocities and directions of the vibrations of the particles of the medium itself. Mr. Airy suggests that the development of the action caused by the particles of a

A Julchen good and strong the and but The Der on which insensible. instant light. concentric pencils refracting consis of the light are prevented from entering the screen, and the phenomena are exhibited on it. small dark undulatory bars, bars, and a much smaller set of bars, which were accounted for on the corpuscular theory, while our knowledge of the aeration of material particles and the propagation of motion through elastic media, is so imperfect, philosophers seem to be fully justified in suspending their judgment concerning the relative merits of the two rival hypotheses.

UNGER, JOHANN FRIEDRICH GOTTLIEB, was born in 1750, at Berlin. His father, Johann Georg Unger, distinguished himself greatly by the improvements which he introduced into printing, and the typographical ornaments usually displayed by wood-cutter, which had fallen into neglect, was revived by him, and he engraved in wood several landscapes, which are even now considered as works of art. When he died in 1803, his son, Johann Friedrich, who was engaged as a printer, followed in the footsteps of his father. He became one of the most distinguished printers and wood-cutters of his time. As a printer, he endeavoured to introduce such changes in the types of the German printed characters as would make them more beautiful, and at the same time more adapted to the character of the language and old-fashioned and angular forms. The kind of types which he introduced were called, after him, Ungerian types (Unger'sche Schrift), and were used for a time very extensively. This type is still considered very convenient, and the art of wood-cutting was much improved by him, and he was the first who raised it to a high degree of estimation in Germany. As an acknowledgment of his merits, he was appointed, in the year 1800, professor at the Academy of Fine Arts, and was a regular subscriber to the Academy of Sciences for several years. At the same time he continued his business as a publisher, and many excellent works appeared from his establishment. He died in 1804, and his wife, Friederike Helen Unger, a woman of very extraordinary talent, continued his business until her death, on the 21st of September, 1813. Friederike Unger acquired a considerable reputation as a writer of novels, and as a translator from the French and English, with which two languages she was perfectly familiar. Her novels, which are still much read, are chiefly praised for their beautiful delineation of character. The best among them are—


UNGHAR, a county of the kingdom of Hungary, in the circle on this side of Tihany. It is bounded on the north by Galicia, on the east by the county of Berecz, on the south-east by Szabolcs, and on the south-west and west by Zemplin. The greater part of the country is covered with mountains, which are branches of the Carpathians; the only part that is not mountainous is the great plain of the kingdom, which has a good and fertile soil. The principal rivers are the Ungh, the Laboroa, and the Latorza. The natural productions are oats, rye, wheat and hemp. The area is about 1250 square miles. Nearly one-half of the productive part of the country is covered with forests, and large numbers of swine are driven from great distances to be fattened in the swine-breeder. On the branch of the Carpathians called the Beskid there are fine pine-forests. These forests abound in most kinds of game. Fish and bees are in abundance. Horned cattle are sufficient for the supply of the inhabitants; and beef and mutton are kept in the present.

The county has 84,250 inhabitants (now probably nearly 90,000), of whom, in 1833, 62,000 were Roman Catholics (chiefly United Greeks), 12,000 Protestants, and 5000 Jews.

UNGRHA, the chief town of the above county, is
UNGKA-ETAM, the Asiatic name for *Hylobates Rafflesii*, Geoffr., one of the Gibbons, or Long-armed Apes.

**Description.**—Hair thick, furry, black, but in some lights deep brown; loins, and thighs externally, lighter, being of a pale coffee hue. Face encircled with white hair, which is narrow across the forehead; but upon the cheeks expands and forms a large circle. Hair on the hands black of hands and feet black; face, palms, and soles black; hair on forearm reversed towards the elbow. There are fourteen pairs of ribs.

Locality.—Sumatra, in the neighbourhood of Padjang, which is a very fine road. [Unkara.

UNGKA-PUTI, an Asiatic name for *Hylobates agilis*, one of the Gibbons. [Hylobates, vol. ii., p. 407.]

**Description.**—Head, shoulders, inside of the arm, and armpits, are a dark brown. Hair on the face is dark brown; under surface of the body darker than the upper surface. Hind head, back, and loins, from behind the shoulders to the end of the body, and thighs, externally light blond. Cheeks covered with large white whiskers; united above by a narrow band of the same colour across the lower part of the forehead. Callousities encircled by a few brown hairs. First joints of the fore and middle fingers behind united. Face bluish-black. Eyes sunk. Brows large and arched long. Hair of the head with a dark and forward direction. Canine teeth very long and projecting. Fur soft and woolly.

**Female.**—Face browner than that of male; whiskers not so large, and more obscure; eyebrows not so projecting; ears are also less prominent.

Colour of the young nearly the same as that of adults, but less intense; always however darker on the anterior part of the body than on the posterior.

This animal is abundant in Sumatra and the large islands of the Indian Archipelago.

**Habits, &c.**—Sir Stamford Raffles states that both the Ungka-estam and Ungka-puti are more timid than the Siamang, and are without its strength and boldness. The people of the country where it resides believe that the Ungka-puti will die of grief if it sees a preference given to another. In confirmation of this, Sir Stamford remarks that one in his possession seckened under such circumstances, and did not recover upon the removal of the Siamang, to another apartment.

M. Duvaucel observes that the Ungka-puti lives more frequently in couples than in families, and is the least common of the genus found in the neighbourhood of Bencoolen. Strongly contrasted with the Siamang, it is, he says, surprisingly agile, darting away like a bird; and, like some birds, is only to be shot, so to speak, flying. Upon the appearance of a stranger or enemy, its feet are then seen far away. Rapidly ascending to the tree-tops, it grasps the most flexible branches; and after balancing itself, and acquiring sufficient impetus, it repeatedly springs, apparently without effort or fatigue, to the distance of forty feet at a bound.

As a domesticated pet, M. Duvaucel gives it credit for no extraordinary faculty. It is, he remarks, not so clumsy as the Siamang, and its movements are more ready and graceful; but, in his opinion, its manners are less lively than those of the great American monkey. The Ungka-puti is particularly noted for the delicacy of its touch at the external appearance of its long and slender arms and short sandy legs, one would not suppose that its muscle was so vigorous and its address so surprising; but its great power is concealed behind a refined exterior. It will not seem to have been allotted to it: in this respect he considers it to be in no way superior to the Siamang; and he observes that both species are without the high and expanded forehead indicative of superior intelligence.

Yet it never saw however, that Ungka-puti is susceptible of education to a certain point. It has not, he says, the imperceptive gravity of the Siamang: it may be terrified or pleased; it flies from danger, and is acquainted with various objects and habits of the human. It can be trained to a certain degree; it is greedy, curious, and, occasionally, even gay. Although without the guttural sac of the Siamang, its cry, he remarks, is very nearly the same; and he states that the Ungka-puti is known by various names to the Sumatran natives: among others, Wou-wou, a designation by which another species, *Hylodbates leucius*, has long been distinguished.

We agree in thinking, with the author of the "Natural History of Lemurs, Monkeys, and Opposums," that M. Duvaucel means by his drawing the Ungka-puti distinct from the Ungka-estam, but the Siamang from animals in a state of debility and disease. Mr. George Bennett's interesting account of the Siamang, in his "Wanderings," is much at variance with Mr. Duvaucel's account. It is also remarkable that species in a very different light as to its intelligence, affection, and discretion. With regard to *Hylobates agilis*, those individuals which we have seen have been remarkable for their intelligence and sensibility. The Ungka-puti is a very sedentary animal; it has been known to seek out and fondle a baby, laying its face close to the cheek of the infant, which remained perfectly at ease under the caress of its long-armed companion. It has been known to fall asleep for it would lie in the bosom of a gentleman to whom it belonged, look him kindly in the face, and then, with its length of arm passed round him, pick his waistcoat pocket opposite to the side on which it was reposing, apparently thinking of nothing at all, of a signature on which it could lay its lean lengthened fingers. In the same spirit it would frolic with an Orang. Light as a fairy, and quick in its nipping motions as a bird, it would sportively elude the efforts of its most artful and curious person. It was a playmate to catch it. Dashing suddenly from a distance to some holdfast, it would suspend itself by its arms over the head of the Orang, and spin itself as it were, like some intrusive insect, about the eyes and nose of the more sedate Orang, as if avoiding the effect of its own sudden flight and adroitness. After a time it would suffer itself to be caught by the Orang, who would soon let it go, again to resume its amusing agile tricks and mercurial motions. Many of our readers may, we imagine, have witnessed these bold and curious notes uttered by this species, especially in the morning.

UNGKANTS, or ointments, are medicat substances, for external application, and intended to answer a variety of purposes, according to their composition. They are variously designated according to their nature and consistence. At one stage of surgery they were of a very complicated kind, as may still be seen in the so-called balsams (artificial) of our continental pharmacists; but the progress of modern science leading to greater simplicity, their numbers are much reduced, and their ingredients fewer. If they are composed chiefly of wax, without resin, an oil of oil, with or without other active materials, and have the properties of a plaster, they are termed cerates; when fats or resin are used, so that the consistence is scarcely greater than that of butter, they are termed ointments; if distilled fragrant resins or essential oils are used, they are termed resins, or pomades; and occasionally, if the appearance correspond, some are termed butters, or pastes, such as almond paste, which, being bland and emollient, must be more distinctly distinguished from the other kind, called butters [Butees, in Pharmacy], which are acrid and corrosive, such as butter of antimony, or violent poisons, such as butter of arsenic. Most ointments are formed

* London, Illno, Knight and Co.

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by melting together the ingredients, and in doing this the heat should never exceed that of the boiling-point of water. To ensure uniformity and smoothness, not only should the ingredients be carefully stirred while on the fire, but they should be strained through a cloth while yet in the liquid state: if essential oils are used, these must be added afterwards. Some are made by merely triturating the materials together, as in the case of mercurial ointment. No great quantity of any ointment should be prepared at one time, as they are apt to undergo changes, sometimes very detrimental, either by the ingredients acting on each other, or by absorbing oxygen from the air. Many should be prepared only when wanted, such as the ointment of the nitrate of silver.

The chief use of ointments is either by their emollient qualities to soften tense or hardened parts, or to sheath excoriated parts from acid secretions or the irritation of the air. Applied to ulcers, they may, according to their nature, besides excluding the air, promote the healing if judiciously used, or hinder it if improperly used. For chapped hands or rough skins, one of the mildest and safest applications is almond-paste.

UNGICULATA. Linnæus divided the Mammalia into the following sections:—UNGICULATA, UNGULATA, and Mutica. [Whales.]

The Ungiculara, or Clawed Mammals, included the orders Bruta, Glires, Primates, and Fere.

UNGULA. The hoof of a horse looks like the part of a cone which is separated from the part containing the vertex by an oblique plane. Hence such a solid is called an ungula, and rules for the determination of its content are given in books of mensuration.

END OF VOLUME THE TWENTY-FIFTH.