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THE

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HADLEY, JOHN, the reputed inventor of the sextant which bears his name, became a Fellow of the Royal Society in 1717, and died February 15, 1744. He was author of several useful papers, which appear in the Transactions of the Society, from vol. 92 to vol. 99. 

HADLEY gave account of the instrument in the 'Philosophical Transactions' for 1731; but Newton, previous to his death in 1727, had given a description of the instrument to Dr. Halley, by whom it was, for some unknown reason, suppressed, though it was communicated to the Royal Society in the year 1742, after Halley's death, by his executor, Mr. Jones. (Hutton's Dictionary, 1813; Herschel's Astronomy, p. 102; and Tract of the American Society, vol. 1, p. 21, Appendix.)

HADRANUS. [ARABIA.]

HADRIANUS, AELIUS, son of Aelius Hadrianus. After a cousin of Trajan, and a native of Hatra Pecena, but of Spanish descent, and of Domitia Paulina of Cadiz, was born at Rome, in January, A.D. 76. He was left an orphan at ten years of age, under the guardianship of Trajan and of Tatianus, a Roman knight. He made great progress in literature, especially in the study of Greek. In the reign of Domitian he served as commander of an auxiliary legion in Mesia. Trajan gave him his niece Sabina in marriage, and he accompanied the emperor in his Dacian and Eastern campaigns. When Trajan died at Selinus, in Cilicia, in August, 117, Hadrian, whom he had left in charge of the army in Syria, was proclaimed emperor by the soldiers at Antioch, and he wrote to the senate, requesting their confirmation. Paulina, Trajan's widow, favoured his views by pretending that Trajan on his death-bed had appointed him his successor, and for this service Hadrian showed his gratitude to Paulina to the end of her life. The fact that Hadrian being adopted by Trajan a year before his death has been asserted by some writers and denied by others. His election being confirmed by the senate, Hadrian, after withdrawing the troops from the countries east of the Euphrates and making peace with the Parthians and the Armenians, set off for Rome, where he assumed the consulate in the following year (A.D. 118) with T. Fuscus Salinator. He refused to appropriate to himself the triumph which had been destined for Trajan, and he caused the image of the deceased emperor to be carried in the triumph: according to Suetonius himself carried it. He remitted all the arrears due to the public treasury by individuals in Rome and through Italy, and all that was due from the provinces for sixteen years past; and he burnt in the Forum of Trajan the schedules of the debts, which are said to have amounted to several millions sterling. Medals were struck on this occasion with the figure of Hadrian holding a torch and setting fire to the heap, and the legend 'He enriches the whole world.' In the following year Hadrian was consul again with Rusticus; and hearing that the Sarmatians and the Roxolani had made an irruption into the Illyricum, he repaired to Dacia, defeated the invaders, obliged them to recross the Danube, and to sue for peace. He appointed Marcus Turbo governor of Pannonia and Dacia. From his camp in the Illyricum he wrote to the senate, accusing of high treason four senators of equestrian families, who were ordered for immediate execution. Other persons were arrested and put to death as accomplices in the alleged conspiracy, and a general alarm spread at Rome, when Hadrian hurried back and affected to blame the precipitancy of the senate. He compelled Tatianus, his former guardian, whom he had made prefect of the Praetorian soldiers, and who had abused his power, and had advised the proscriptions, to resign his office. The year after, Titus Aurelius Fulvius, afterwards the Emperor Antonius Pius, was made consul; and in the same year Hadrian began his travels through the various parts of the empire, which may be said to have occupied, with few interruptions, the remainder of his reign, a period of about eighteen years. We have memorials of his travels in numerous medals, struck in the various provinces on the occasion of his visit, which form an interesting series. An Italian medalist, Mezzarbarba Brago, has put these medals in order and illustrated them. Hadrian began with Campania, where he distributed sums of money to the poor of the various towns which he visited. Indeed liberalism in this respect was one of the most conspicuous qualities of this emperor. He next went to Gaul, where he visited all the principal towns and fortresses; from thence he proceeded to Germany, where the best legions of the empire were stationed, and he remained a considerable time among them for the purpose of restoring the discipline, which had become relaxed. He himself set the example by living as a soldier among the soldiers. Hadrian was not fond of pomp or show, and he went about with as little state as possible. He drew up a series of military constitutions or laws, which remained long in use after his time, and are quoted by Vegetius. He attached to every cohort a certain number of builders, masons, and other workmen.

In the following year, in the consulsip of Annius Verus, grandfather of Marcus Aurelius, he left Germany, and returned to Gaul, from whence he passed into Britain, where he is said by Suetonius and others to have refrained from any military operations, although Hadrian did not live on very good terms with his wife Sabina, he punished those who presumed to fail in respect to the emperor; among others Suetonius Tranquillus, the biographer, who was Hadrian's epistolographer, or secretary, whom he dismissed, as well as Clarius, the prefect of the Praetorium. While in Britain he constructed a rampart of earth, extending from the Solway Firth to the German Ocean near the mouth of the Tyne, a little to the south of the

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more substantial wall afterwards raised by Severus. On his return to Gaul, Hadrian built a magnificent palace at Nimes for Plautus Traganus, who then succeeded into Spain, and spent some time at Tarraco (Tarragona), where he held a general assembly of the deputies of the various provinces of Spain, and settled several disputes and complaints. He was walking in the gardens of the Cephytrum, when a Tarraco slave attempted to kill him. The emperor parried the blow, and consigned the assassin to his guards, but, on hearing that the man was insane, he ordered him to be taken to a physician and returned to Rome in the consilium of Aulus Aviola and Cornelius Pansa, A.D. 122; but he left it again soon after, and the next year we find him at Athens, a city to which he was much attached. He sent the embassies to the Cepheus, which had damaged the town of Eleusis, and the construction and repairation of various edifices. From thence he went to Syria, and had a conference with the king of the Parthians, when he was confirmed in the two provinces. In the year following he visited various parts of Asia Minor, and after building temples and other edifices at Niconemia, Cyrieicum, Nicaea, and other towns, he sailed to the islands of the Aegean Sea, and returned to spend the winter at Athens, where he was initiated in the Eleusinian mysteries, presided at the public games, and showed many marks of favour to the Athenians. He next went to Sicily, and ascended the summit of Etna to see the sun rise. He returned to Rome for the consultation of Julius Libanius and Julius Bibulus, A.D. 126, and we know nothing of his movements for the two following years. He appears to have been at Rome in the year 125, under the consilium of Lucius Antoninus. He visited the East, and passed on to Egypt, quaking having destroyed the towns of Niconemia and Nicaea in Bithynia, and others, he ordered them to be rebuilt at his own expense, for which he is styled on some medals the Roman Liberator. In the year 127 he sailed to Africa, where he distinguished himself, as he had done on his previous travels, by his munificence. Plautina having died meantime, Hadrian returned to Rome, and celebrated the great ceremony which he had heretofore arranged among the gods. In the following year, 130, he raised a magnificent temple in honour of Venus and Rome, some remains of which are still seen near the arch of Titus. The plan of the building was made by Roman architects, and sent by the emperor to Apollodorus, a celebrated Greek architect, for his opinion. Apollodorus observed that the building appeared too low for the size of the statues of Venus and Rome, which were intended to be placed thereon. Hadrian, who had a conference with several kings or chiefs of the Caucasian tribes, the Abaxi, Zidotres, &c., whom he sent back loaded with presents. Even the Bactrians sent an embassy to propose an alliance with Rome. He next proceeded to Syria, Palestine, and Egypt, in which last country he remained two years. While he was in Egypt, and under the consulship of Lannus Pontianus and Antonius Rufinus, A.D. 131, the juris Salvius Julianus completed his most important edicts, which may be considered as the first general code of Roman law published by authority.

There is a letter of Hadrian, written from Alexandria, to Servius Sulpicius Venetus, in which he describes the state of the population of Egypt, and speaks of the various sects, Jews, Christians, Samaritans, &c., who were very numerous in that country; he says that they all adore but one god, namely, their own interest. He also notices as an innovation the Perpetual Diet, which may be considered as the first general code of Roman law published by authority.

He died in July, A.D. 138, in his sixty-third year, and was succeeded by Antoninus Pius, the twenty-fourth sign, about 700 B.C.

"Animula vagilla blandula, Hooper congrege corporis, tci.

In his personal character Hadrian had many valuable qualities, tarnished by some vices. As emperor, his reign may upon the whole be considered a happy one for the empire, which enjoyed almost uninterrupted peace. Less warlike than Trajan, he made himself respected by foreign nations without having occasion to resort to arms. His extensive travels formed the material for the Roman citizen, which they have tended to spread, while he corrected many abuses of provincial administration, and thus cemented the union between Rome and its vast dependencies. He used to say that an emperor ought to be like a king, surrounded by tumuli of the earth. He built numerous towns, embellished others, and peopled them with fresh colonies. Dion, who in general not favourable to Hadrian's character, admits that he never rewarded his subjects with anything inappropriate. However, he would not receive anything left him by will when the testator had children. Hadrian gave no power to his liberii, and punished those about him who boasted of their influence for the purpose of extorting favours. He increased his business, and an enemy to pomp and parade. If he cannot be counted one of the best emperors, he certainly must not be reckoned among the bad. He had an extraordinary memory; was a good orator, grammarian, poet, and musician; was acquainted with mathematics and medicine.
and delighted in the company of learned men; he was also a great friend to the arts of sculpture and architecture. He was the first emperor who let his beard grow— in order, it is said, to conceal some blemish in his face.

The busts, statues, and medals of Hadrian are very numerous, and all bear a striking resemblance to each other in the character of the countenance. There is a full-length statue of him and two busts in the Townley Gallery, British Museum.

Reverses of Coins of Hadrian.

HÈMATEMESSIS (from αίμα, blood, and λίθος, to vomit), a bleeding from or into the stomach. [HAMMORRHAGE.]

HÈMATOCYTE (from αίμα, blood, and κύτταρος, a tumor), an effusion of blood into the scrotum.

HÈMATOPS, a name given by Mr. Gould to a genus of birds inhabiting Van Diemen’s Land, and New South Wales, and thus characterized by him in ’Zool. Proc. for 1836 (Dec. 27).

Bill shorter than the head, slightly curved, without any denticle at the apex, rather compressed. Nuestra livid, and covered by an operculum; no bristles at the gape. Wings moderate, first quill short, third and fourth nearly equal and longest. Talus moderate, equal or slightly forked. Tail moderate, the rather strong ball and claw equaling the middle toe and claw; external toe equal in length. Ensigns' spots or marks (nervi sanguinolenti) above the eyes.

Mr. Gould recorded two species, Hematoxylen calidiotriis, 63 inches in length (Van Diemen’s Land), and H. guatra, 6 inches long (New South Wales).

These were among the specimens from which drawings had been taken for the first part of Mr. Gould’s new work on the Birds of Australia. The name, in sound, comes rather near to Hematopus.

HÈMATOPUS. [OYSTER-CATCHER.]

HÈMATORNIS. [FALCONIDÆ, vol. 5, p. 174.]

HÈMATOXYLON CAMPECYANUM (Logwood), a tree native of Canapehchi, but cultivated also in Jamaica. The finest wood is the producer of the former place. The bark and albumen being removed, there is within a dark red fibred durum, having a violet-like odour, and a taste at first sweetish, afterwards astringent. It dyes the saliva violet-coloured, and produces a similar change on many of the other secretions. Specific gravity 1.057. Ten pounds of wood yield 16-18 ounces of extract. Its chief constituents are volatile oil, resinsous or fatty matter, and a principle termed hematoxyline, which is occasionally found in the wood in the form of crystals.

Logwood acts as a mild astringent in hemorrhages or increased secretions; and in some forms of diarrhoea it often effects a cure where more powerful astringents fail. (See Abercrombie on Diseases of the Stomach, &c.) It may be exhibited in the form of infusion or of extract; the former is preferable. Logwood is also used extensively in the arts, especially for dyeing. It gives the peculiar colour to the paper in which sugar-loaves are always wrapped.

HÈMATURIA (from αίμα, blood, and ώρα, to vomit), voiding of bloody urine. [Hæmorrhage; Kidneys, Diseases of.]

HÈMOCRÀCHIS. [LEECHES.]

HÈMODORÀCEÆ. Under this name Dr. Robert Brown proposed, in the year 1816, to separate from the natural order Iridaceæ, the genera Hemodorum, Conostylis, Anigozanthos, Phelocarya, Distria, Lanaria, Heritiera, and Wechselaria. He remarked that they are abundantly different, especially in being hexagonal, or in having the stamens, if only three in number, stationed opposite the petals, and in having the anthers opening on the side next the stigma; the habit was moreover different. This distinguished botanist mentioned in connection with his new order, without actually adding it, Xiphidium. The latter genus has more recently been introduced along with Hagenbachia as an undoubted member, notwithstanding its having a superior ovary. All the species have capitate leaves, and perennial fuscous fibrous roots or bulb-like corn; there is also a general appearance of wool upon their flowers, in some cases to such an extent as to bury all the outer surface. The order may be considered a connecting link between Iridaceæ and Liliacæ. One species, Distria Heritiera, yields a dyeing matter in its rhizomes.
of more than a line in diameter has been divided, the blood flows in a constant more or less rapid oozing, but is not pro-\nected to any distance from the body; and when it issues from\nboth kinds of vessels at once, and in equal quantities, its\ncolour is intermediate between those peculiar to each of\nthem. The same mixture of the two kinds of blood may\nsometimes, when a number of small vessels of both kinds,\nand a large one of either kind, are simultaneously divided,\ndo make it difficult, from the colour alone, to determine which kind it is proceeding from, still more difficult if the\narterial blood be long detained in the tissues, for then it\nasumes a venous colour.

When a large artery, as one of the main trunks of the\nlarge abdominal vessels, is examined after it has been wounded, the blood rushes forth with such\nimpatience that life is often destroyed almost instantaneously. The quantity of blood lost however, and the\nrapidity with which death ensues, will depend in some mea-\nsure on the state of the tissues around, and be thus partly covered, so that the haemor-\nrhage will be retarded. If it be cut longitudinally, the blood\nwill flow much less rapidly than if the wound be transverse.\nIf the external wound be properly closed, however, the\narterial blood will not be quickly made, if the edges be rough and\ntorn, as by a gun-shot, no blood at all will flow, at least for\nsome time. None of these circumstances however is likely to\nprevent the fatal consequences of a wound of a large artery, unless immediate assistance be given.

When an arterial branch of the second magnitude, as one of the primary divisions of the main trunks in the leg or fore-\narm, is wounded, the flow of blood is at first profuse, and a\nlarge quantity is soon lost; but after a time the patient\nbecomes faint from extreme exhaustion, and then the heart ceasing\nto act the blood no longer flows, but begins to coagulate both\nwithin and around the vessel, whose extremities contract, and\nthe haemorrhage is accordingly arrested. Yet, however, as soon as the patient recovers from his exhaus-\ntion, and the heart regains some of its power, the slight\nobstacles formed during the fainting are forced away, and the\nhemorrhage recommences and continues until the patient is\nagain exhausted. Thus by a succession of hemorrhages and\nand temporary staunchings, he may at last be destroyed by\nextreme debility. From arteries of smaller size, as those\nwhich furnish the blood to the skin, the blood flows very\nslowly, but in a rapid stream, but after a few minutes, if they are exposed to the cold air,\nare restrained by their orifices contract and close, and the\nbleeding altogether ceases, without much danger of returning.\n
It is much more slow, for the blood is prevented by the\nvalves from flowing from that part of the vein which is be-\ntween the heart and the orifice, and in the part which is\nbehind the orifice it has only the force of that in the smaller\narteries. Hence it is seldom immediately fatal, and when the\npatient becomes faint the edges of the vessel fall together,\ninstead of remaining open as those of arteries. Thus a coagu-\nlaris, for a while, round it, and be spilled from the\nlargest trunks, prevents any further flow. Other cases in\nwhich bleeding takes place from large vessels are those in which they are burst by sudden efforts, as sometimes happens in\nbirthing, and more rarely when the intestines are diseased; \nthey are in which the walls of an aneurism or other diseased\nartery or vein burst or ulcerate; those in which ulceration, whether\nin internal or external organs, spreads from surrounding parts, and at last (though they always peculiar for a long time) in the breasts of children. These cases require to be treated as\ncommon from ulcerated surfaces, and from various vascular\nmotions growths, probably depends on rupture of the very\nminute vessels which they contain; and the same delicacy of\nthe walls of its vessels, with their great liability to disease in\nadvanced life, may be assigned for many cases of hemorhagie in\nthe more vascular parts of the brain producing apoplexy.

But bleeding to a great extent may take place without\nviolent injury to the vessel. This may in which may take place in various parts of the body, is that\npopularly supposed to arise from the bursting of a blood-\n vessel; but in the large majority of cases where blood is
passive must be supposed to depend. Such are especially those from the nose, rectum, and other organs, which occur in persons of weak lax habit, and which may be distinguished from the first class by their placed on both sides of the opened fist.

Lastly, there are cases in which the hemorrhages that take place, often coincidently from several organs, may be presumed to depend on a state of the blood itself. Such are those that occur in scurvy, in which the blood, when drawn from a vein, does not separate, as in health, into a firm coagulum and a clear serum, but settles into a loose mealy mass, which may be poured out under the touch of the finger. Such too are probably the petechial and other effusions of blood in fever.

Hemorrhages by exhalation may take place habitually or occasionally, and are characterised by the constant confluence of the blood flows from the nose or rectum, more rarely from the lungs or stomach, or even from the skin. They are sometimes periodic; and when occurring in men, have been found to bear the idea of a periodic action of the system, in the male sex as in the female, and the more so as the menstrual evacuation, when suppressed in the latter, is not unfrequently compensated for by hemorrhage from some other organ. Most of the cases of spontaneous bleeding from the skin are of this class, and in other instances the blood has flowed at regular periods from the gums, the breasts, umbilicus, axilla, or kidneys, and is most frequently from the stomach; in epidemic cases the hemorrhages occur in men when an habitual discharge from the same organ has been suppressed, or when an old ulcer has been suddenly healed.

The means of arresting Hemorrhages—When an artery is wounded, unless death rapidly follow, a natural process takes place by which further bleeding may be prevented. If completely divided, both extremities retract into the sheath of cellular tissue in which they lie, so that a considerable interval is produced between them, bounded by loose and irregular walls, into which the blood as it flows infiltrates, and coagulates, tending to fill it up and obstruct the vessel. The open mouths of the artery also convert it into a series of aneurysms, or from the orifice, or closed, at or just above their extremities. As the stream of blood is thus checked by the narrowing and closure of its canal, at the same time that by the faintness induced by the previous loss of the action of the heart is weakened and the whole circulation retarded, it begins to coagulate within the vessel itself, till its tube is nearly filled by a clot adhering loosely to its walls. Further changes then ensue; the divided vessel and the parts around become incoagulable; coagulating lymph is effused from the edges of the wound into the artery itself and over its extremities, forming a firmer plug than the blood alone had; in process of time this lymph becomes organized, vessels enter it from the parts around, and it becomes a solid column of action. Meanwhile some of the blood, till at length its tube is rendered impervious from the point of division up to the first branch given off from it, and as last converted into a solid cord, closely connected with the substance of the cicatrix around it. If the artery be only partially divided, the same effects follow; though, if the cut be extensive transversely, with less certainty, the action cannot take place, and the internal coagulum, if formed, is washed away by the stream which still partly passes along the vessel. The natural cessation of hemorrhages from veins is effected in the same manner, but far more easily, for the valves prevent any bleeding from the orifice in the vein; and not only does the wound of gapping open, fall together, and soon become adherent. But in the human subject it is only in the very small arteries that the hemmorhage can be sufficiently expected to terminate itself naturally, and hence various artificial means of checking bleeding from the larger ones have been invented. The simplest of these is pressure: if the finger be placed with moderate firmness over the mouth of a small bleeding vessel, the blood is pitch to the orifice, which will be found closed and no more blood will exude.

Pressure is also especially useful when a number of small arteries are bleeding together, with a constant oozing rather than a rapid flow, as in diarrhea, when the edges of the wound are brought together, a compress should be laid on, and bandaged firmly and steadily over them. The same means, or a tourniquet applied a short distance above the wound, so as to compress the trunk of the artery, may be used with benefit by lessening the force and volume of the current, and thus permitting the natural processes to take place undisturbed. But if these means are insufficient, the artery must be tied; if it be completely divided, ligatures must be tied, otherwise it may be avulsed; and if it be only cut through on both sides of the opening, for, from the numerous communications of the arteries, when the main current is checked, another in a retrograde direction is always established which may be sufficient to carry the blood through the limb, and therefore the use of the ligature is not merely to prevent mechanically the flow of blood from the opened vessel. When a fine cord is drawn tightly round an artery, something is felt to give way, and in a few minutes the pulse in the artery's limb within, and in its inner and middle membraneous coats are found cleanly cut through as with a knife, while the outer coat remains entire. When the ligature is left on, it embraces this outer membraneous coat, and completely prevents further bleeding. The blood thus becoming stagnant coagulates in the lower part of the vessel and adheres to its walls; those at the same time inflame, coagulating lymph is effused from their cut edges, and soon becomes organized, at last, as in the natural process, completely fills up the canal of the vessel, while the part constricted by the ligature ulcerates and gives way, permitting the cord to be safely drawn away at the end of from six to sixteen days.

Previous to the general use of the ligature, introduced by Ambrose Paré in the sixteenth century, numberless means for checking hemorrhages, then so frequently fatal, were resorted to by surgeons, under the name of styptic, straminating, and other agents, &c. The facilitation of the habit of applying the ligature to the stumps of amputated limbs to stop the bleeding, which is probable the eschar thus formed would generally effect. At present however the use of the actual cautery is nearly banished in this country: it can only be employed in a few cases where, from peculiarity of situation, the vessel can neither be tied nor compressed, and for such cases it is certain the most effectual styptic known. Cold air or ice is nearly as useful, and far more nourishing to the parts, as it is by no means sufficient in all common cases where only small vessels are divided. In the very few cases where any astringents are required, as in some of external bleeding from diseased surfaces, the best are, eau de toilette, or else any of the common cordials, e.g. brandy, wine, or ale. Another class of remedies that may be usefully employed are those which act mechanically—as sponge, agaric, lint, and other light very porous bodies, which placed over a small bleeding orifice will soon completely obstruct it by favouring the coagulation of the blood.

Such are the principal modes of treatment applicable in cases of external or surgical hemorrhage in which vessels are divided by external injury, and are within reach of the operator. In cases of hemorrhage however it is obvious that mechanical means can rarely be employed. From the varied nature of the cases from which they arise it is evident that different measures may be required in the several kinds of cases. In the formation, in which there is accumulation of blood from local or general excitement, the hemorrhage is itself a naturally curative means of its cause, and need not be checked unless it impinges some important organ, as the brain, and then the most advisable means of arresting it is to bleed from the arm. So, too, in cases of habitual or vicarious hemorrhages, if not dangerous or very inconvenient from locality, it will seldom be advisable to check them, for they are generally outlets by which a plethoric condition that would else be highly injurious is cured; at any rate they should be arrested gradually and cautiously. Where external means are resorted to it is necessary in no case to use them as a last resource, pressure; as by plugs put in the nostrils, &c. Where a mechanical obstacle to the passage of the blood exists, medicine can often do nothing for the permanent cure of the hemorrhage that it produces. For the time, the most effectual means are cool air, cold water or ice applied as near as convenient to the seat of bleeding, iced dressings, perfect quietude, and the avoidance of all stimuli; the body should be placed in that position in which blood is less likely to gravitate to; may gravitate to any elevated part, and if it can be prevented, the indication of plethora or accelerated circulation blood should be drawn from the arm to an amount to be determined by the circumstances of the case. In many cases it might benefit results to apply a cold or icy, if possible exciting the part, to a copious secretion of the usual fluids, as in some cases of hematemesis by administering purgatives. If astringent remedies be deemed advisable, and in many cases they are highly useful, the essence of lead will generally be
HAF
preferable, and next to it the different vegetable compounds of gallic acid. [Astrawenz.] The treatment of the patient from hemorrhages from alteration of the blood is considered under Fyzer, &c. (J. F. D. Jones, On Hemorrhage and the Ligature; T. Watson, Cyclopedea of Medicine, art. Hemorrhage.)

HÆMULON, a genus of fishes of the section Acanthopidae, and the order Acanthoptera. Genera: Haplophrys (1871); a single species, H. fistulifera, a dorsal fin; seven branchiostegous rays; lower jaw compressed, a small oval opening and two small pores under its symphysis; the vertical fins partially covered with scales. [From the Greek ὧμος, haemulon, a fish.]

HAPFLÖZ, [Balkan.]

HÄFIZ, MOHAMMED SHEMS RADDIN, a celebrated Persian poet, was born at Shiraz, at the beginning of the 15th century, a member of the families of the Christians. From his earliest years he received a lettered education; and paid great attention to the study of religion and Mussulman jurisprudence. He afterwards cultivated poetry, and became so celebrated that the Sultan of Bagdad invited him (v. 1725) to his court. Häfiz however appears to have remained in his native town the greater part of his life. His Persian biographers relate an interview he had with the celebrated Turkish poet, Hâfiz, who conquered the Crimea, a.d. 1382. The date of his death is uncertain; it is placed by Doulet Shâh, a.d. 1389. A splendid monument was erected over his grave, which is described by K Kempfer (Amoenitates Euxinae, vol. 3); and Franklin (Observations on a Tour from Bengal to Persia, pp. 90-7) gives us an account of another monument erected to his memory in more modern times.

The poems of Häfiz, like those of Anacreon, celebrate the pleasures of love and wine. They have always been greatly admired in Persia; though many Mohammedans have condemned them for their irreligious and licentious tendency. The admirers of Häfiz, on the other hand, contend that they must be understood in a literal, but in a figurative or allegorical sense; and that they express emblematical language the love of the creature to the Creator. The sect of the Süfís, who interpret the poems of Häfiz in this manner, possess many similar poems. They maintain that by wine he meant devotion, by perfumes the hope of divine favour, and some have gone so far as to compose a dictionary of words in the language of the Süfís (see Sir W. Jones, 'On the Mystical Poetry of the Persians and Hindus,' Asiatic Researches, v. 3). But we are not sure that any of the poems of Häfiz ought to be interpreted in this manner. Sir W. Jones, who was a great advocate for such a mode of interpretation, remarks, in the essay referred to above, 'It has been made a question whether the poems of Häfiz must be taken in a literal or figurative sense; but the question does not admit of a general and direct answer; for even the most enthusiastic of his commentators allow that there is occasion to take them literally and his own work ought to have distinguished them, instead of mixing the profane with the divine, by a childish arrangement according to the alphabetical order of the rhymes (p. 172-3). We are aware that many European Jews are the peculiar interpreters of the poems of Häfiz, by a reference to Solomon's Song and the Sanscrit poet 'Gita Govinda' by Jayadeva. It is however very doubtful whether these preferences are not anticipated in the Jewish manner. [SOLOMON; JAYADEVA.] The poems of Häfiz have had a great number of Süfís commentators, such as Shuri, Seid Ali, Lamei, Sururi, and Shemei; but the most celebrated are the Turkish commentators Feridun and Süleyman. The poems of Häfiz were arranged after his death, by Seid Kāsmī Anvārī, and were entitled the 'Divān.' The 'Divān' contains, according to the best MSS., 27, 09, called the 'Gaza Divān.' Each of the seven famous editions of the 'Divān' (from 1672, blood, and 5th, to flow, various' tumours of the veins of the rectum. [Veins, Diseases of.]

HÆMULON, a genus of fishes of the section Acanthopidae, and the order Acanthoptera. Genera: Haplophrys (1871); a single species, H. fistulifera, a dorsal fin; seven branchiostegous rays; lower jaw compressed, a small oval opening and two small pores under its symphysis; the vertical fins partially covered with scales. [From the Greek ὧμος, haemulon, a fish.]

Further particulars concerning the life and writings of Häfiz are given in the life prefixed to the Calcutta edition of his poems; in his biography and Doulet Shâh, in Wilhelm Christoph Fredrich Schultes, Leips., 1805; and in the 4th vol. of the Notices et Extraits des Mss. de la Bibliotheque du Roi; in the article 'Häfiz' in the Biographie Universelle, by Lapiès; and the same article in Brach and Gruber's Encyclopaedia of the Classical Antiquities.

HAGGAI (הנאגא, 'Aynagā), one of the twelve minor Hebrew prophets. We know nothing concerning the place or time of his birth. The pseudo-Ephippius, in his Lives of the Prophets, states that he was 'born at Babylon;' and according to the Rabbis he was a member of the Great Synagogue. The date of Haggai's prophecy is fixed by himself (1 and 2) and by Ezra (v. 2), in the second year of the reign of Darius Hystaspis (a.c. 521). We learn from Ezra that the Jews, who returned to their native country in the first year of the reign of Cyrus, commenced rebuilding the temple, when Haggai appeared and stopped them. He reproved them for their neighbourly satraps, till the second year of the reign of Darius Hystaspis, when the building was again continued in consequence of the exhortations of Haggai and Zechariah.

The prophecy of Haggai may be divided into four parts: in the first, the prophet urges the people to continue building the temple, by the promise that God would bless them in their undertaking, and that their previous neglect had been the cause of the drought and bad seasons which they had experienced (1); in the second, he encourages them by the promise that this second temple should surpass the first in glory; this prophecy is supposed by many to have been fulfilled by the temple of Balthasar (v. 1), and, third, he promises the people an abundant harvest, since they had begun to build the temple (v. 10—19); and in the fourth, he foretells the prosperity of Zerubbabel, governor of Judah (v. 20—23). Zerubbabel is considered by many commentators to be a type of the Messiah; and the prophecy is supposed to relate to the glory of the Messiah's kingdom.

The canonical authority of this book has never been disputed. It is quoted by the author of the Epistle to the Hebrews, xii. 26; compare Hag. ii. 7, 8, 22.

The prophecy of Habakkuk is written in a dull and prosaic style, and bears traces of having been composed in a late period of Hebrew literature. It possesses none of that vigour and sublimity which distinguish the works of most of the Hebrew prophets who lived before the Babylonian captivity.

The Septuagint, Vulgate, and Syriac versions of the Old Testament are 10th, 11th, 12th, 14th, 16th, 17th, 14th, 17th, and 148th Psalms to Haggai and Zechariah. (Eichhorn, Einleitung in das Alte Testament, iv. 422—27; Augustii, Einleitung in das Alte Testament, p. 324—348; Rosenmüller, Scholia in Psalmus, etc.; and the list of commentators in Watt's Bibliotheca Britannica.)

HAHAG. [FALCONID, vol. x., p. 181.]

HAGUE, THE ('t Groenhaag), a large and beautiful town, the religious seat of the province of South Holland, in the kingdom of the Netherlands. It is not fortified, but is surrounded with a moat with drawbridges over it. Though from being thus open it has been generally designated as a village, it may be ranked among the larger cities of Europe for its stately buildings, its broad and regular streets traversed by canals, and for its pleasant situation on
A dry soil, which is rather more elevated than the surrounding country, is the characteristic and healthy. Many of the streets are planted with rows of trees and paved with coloured bricks. The finest parts of the town are the Voorhout and the Vvyverberg, of which the latter, with a fine avenue of trees and a walk on one side, and a castle on the other side, where many magnificent buildings, is peculiarly agreeable. Among the most remarkable public buildings may be reckoned the royal palace, the exterior of which is by no means beautiful, with a large garden, the formal arrangement of which is in the hands of the municipality, with many fine paintings; the cannon-foundry, erected in 1668; the theatres, and the state-prison. Among the churches are the three Dutch Reformed, and the French church, formerly Reformed, now Roman Catholic. The Portuguese and German Jews have large synagogues, and the Lutherans, Presbyterians, Remonstrants, and Jansenists have chapels. There are likewise numerous charitable and scientific institutions, and fine private collections. On one side of the town there is a canal constantly covered with vessels, and on the other a fine wood of oaks called the Bosch, in which is the country-palace of the royal family, resembling a grand theatre, with a magnificent picture-gallerie, and extensive gardens laid out in a less stiff and formal manner than the usual Dutch style. There are numerous elegant villas in the environs, and on the west of the town is the Noordings, a chocolate factory, containing about 700 houses, and which has become, especially of late years, much frequented for its sea-bathing. Between that and the Hague is a fine avenue of oaks, beeches, and limes.

The Hague seems to have owed its origin to a hunting-seat of the counts of Holland in the wood (Haag), which however so early as 1260 became a palace, which many other houses were soon erected. In the sixteenth century it became the residence of the States-General of the States of Holland, the Stadtholder, and the foreign ambassadors. In the course of the seventeenth century it was gradually enlarged, and at the commencement of the eighteenth was the centre of the most important diplomatic negotiations. [Annuaire de la France d’Outre-Mer; Geographie de l’Europe; Vandam, op. cit.]

HAINAULT (in Flemish, Henegouwen), a province of Belgium, bounded on the northwest by Flanders, on the north and northeast by the river Sambre, on the east by the river Maas, on the south by Luxembourg and France, and on the west by the county of Namur. The province lies between 49° 36' and 50° 48' N. lat., and between 5° 17' and 5° 43' E. long.; its greatest length from northwest to southeast is about 75 miles, and its breadth 30 miles. Its total area is 372,139 banniers, equal to 1438 square miles (English), thus divided:

- Cultivated: 295,178 banniers.
- Cultivated, 2,671
- Woods: 61,832
- Towns and Buildings: 3,059
- Rivers and Canals: 1,165
- Roads and Paths: 6,298

Total: 372,139 banniers.

The province does not contain any mountains, but is hilly to the north. The river Sambre, the Dender, the Haine, from which the province derives its name, the Trouille, and the Seine. The Sambre enters the province from France, near its confluence with the river Scarde at Cour, and flows to the north and then to the west, to join the river Semois at Charleroy; then it flows to its course to north-northwest, it forms the boundary-line between Hainault and Flanders, and quits the province of Escaut, its northeastern boundary. The Sambre also enters the province from France, near Marouge, flows north-west to Charleroy, and soon after enters Namur. The Dender rises within the province at Hercheu, flows north-east to Ath, and then north-north-west, quitting Hainault at Grammont. The Haine is formed by three brooks which rise in the commune of Anderlues, a little to the west of Charleroy; it flows from east to west, near to Mons, and falls into the Scheldt at Combe. The Trouille rises at Grandpre, near the frontier, and flows from east to west, it falls into the Seine, but leaves it again almost immediately, flows then north-northwest to Mons, and falls into the Haine near Jemappes. The soil of the province is for the most part fertile. The agricultural district of Tourney is the most fertile, and that of Charleroy the least so. The chief agricultural productions are wheat, rye, oats, winter barley, potatoes, beans, rape, flax, and hemp; tobacco and chicory cultivated in some parts. Much of the land near the rivers, where irrigation can be useful, is in vineyards. In other places trefoil, lucern, and saffron are cultivated.

Hainault is divided into three arrondissements, Mons, Tourney, and Charleroy; and contains 21 towns and 424 communes. The towns are Antoines, Beaumont, Brinche, Braine-le-Compte, Charleroy, Châtelet, Chêvres, Chimay, Enghien, Fontaine-l’Evêque, Gosselies, Losinges, Lesse, Mons, the capital of the province, Pérutin, Reulx, St. Ghislain, Soignies, Thuin, and Tourney. [Arr; Beaum-
The chief means of employment is afforded by some limestone quarries, whence considerable supplies of building-stone are procured. Thuin, on the Sanacr, is 10 miles south-west from Charleroy, and contains 3686 inhabitants. An iron-work established at this place produces 1100 tons per annum: there is but little other trade. Boussu, 7 miles west from Mons, stands on the Haine. This is a small town, containing 2800 inhabitants, 3 churches, a chapel, a church, a chapel, two schools, and 500 houses. The population in 1829 was 2887, many of whom are employed in raising coal or burning lime. Courcelles, 5 miles north-west from Charleroy, contains 3226 inhabitants, whose principal employments are nail-making, tanneries, and tannery merchandise. The town stands on the south-west from Mons, and has a population of 5484 inhabitants, many of whom find employment in the productive coal-mines of the district. There are also 20 steam-engines of 200 horse-power, a manufactory of safety-lamps. Fonteny, an inaccessible village, containing 678 inhabitants, is 4 miles south-east of Tournai, on the high road from that town to Mons. A battle was fought near Fonteny in May, 1745, between the French under Marshal Saxe and the allies under the duke of Cumberland, in which the latter were defeated with the loss of 15,000 men. Hornu, a village 5 miles west from Mons, is the seat of considerable coal-mines, giving employment to from 1500 to 1800 men. The village is chiefly composed of the cottages of the miners, which are built on a regular plan, and so arranged that the steam-engine which discharges water from the mines is also employed in distributing the coal which is mined. There are likewise warm and cold water baths, two large baths for promenading and public games, and a dancing-room for the use of the workmen, all established by the proprietor of the mine, who likewise supports a school for 480 children and a library. There are employed in these works 12 steam-engines, whose united power is equal to that of 320 horses. The village of Jemappes, on the high road from Mons to Valenciennes, contains 6528 inhabitants, of whom 14 are engaged in prosecuting various manufactures, among which glass-blowing, brewing, distilling, and tanning are the most considerable; several are also employed in coal-mining.

The number of persons accused and convicted before the courts of assize and the correctional tribunals 'in this province, during each of the four years from 1831 to 1834, was, according to official returns as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Accused</th>
<th>Convicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1831</td>
<td>95</td>
<td>48</td>
</tr>
<tr>
<td>1832</td>
<td>25</td>
<td>13</td>
</tr>
<tr>
<td>1833</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>1834</td>
<td>116</td>
<td>121</td>
</tr>
</tbody>
</table>

The great difference in the number accused before the courts of assize in these years arose from 48 persons in 1831 and 77 persons in 1834 having been concerned in riots, the greater part of whom were acquitted. The only capital conviction occurred in 1834, when a man was found guilty of murder. In proportion to its population, Hainaut presented in the above years fewer delinquents than any other province of the kingdom; and it is deserving of remark, that, with the exception of 1833, the proportion of students is greater also. In 1831 there were 888 schools, giving instruction to 35,671 boys and 29,048 girls, being very nearly 1 in 9 of the whole population.

HAINAUT SCYTHE AND HOOK. [Flanders Agriculture]

HAIR. The hairy coverings of mammals are composed of long delicate processes of a horny substance, which grow from their surface, and in which whiteness is contained at its lower part in a delicate sheath, or follicle, which passes obliquely from the surface of the skin on which it opens to a greater or less depth, and at its base dilates into a papilla or crevice, through which the hair is analogous. The hair consists of a small cone-shaped body, the pulp, soft and delicate, and apparently made up of blood-vessels and nerves, and covered by a reflection of the smooth lining
of the sheath of the hair, which is continued from the cuticle covering the surrounding skin. On the whole surface of this bulb the substance of the hair is secreted, and as each layer which is deposited pushes that previously formed onwards, the whole gradually advances along the sheath till it projects beyond the skin, and thence continues to grow free.

In the early embryo the sheath or follicle in which the hair is afterwards formed is alone seen, then a delicate vessel may be traced to its base, where a little black spot is soon formed, and this, as all the other parts increase, is gradually developed into a hair. Into each hair-follicle, as Gurit has shown, there open the ducts of one or two little glands, by which the oily matter is secreted to lubricate the hair and keep it supple and firm, and where these are deficient the same purpose seems to be performed by the follicle itself.

The annexed cut will explain the general mode of formation of hairs, which, it may be observed, is effected in the same manner as that of horn, nail, and many other extra-vascular appendages of animal bodies, viz. by the deposition of successive layers of organic matter on the surface of an abundantly vascular tissue. Fig. 1 represents an oblique section of the pulp and lower part of the whisker of a lion, in the Hunterian Museum, in which a is the body of the hair, b the conical pulp, and c a blood-vascular passing into and ramifying in it. Fig. 2 is a section of the skin of the upper lip of a lion, with part of a whisker completely formed, and another in progress of growth, from the same collection; a is the outer part of the hair-follicle, formed by a deep depression in the skin; b is its internal cuticular lining; e the contained hair; d the sheath containing the vascular nerves, passing to the test in all the hair of the bulb of the hair. Fig. 3 is a section of a skin, containing a hair from the human scalp, from the figure by Gurit, in Müller's 'Archiv für 1833': here a is the thin cuticle, b the cutis, c the subjacent fat, d the cellular tissue, in which the base of the hair follicle e is seen; f is the hair itself, enlarged at its base, and g and g the two sebaceous glands opening into the sheath. These views are of course all much magnified; indeed in man the component structures are so minute that part of the description is of necessity taken from the analogous structures in other animals.

In man the hairs are not, as has been generally supposed, perfectly cylindrical. Weber has shown that they are more or less flattened, so that a transverse section presents an elliptical form, or sometimes, from one side being grooved, the shape of a bean. The hair of the whiskers, beard, and mustachios, in general all short curly hair, is most flattened. In most instances flatness and length are directly proportionate, and both attain their maximum in the crisp woolly hairs of the negro, which are sometimes as much as two-thirds broader in one direction than in the other. The hair of the negro, which is circular, though it varies considerably from the wool, properly so named, of sheep and other animals: the latter is not spirally curled, but wavy, all its curves being nearly in the same plane; it is much more delicate, and its diameter round, and is equally fitted to curl in any direction, is peculiarly adapted for waving, while the flattened hairs of men have always a tendency to turn their broadest surfaces towards the middle of the curl.

Except at their base, into which the conical pulp enters to a variable distance, the hairs are perfectly solid, and in most animals their substance is similar throughout. Weber has shown that they are generally rounded along them, and of a softer internal than external material, has resulted from microscopic errors, occasioned by the unequal refraction of light passing through their rounded or spirally grooved substance, and which explains the surface of the hair in the lion, as seen in the figure. Weber finds that the internal part seemed rather paler than the outer; in the reed buck and a few other animals he found the cellular structure which has been sometimes erroneously supposed to exist in all the NIH hairs. The average diameters of hairs from the human head are respectively about 5/54th and 5/54th of an inch, and hairs which attain a length of 6 or 7 feet in women. Instances are recorded also of the hair of the beard growing to a length of nine feet. They are generally of the same thickness throughout their whole length in man, but in the finer kinds of wool they are of unequal size at different parts. This seems to indicate no occasional alteration in the size or activity of the pulp, a supposition which is further supported by the varieties of colour which the same hair sometimes presents, as in those animals which seem to have grey ears, but in which each hair is made up of alternate bands of black and white. In man however nothing of this kind occurs; the colour of each hair is uniform, the appearance of greyness being produced by a mixture of completely white with dark hairs. The colour of the human hairs generally varies with the colour of the iris and the general dark or light hue of the skin. Commonly the darker the hair, the more robust the body, and the coarser the skin and other tissues, and the hair is much stronger with animals than in man, for not only are white or grey horses less healthy and vigorous than dark ones, but if one or two of a dark horse's legs be white, they are always most liable to injury and to disease.

Hairs are very elastic; they admit of being stretched nearly one-third of their length, and regain their original length almost completely: in proportion to their size, they are very tough and firm. In masses they are impenetrable, except to very great violence, and hence one of their uses in the thick coverings of animals: they are also adopted in armour, as for the coverings of helmets. They are extremely bad conductors of electricity, and when rubbed with almost any other substance so large a quantity of negative electricity is developed, that in the dark even sparks may be seen, and the peculiar hissing sound of rapid little electrical discharges may be heard. This is especially the case with the finer hairs of cats, dogs, &c. But weaker electrical phenomena may be observed by rubbing the human scalp. Hair is also remarkably hygrometric, attracting and retaining in its tissue a large quantity of moisture, in consequence of which it becomes of greater length, and hence it is used in the construction of the more common hygrometers.

It assists also to shield the skin from moisture by its oily surface, and when thick presents almost an imperceptible barrier to water. The availing to itself from the three most powerful external agents, heat, electricity, and moisture, it is scarcely possible to imagine any structure...
ture better adapted for the external covering of the whole body, whose motions it is too light to impede, and to whose beauty it is so remarkably contributes.

In chemical properties hair resembles horn, nails, &c. It is soluble in water at very high temperature, as in a paper digester, leaving a large quantity of oil mixed with sulphuric acid, and some sulphurized hydrogen. It is this oil, with the sulphur of iron, which gives the colour to the hair, and by whose absorption greyness is produced. There is more, however, in the form of albumin, inasmuch as the sulphur is the ingredient on which the action of the various black dyes for red or grey hair depends. These are all composed of some salt of silver or lead, which, mixed with some other salt taken in the form of albumin, insinuates itself into the hair, where it is decomposed and a black sulphur of silver or lead is formed. Hair is soluble in alkaline and alkaline earths, and for this reason the depilatories in common use are chiefly composed of quick-lime, which however is materially injurious to the skin at the same time that it removes the hair. Hair contains a very small quantity of water, and when burnt leaves a large proportion of ashes, containing iron, manganese, and various salts of lime; it is one of these properties that hair is peculiarly indestructible, and has been found unaltered on innumerable more than twenty centuries old. It has even been supposed to grow after death, but it is probable that, in the few authenticated cases, it was owing to the lengthening of the hair by the attraction of moisture from the body or surrounding atmosphere, and to the more rapid drying and contraction of the adjacent tissues.

Little need be said of the diseases of hairs. Possessing neither vessels nor nerves, except at their base, they are rarely altered except by the diseases of the skin itself. Their fall, as it is called, is in most animals annual, but in man seems to occur except by accident, or after particular diseases. The process by which it takes place is unknown, but is probably similar to that of the shooting of the quills of the porcupine, by the gradual approximation of the base of the follicles to the surface. Their loss is occasioned by a secretion which is sometimes exceedingly rapid, is owing to deficient secretion of the colouring oil, and can only very rarely be remedied. When sufficient moisture is not supplied, they sometimes split into long braids; at others they break at the middle of the shaft, snapping off, and leaving a little fringed extremity to the stump. The most singular alteration however to which they are subject is that called the plum polonica, from its occurring almost exclusively in some toils in Poland, in which, with so much general disease as sometimes proves fatal, the hair of the head becomes sticky and matted together, when touched gives extreme pain, and is sometimes said even to bleed when cut. This fact cannot however be regarded as evidence of the naturally containing vessels, though it indicates an elongation of the pulp to some distance beyond the skin, just as is the case in dogs, whose whiskers will sometimes bleed if cut on the surface.

(Weber, in Hildebrandt's Anatomie, vol. 1; Gurlt, in Müller's Archiv für Anatomie und Physiologie, 1835.)

HAIRS. In plants these are long expansions of the cuticle, chiefly intended to answer the double purpose of collecting moisture from the atmosphere and of protecting the surface of a plant from the too powerful influence of the sun's rays. It is supposed that they are also destined to assist in the conveyance of certain kinds of seeds through the air, and in other cases, as hair in that of cotton, they are specially adapted for the use of man. That the two first purposes are those for which hairs growing on the surface of plants are most generally indicated, is sufficiently indicated by the following facts. Hairs are seldom found on water-plants, which have no occasion for absorbing organs, and when water-plants are accidentally obliged to grow in dry places they acquire them; while on the other hand species naturally dwelling in dry places of dry climates are almost usually provided with them, unless in those cases where the cuticle becomes excessively thickened. If a hair-leaved plant is observed in dry weather it will be found that all its hairs are weak and flaccid; but no so soon dom, induced by a shower of rain fail, or the atmosphere become humid, than the hairs acquire a rigid consistency.

In all cases hairs are composed of lengthened cells of cuticle, growing from one or more of the cells of the cuticle. Most commonly they are quite simple, and are merely formed of several cells of equally diminishing size, placed end to end, or of a single cell. Of the latter kind are the long entangled hairs that clothe the surface of the cotton-seed, and which are manufactured into thread and linen. Sometimes several such hairs spring from a common point as in Malvaceae and Euphorbiaceae plants, and Marrubium creticum (fig. 1); these are technically called stellate. Others branch in various ways, as in Nicandra aristata (fig. 2), and from such the woolly appearance of the surface of plants often takes its origin. It sometimes happens that the cell out of which a hair is formed, instead of growing perpendicular to the surface, lengthens in a parallel direction, growing at two opposite sides; cases of this sort are found commonly in Malpighiaceous plants, and in the common hop (fig. 3). Finally, in those instances where the terminal cell enlarges and is furnished with an aperture, hairs become glands, and consequently secretory organs (figs. 4 and 5).

In consequence of the hairs of plants being an extension of cellular tissue, which is naturally thin-sided, all hairs are much weaker than the tough thick-sided tubes of which woody tissue is composed. This accounts for the well-known fact that all goods manufactured from cotton, which is vegetable, are far less tough and durable than those which, like linen, are prepared from the tissue of bark or wood. When the two forms of matter are submitted to microscopic examination, the thin sides and transverse partitions of the former will usually distinguish it from the thick-sided tubes of the latter, in which no partitions are discoverable.

HAJE, a name of a venomous serpent, Coluber Haje of Linnaeus. [NAJA.]

HAKE, an edible fish allied to the cod. [MERLUZZA.]

HAKLUYT, RICHARD, born in 1553, studied at Christ Church, Oxford, and applied himself particularly to the study of geography, or cosmography, as it was then called, and he was made a lecturer on that subject at Oxford. In order to promote the study of his favourite science he published narratives of several voyages and travels, both English and foreign, which he afterwards brought together in his great collection. About 1584 he went to Paris with Sir Edward Stafford, ambassador of Queen Elizabeth to the French court, where he remained five years. On his return to England he was made by Sir Walter Raleigh a member of the company of gentlemen adventurers and merchants of London, for the inhabiting and planting of our people in Virginia, as appears from his Collection of Travels, edition of 1598, p. 815, which he published in one vol. fol., and which he afterwards enlarged and published in 2 vols. fol. 1599-1600, under the title, 'The Principal Navigations and Discoveries of the English Nation, by Sea or over Land, to the remotest and farthest distant quarters of the Earth, at any time within the compass of these 1500 years.' This fine work exhibits the discoveries by the English in the north and north-east by sea, towards Lapland, the Straits of Weights, Nova Zembla, and towards
the mouth of the river Oby, and also travels through the
empire of Russia, Georgia, Armenia, Bactria, Tartary, &c.

The first volume contains accounts of the discoveries
made by the English by sea and land in the southern and south-
eastern parts of the globe; and the third, their discoveries in
the new world of America. Hakluyt has inserted many
curious documents, such as letters of sovereigns, chancel-
ors, and other persons of various privileges granted by the
Kings of Russia, the Sultan, and others, to English merchants;
tables of weights, coins, and distances of different countries, &c.

Most of the Voyages and Discoveries contained in this
4to., London 1809-12. Hakluyt published also or edited translations of several foreign narratives of travel-
ners, &c.

A Selection of curious, rare, and early voyages and histories of
interesting discoveries, chiefly published by Hakluyt, or by his
assistance, is not included in his celebrated compila-
tion, 4to., London, 1812. It contains among others Le
Brocquère's, 'French Narrative of a Visit to Palestine,' in
1442-3; the Travels of Louis Vescoumanus of Rome to
Ambia, Persia, and the East Indies in 1502, and 'Virginia
richly described' by the description of the mainland of Florida.

HALDE, DU, born at Paris in 1674, entered the
college of Jesus, and was distinguished for his information
and laboriousness, he was entrusted by his superiors with
the care of collecting and arranging the numerous letters
written by the missionaries of the college in different parts of
the world. This employment furnished him with ma-
terials for the collection style: 'Lettres Edifiantes et Curie-
sues,' which he compiled, and which contain much interest-

The Halsted, chief town of the island, is pleasantly
situated on the river Holzemere. It is an an-
tient city, said to have been founded by the Ceresa-
ths, and the actual date of its foundation is unknown.

It became a bishop's see in 804. The most ancient part is
the Dom Platz (Cathedral Square), formerly a castle. In
1179 the greater part of the town was burnt by Henry the
Lion; and the walls were afterwards repaired.

In the Thirty Years' War it made a brave resistance; in
the Seven Years' War the French destroyed the gates and a large
portion of the ramparts. In 1809 Duke William of Bruns-
swick, with his infantry, vanquished, preceding the whole
Westphalian garrison under Count Wellingen. In 1813
the Westphalian General Ochs, who was posted here with
20,000 men and 14 pieces of cannon, was suddenly attacked by
the Russian General Czermitschke, who took 1000 of his men
and many officers prisoners. The streets of Halberstadt
are for the most part long, broad, and tolerably straight.

It has many good manufactures of various kinds, and a
considerable trade. It is the seat of a high court of justice,
and has many public institutions, and a university, of
which, as the cathedral school, with a library of 8000 volumes,
a cabinet of natural history, and a collection of instruments;
a gymnasium, a seminary for schoolmasters, a literary
society, and powerful commercial associations. The largest
Lutheran churches, 2 Reformed, or Calvinist, 3 Roman
Catholic churches, and a Jewish synagogue which is per-
haps the handsomest in Germany. The most remarkable
buildings are the Church of St. Mary's Church, which was
added in 1603, and the cathedral dedicated to St. Stephen,
built in the noblest style of the fifteenth century—its length
is 412 feet, 75 wide, and 94 high inside, and has 35 altars.
The church is full of interesting antiquities and some paintings on
the glass. The number of the inhabitants is now about 17,000, of
whom 1300 or 1400 are Roman Catholics, 450 Calvinists, and
as the Jews, who, under the bishop, are subject to many
laws. The town is situated on the River Halsted, is a
barren hill, which Baron von Spiegel, dean of the chapter,
converted into a public prome-
nade, or what the Germans call an English garden, and
left a fund to keep it in order. Halberstadt is in 11° 50' 55'

HALCYONIDAE [Kleine Wasserperlen]
the law. In 1653, having shown some hesitation as to accepting the dignity, he was made one of the judges of the Common Bench; resolving, after discussing his doubts with lawyers and divines, 'that as it was absolutely necessary to have justice and property kept up at all times, it was no sin to accept a commission from the king in consequence of his insincerity; but credit can hardly be given to the statement, for it is impossible to suppose that Hale, who was unquestionably an honest and sincere man, though perhaps weak in his character, was the first to renounce most of the worthless court and the delightful and shallow attempt to evade the evident conclusion, that as a judge under his commission was the most effectual and formal declaration he could make of his submission to Cromwell's authority. Some colour how- women for witchcraft, at the instance of Hale's subsequent conduct. After having discharged the duties of his office with consummate skill and strict impartiality, he suddenly, and without any apparent cause, affected to feel apprehensions of crime and refused to preside in the crown courts, though he still continued to administer the law in civil cases. This conduct was directly contrary to his reason for accepting the office of judge, and appears to have been no just cause for complaint. Cromwell, Hale refused to act under a commission from the Protector Richard, alleging that he could no longer sit under such authority. He was a member of the parliament which deposed the last monarch, and was afterwards an exchequer in 1646, and knighted. In 1671 he was raised to the chiefjusticeship of the King's Bench, where he pre- vailed with honour to himself and advantage to the public till 1674, in which year he resigned his office. He suffered considerably from repeated attacks of asthma, and died from dropsy on Christmas-day, 1676. As a lawyer Hale's reputation is high, and his integrity remains unsullied. His judgments were carried to a fantastic excess, as many anecdotes related by his own biographers show. The only spot upon his memory as a criminal judge is the notorious fact of his having condemned two women for witchcraft, at the instance of Mrs. St. Edmonds, in the year 1655. Hale in the course of the trial avowed himself a believer in witchcraft, and the jury found the prisoners guilty, notwithstanding many impartial bystanders declared that they disbelieved the charge. No reparation was granted, and the prisoners were executed. An anecdote is mentioned by his biographers of having hastened the execution of a soldier found guilty of murder, for fear he should be pardoned; and doing it, he certainly overstpped the bounds of his duty as a judge.

Sir Matthew Hale was a voluminous writer, though none of his productions were printed during his life. His 'Plea of the Crown,' his 'Life of the Common Law,' and other treatises connected with the law, have been published since his death, and also several others upon scientific and religious subjects. His manuscripts, which he had collected at a very considerable expense, he bequeathed to the Society of Lincoln's Inn, and he directed that they should not be lent out or printed, saying, 'As they are a treasure not fit for every man's view, nor is every man capable of making use of them, I would have nothing of these books printed; and it is my wish that any of his posterity, members of that society, might, on giving security, have one book at a time lent out to them by the society.' A catalogue of the manuscripts was contained in his will, and a full account and catalogue of all his works is printed in Dr. William's 'Life of Hale'-recently published. His life has also been written by Burnet and Roscoe, and many anecdotes relating to him are detailed by that amusing good-natured humorist, Sir John Guilling, though it should be observed that the author does not write in a very friendly spirit towards Hale. Notices of his life will also be found in the 4th vol. of the 'Bibl. Brit.'

Sir Matthew Hale was twice married: first to Ann, daughter of Sir Henry Moore, by whom he had ten children; and secondly, late in life, to one of his own domestic servants.

ALEPPO (commonly but erroneously called ALEPPO), the capital of a pashalik of Asatic Turkey of the same name, is situated in the north part of Syria, in 35° 11' 32" N. lat. (according to Niebuhr), and 37° 9' E. long. It is one of the largest and most important towns in Western Asia. Tavernier, in 1670, estimated the population at 258,000; D'Aubreuil, in 1683, at about 250,000; Russell, in the last century, at 250,000, of which 200,000 were Mohammedans, 40,000 Christians, and 10,000 Jews. There are 100,000 houses, of which 25,000 are inhabited. It is said that in 1683 there was a magnificent castle, which is surmounted by a stone wall, and has seven gates; that it contained 5 serais, or governor's palaces, 100 mosques, of which the most celebrated is that of Za- dehar; the German and Italian Hospitals; and a new and magnificent church, called Hejewie, is supposed to have been formerly a Christian church built by Helena, mother of Constantine; 10 or 12 public schools, 2 public libraries, 5 mekhems, or courts of justice, 60 baths, 100 coffee-houses, 40 or 45 great bazaars, 31 khans, occupied principally by Franks or other foreigners, 200 fountains, about 15 wells, or religious institutions, 1 mewla-khanef, or college of der- elches, 5 Christian churches, and 40,000 houses. But the state of the city has been greatly changed by an earthquake which happened in August, 1822, and which destroyed almost two-thirds of the buildings. The population is now a mixture of Turks, Arabs, Christians, and Jews. There are also Greek and Armenian churches: of these the Greeks are the most nume- rous and the richest. The small river Koik runs along the west side of the town.

Before the Conquest of 1822 Hale was supposed to possess 12,000 artisans, and was celebrated for its gold and silver lace, its manufactures of silk and cotton goods, shawls, &c.; but its prosperity was chiefly owing to its situation, for which reason it has been termed the gate between Europe and Asia. It carries on a great caravan trade with Bagdad, Persia, and the eastern parts of Asia. The goods destined for the European market are shipped from the ports of Smyrna. Caravans from all the commercial states of Europe reside at Haleb.

The ancient name of the town was Chaleb, or Chalihon, which was changed by Seleucus Nicator into Benna. It continued to be called by that name until its conquest by the Arabs under Abu Obaidah in 636, when its original name of Chaleb or Haleb was restored. It afterwards became the capital of an independent monarchy under the sultains of the race of Hamadan, under whose rule it ap- pears to have enjoyed great prosperity. In the latter part of the tenth century Haleb was again united to the Greek empire by the conquests of Zimises, emperor of Constanti- nople. During the crusades Haleb was subject to the Genoese, and in 1260 it was taken by the Turks, and again in 1401 by Timur. It was afterwards annexed to the dominions of the Mameluk sultans of Egypt, but was conquered by Selim I., the Turkish sultan, and has remained under the dominion of the Turks ever since. Haleb is at present however in the possession of the pasha of Egypt.

The pashalik of Aleppo is bounded on the west by the Mediterranean, on the east by the Euphrates, on the north by an imaginary line drawn from Scanderoon (the ancient Alex- andria) on the coast to El Bir on the Euphrates, and on the south by another line drawn from Bills to the Mediterranean, passing by Murrah and the bridge of Shogher. The northern part of the pashalik is of considerable extent, and produces the numerous crops, which have been already mentioned under the name of Amanus, which is only a branch of Mount Taurus. The southern part is sterile and sandy; but the plains at the foot of the mountains are fertile, and afford good pasture for the numerous flocks and herds of Kurds, which graze upon them during the greater part of the year. The inhabitants only cultivate the land in the mountainous districts, which produce wheat and other sorts of grain. The country is divided into two parts, the northern parts of the country are abandoned to the Kurds and Arabs. The heat of the climate is seldom oppressive, in consequence of the west winds which blow from the Mediterranean. The country is reckoned healthy; but the inhabitants of Haleb are very subject to a disease, which first appears under the form of an eruption on the skin, and afterwards forms into a sort of boil; it dies away in about eight months from its appearance. Volney and many other travellers
attribute the disease to the badness of the water which the inhabitants drank. The water of Hal is not wholesome, being alkaline and impure. It is supplied from the springs of Sirsat and the wells of Ghaziabad. The Best is taken on the day of the Feast of St. John the Baptist and is carried to the places of public worship. It is used in the churches and the houses of the town and is believed to have medicinal properties. It is said to cure ailments such as dysentery, fever, and rheumatism.

The parish church of Hal is dedicated to St. John the Baptist and is located in the town center. It was built in the 13th century and is considered a historic monument. The church has a large tower and a nave with a chancel. The interior is richly decorated with carved woodwork and frescoes. The church also has a valuable collection of stained glass windows.

Hal is a town of about 10,000 inhabitants and is located in the district of Ghaziabad in the state of Uttar Pradesh, India. It is situated on the banks of the River Ganges and is served by several major roads and highways. The town has a vibrant cultural scene and is known for its festivals and fairs. The main festival is the annual fair of St. John the Baptist, which attracts thousands of visitors from all over the region. The town is also home to several schools and colleges, including a government college and a private engineering college.

The town of Hal is also known for its traditional crafts, including weaving, pottery, and metalwork. These crafts are passed down through generations and are an important part of the town's heritage.

Hal is a town of rich history and culture, and its people take great pride in their traditions and customs. The town is an important center for trade and commerce, and its location on the Ganges River has made it a hub for transportation and trade for centuries. The town is a popular destination for tourists and is renowned for its hospitality and warm welcome.
posed, nineteen are said to be manufacturing, and contain 141 mills in operation, which have an aggregate power of 2319 horses; 57 of them are cotton-mills, 35 woollen, 45 worsted, and 4 silk mills. They employ together 16,377 persons, of whom 8,978 are females. A considerable portion of the population is employed in making mill-machinery and wool-cards. The manufacture of these cards gives occupation to numerous wire-workers and curriers. The wire teeth of the cards are fixed in leather, and nearly 20,000 people are employed at a very low rate of wages, in fixing the wires in the leather.

A weekly market is held on Saturday, chiefly for the sale of woollen cloth. The Piece Hall, which was erected in 1779 with the aid of subscriptions from the manufacturers, is a large quadrangular structure of stone, which cost 12,000l., and which occupies an area of 10,000 square yards of land, which were given for this purpose by Mrs. Caggill. It is 100 yards long and 91 yards broad; the centre is occupied by a grass-plot. It contains 315 apartments for the reception of goods, the quantity of which was fixed for sale at one time is often of the value of 50,000l. The east side has three stories, being on a descent; the other sides only two. Each story is fronted by a colonnade, with spacious walks round the whole square, having columns in the front opposite to the partitions of the rooms, each of which has a door, and each window to the gallery. The simplicity and elegance of the building form the model for such establishments. It was erected from a design by Mr. Thomas Bradley, and is said to be fire-proof in every part except the roof.

The appearance of the town of Halifax is generally handsomely relieved by many edifices well lighted with gas, and amply supplied with soft water from reservoirs about a mile north-west of the town, which were opened about 1827. Under the act of 1823 for paving, cleaning, and otherwise improving the town, many great improvements have been effected by the widening of streets, the formation of drains, and the removal of unsightly buildings. The modern streets are spacious, and lined with houses of a handsome and generous style.

The parish-church of Halifax is a handsome and spacious edifice of pointed Gothic architecture, erected at different dates. It is said that the chancel is an addition to the original fabric, and that the tower was built by the munificence of the Lucy and Saviles. There are several monumental inscriptions worthy of notice in the chancel, one of which is to Archbishop Tillotson. Trinity Church is a handsome Gothic building, with Ionic pillars, and an elegant tower surmounted by a dome: it was built in 1785. St. James's Church, built in 1831, is in the pseudo-Gothic style, with turrets at the west end. The other places of public worship in Halifax are the Catholic chapel, which was built in 1809 by the Oldham brothers, two belonging to the Baptists, two of the Wesleyan Methodists, two of the new Connection Methodists, one of the Primitive Methodists, a Friends' meeting-house, and a Unitarian chapel, which was formed in 1835 by a company of shareholders. To the above-named places of worship Sunday-schools are attached, and the religious and charitable institutions of the town and county are liberally supported. The free grammar-school at Skircoat was established in 1586 by letters-patent of Queen Elizabeth: it is under the direction of twelve governors, chosen from the discreet and honest men of Halifax. Its property yields 187l. per annum, exclusive of the school-house, garden, and park, which are occupied by the masters of the smaller schools. Waterhouse's Charity, established in 1636, provides almshouses for twelve poor widows, a stipend for the lecturer at the parish church, small yearly stipends for certain children in the local district, and various sums for other local purposes. The property of this trust has of late years greatly increased in value. The infirmary is a very noble building, which is just opened to the public. The first stone was laid in September, 1836, to the designs of Mr. Ford, medical and surgical assistant to both in and out patients. A subscription of 5000l. was raised, to which an addition of 2500l. was made by the trustees of the dispensary, which institution is now consolidated with the public baths, which are beautifully situated in a valley on the road to Huddersfield. They afford all the various accommodations of the most superior bathing establishments; attached to them is a large garden and a bowling-green. The literary institutions of Halifax are the Literary and Philosophical Society, which has an elegant hall and museum; the Mechanics' Institution, with a library of upwards of 1000 volumes; and the news-rooms, which also comprise a subscription library. There are also assembly-rooms and a theatre.

[Communication from Yorkshire.]

HALIFAX. [Nova Scotia.]


HALIME'DA, a portion of the genus Corallina, Linn., for which Lamarck had used the name Flabellaria, is thus styled by Lamouroux. [Exposition Méthodique des genres.]

HALIT is an aromatic, compressed, rarely cylindrical, almost always flabelliform; the axis fibrous, surrounded by a thin cretaceous substance.

HALIMUS. [Makell.]

HALIOTIDE, HALIOTIS TRIB. OR FAM. The species having a calcareous column of Gastroopus, commonly called 'Ear-shells,' or 'Sea-ears,' are more numerous than is generally supposed. Mr. Swainson, in his first series of 'Zoological Illustrations,' observes, when writing on the 'Small-belled Californian Ear-shell' (Haliotis Californiensis) (1820-21), that the definitions given by conchologists up to that time were so imperfect that he had left our knowledge of these shells nearly the same as in the time of Linnaeus. The common species are enumerated in Mr. Dillwyn's work;* although thirty-four have fallen within my own observation during the last few months.

Linnaeus, who records the seven species known to him under the generic appellation of Haliotis (Sea-ears), describes the oneal as a slug (Limax) and the shell as ear-shaped and open (patena) with a lateral hidden spine, and the disk longitudinally pierced with holes (poris). He places the genus between Natica and Patella.

Cuvier, in the first edition of his 'Règne Animal' (1817), makes the Ormieres (Haliotus of Linnaeus) the first genus of his sixth order of Gastroopoda, Scutibranchia. [Gastero-

poda, vol. xi., p. 93.] He observes that it is the only genus of the order with one species, and that its shells are formed by a company of share-holders. To the above-named places of worship Sunday-schools are attached, and the religious and charitable institutions of the town and county are liberally supported. The free grammar-school at Skircoat was established in 1586 by letters-patent of Queen Elizabeth: it is under the direction of twelve governors, chosen from the discreet and honest men of Halifax. Its property yields 187l. per annum, exclusive of the school-house, garden, and park, which are occupied by the masters of the smaller schools. Waterhouse's Charity, established in 1636, provides almshouses for twelve poor widows, a stipend for the lecturer at the parish church, small yearly stipends for certain children in the local district, and various sums for other local purposes. The property of this trust has of late years greatly increased in value. The infirmary is a very noble building, which is just opened to the public. The first stone was laid in September, 1836, to the designs of Mr. Ford, medical and surgical assistant to both in and out patients. A subscription of 5000l. was raised, to which an addition of 2500l. was made by the trustees of the dispensary, which institution is now consolidated with the public baths, which are beautifully situated in a valley on the road to Huddersfield. They afford all

a curved line near the left-hand border and parallel to it. As the animal increases in growth, it forms for itself a new hole on the edge of the anterior part of the shell; this hole commences with a notch which serves to give a passage to the siphon of the animal, and is afterwards completed; when the animal leaves the shell, the latter part is opake by the usual separation and when the animal crawls, this shell may be considered as a reversed basin with its convexity upwards. Its circumference is thence considerably exceeded by the very large shell, the base of which is 2 inches, and at the part of its posterior part of its body. Following the description of the Ornieri (the animal of the Haliotis) given by Adanson, I had supposed that the branches of this animal were extended through the shell. But nothing could be more deceiving; and I was undeceived by showing me that they are hidden in a particular cavity. Haliotis therefore belongs to the family of Macrostomata. With regard to the tentacula, it has not perhaps really more than two. But as it is not uncommon (assez fréquent) among the marine tachopiclips to find the tuniculae each upon a tubercle which springs from the external or posterior base of the tentacula, these tuberculae are apparent more elongated here than elsewhere: in this case the two larger tentaculae are the anterior ones. Lamarck records fifteen species, including Haliotis dubia. Mr Swainson ('Zool. Illust.' 1st series) remarks that 'the genus Pusillus of Montfort ('De Montfort') 'resting upon the nullity of that knowledge of the animal,' appears to him an unnecessary distinction, for such, he observes, is the character of all young shells, and also of mature ones, whose outer surface is raised into tubercula.

De Montfort (1810) gives the following general characters for Pusillus:—Shell free, univalve, in the form of an ear, pierced with one or two holes; summit spiral, flattened, dorous, and circular; the inner side the same; entire, perpendicu- lar; left lip reflected and terminal; back covered with an epidermis, having a gutter in the middle and in the direction of the spire. He gives as the type of the genus Pusillus the Pusillus of Dr Cuvier; which nearly resembles as follows: The shell without the epidermis in the base, with another species, a double membrane cut out into leaflets (feuilles) and furnished with a double row of filaments. On the outside of its long tentaculae two cylindrical pericardia or ears; the mantle is divided on the right side, and the water, which passes by means of the holes in the shell, can, through this slit, penetrate into the branchial cavity; along its edges are again three or four filaments, which, the animal, when it goes out through these holes. The mouth is a short proboscis. (Cuvier's description for all Gmelin's Haliotides, except H. imperfecta and perversa.)

Body oval, very much depressed, hardly spiral behind, provided with a large foot doubly fringed on its circumference. Head depressed; tentacules a little flattened, joined (connex) at the base; eyes carried on the summit of prismatic peduncles, situated on the external side of the tentacules. Mantle about as long as the body; the two lobes pointed, forming by their junction a sort of canal for conducting the water into the branchial cavity situated on the left, and inclining two very long, pectinated branchiae (pectines branchiaux).—(De Blainville).

Animal oblong, depressed, furnished with a large head and a short proboscis, at the extremity of which is the mouth, containing a tongue armed with points (dents); tentacules two, long and cylindrical; eyes on pedicles, implanted at their external base, a little backwards. Mantle short, delicate; foot very large, oblong, furnished all round with a double row of footstalks agreeably cut out or pinned to the body; from the mouth to the footstalks, the two ends equidistant; footstalks equal pectinated branchia, in a cavity open to the left, the muscle of attachment occupying the middle of the animal; vent (anus) opening into this cavity opposite the slit which forms its aperture, the footstalk being shell-like; for he says in the course of it that the shell sometimes reaches more than an inch in its greatest diameter.

Dr. Leach (1814) adopted De Montfort's distinction and naming the species by the Royal College of Surgeons. He distin-
guished from Haliotis (Ear-shell) by the irregular form of the outer edge or lip; the disk, he adds, has fewer perfora-
tions and the spine is placed rather on the back. He states, in conclusion, that the animal is a young shell; he, however, probably not unlike that of the ear-shell.

Mr. G. B. Sowerby (Genera of Recent and fossil Shells, No. xiv.) observes, that with the exception of a few that are known to be collectors and Linnaeus as Imper-
forate Ear-shells, the genus Haliotis has not recorded any dissimensions. 'An attempt,' continues Mr. Sowerby,
Shell nacreous, very much depressed, more or less oval, with a very small spire, very low, nearly posterior, and lateral; aperture as large as the shell, with continuous borders, the right border delicate and trenchant, the left flattened, enlarged and trenchant; a series of complete or incomplete holes, parallel to the left side, serving for the passage of the two pointed lobes of the mantle; a single large muscular impression, median, and oval. (De Blainville.)

These, the true Haliotidæ, forming M. De Blainville's section A, consisting of species whose disk is rounded forwards and pierced with a series of holes, vary much in size and shape. The general form may be imagined from that of Haliotis tuberculata, the most common species, the size, the species from the warmer climates that are as large as or larger than the crown of a hat, and are absolutely dazzling from the splendid iridescence of their nacre. The shape too varies considerably. Thus we have among the comparatively small species a form very nearly round (Haliotis conica), whilst Haliotis Aurinea is very much elongated. The effect of treating the shell of Haliotis with acid, so as to deprive it more or less of its earthy material, and to exhibit the shell still retained after the removal of that earthy matter, will be seen in the specimens numbered 98, 98 A, 98 B, in the gallery in the same museum.

Geographical Distribution.—Both M. de Blainville and M. Range state that species of Haliotis exist in all the seas; the latter uses the expression ' elles sont très répandues dans toutes les mers,' but their limits seem not to go far beyond temperate climates. None appear to have been seen by our northern voyagers; and though Haliotis tuberculata (which there can be little doubt is the Grypa lessons, by range excites desabres esp. the wild ippus, which some call the Sea-Bear—of Aristotle, Hist. An., lib. iv., c. 4) is common at Guernsey and Jersey, and has been found—that is, the shell—on the south coast of Devonshire, we agree with Mr. Sowerby in thinking that, on the present evidence, this species cannot with propriety be considered a native of our own coasts though the dead shells are sometimes thrown up on our southern shores after violent storms.

Haliotis.—The Haliotidæ, which are all marine and littoral, being without operculum, adhere, like the Patellæ, by applying their under parts to the surface of the rocks. They are generally found near the water's edge, and, according to Lamarck, go during the fine summer nights to feed on the herbage which grows near the shore.

Utility to Man.—As an article of food this genus is by no means to be despised. We have eaten Haliotis tuberculata, and when served by a good cook it is tender and appetizing. The large fleshly foot, if not properly managed, is apt to be in a state of indigestion, and gives rise to complaint. People of Guernsey and Jersey ornament their houses with the shells of this species, disposing them frequently in quincunx order, and placing them so that their bright interior may catch the rays of the sun. We have often thought that some of the large and splendid intertropical species, whose exterior, after removing the outer coat, take a polish almost equalizing the natural brilliancy of the inside, might be converted into dishes for holding fruit: if mounted with good taste, their indescribable iridescence would materially add to the richness of an elegant table.

B. Species whose disk, besides the series of holes, is raised by a large parallel rib, hollowed interiorly, and whose anterior border is more or less irregular.

Padalus. (De Montfort.)

Padalus rubicundus?

M. De Blainville refers to Haliotis canaliculata, Lam., as the example. The figure in Knorr, referred to by Lamarck, is red externally, and has the elevated rib; but the shape of the shell is longer than that of Padalus scalaris, Leach, and of other Padoli which we have seen. The specimen recorded by Mr. Gray in the appendix to the 'Narrative of a Survey of the Intertropical and Western Coast of Australia, performed between the years 1818 and 1822,' by Captain Phillip Parker King, R.N., F.R.S., &c., vol. ii., and which Mr. Gray notices as the largest he ever saw, measured three inches and a half by two and a half. We have seen the shell, and never saw so large a specimen. Mr. Gray records it as Padalus rubicundus of De Montfort, with the synonyms of Padalus scalaris, Leach, and Haliotis tricoscula, Lamarck.

Locality.—Lamarck, on the authority of M. Leschenault, says that his Haliotis tricoscula inhabits the seas of Java. The fine specimen brought to England by Captain King was found upon Rottnew Island, on the west coast of New Holland, and is now in his cabinet. It has only three holes, the anterior ones, open. All, both those which are closed and those which are open, are very highly elevated, and so is the curved longitudinal rib. The left border externally is very much raised and nodulous, looking at first sight as if it had another row of holes which had been closed; but it was evidently always imperfect.

C. Species whose disk is not pierced, but hollowed longitudinally by a decurrent canal.

M. De Blainville gives as an example of his section C. Haliotis dubia of Lamarck. It will be clear to the observer that the animal protected by such shells as the two next, must exhibit some differences from that of a true Haliotis.

D. Species whose disk is not pierced, but is furnished with the two gutters together, but approximated, so as to leave externally a decurrent rib between them.

Stomatia. (Lamarck.)

Cuvier, who says that the animal of Stomatia is much less ornamented than that of Haliotis, is of opinion that this form connects the Haliotides with certain Turbines.

Mr. G. Sowerby (Genera of Recent and Fossil Shells, No. xix.) observes that Lamarck, in his observations upon Stomatia, tells us that in respect to their general form those shells appear to be nearly related to the Stomatia; and that they are principally distinguished by the transverse ridge and the elevated outer lip of the Stomatia.
Upon a careful examination however of ten species, Mr. Sowerby was unable to discover any difference in the outer leaf, and concluded that Lamarck places among his Stomatella one species, S. rubra, which has a nodular keel placed exactly in the same position as the transverse ridge, by which the latter characterizes Stomatella; so that Mr. Sowerby does not consider it to be a distinct species. This view has therefore united the two Lamarckian genera under the appellation Stomatella. He thus characterizes the genus thus reformed:—She pearly within, mostly coloured externally red, and divided into segments by the use of the interior keel. The spires, in most species, prominent, but not produced nor elongated; sometimes very small, marginal and inconspicuous. Attachment mostly longitudinal, in some species cruciate. The spires are large, and at some depth, its edges entire, united at the upper part, and scarcely modified or altered in form by any portion of the last volutions. Volutions from two to four. Muscular impressions two, seldom distinct, nearly marginal, and in the "open part of the shell."

Mr. Sowerby goes on to state that Stomatella appears to be related to Haliotida, and is therefore rightly placed by Lamarck among his Murexostoma. One of its species is known as Linnaeus, he adds, as a Haliotis, under the name of Haliotis imperforata (Gmel.). Mr. Sowerby does not pretend to discuss the question of their resemblance to Lamarck's Turbinaceae; but only observes that in general form and arrangement of the shell of Stomatella resembles that of Lamarck's Monodonta. The Stomatella, he states in conclusion, are marine, and he says that all the species he has seen were brought from the East Indies and New Holland.

Afterwards, about 1518, when Cardinal Wolsey founded various lectures at Oxford, he removed to that university. Having entered the University of Paris, he was called to the bar, and became first one of the common serjeants, and subsequently under-sheriff of the city of London. In 1533 he was appointed summer-reader of Gray's Inn, and in 1540 founded the house of the Bench in the King's Bench. He died in 1547, and was buried in the church of St. Benet Sherehog, London.

HALL, Joseph, an eminent divine and prelate, was born July 1st, 1574, at Ashby-de-la-Zouch, in Leicestershire, and received his education at Magdalen College, Cambridge, of which in due time he was elected Fellow. Having taken orders and received some minor benefices in succession, he was made dean of Worcester in 1617; sent as one of the English captives to the Holy Land in 1618, appointed bishop of Exeter in 1627, and translated to Norwich in 1641. His professional zeal and earnest piety involved him in those jealous times in the love of some, and the hatred of many; and being hoodwinked and vexatious attacks, he plainly told, to use his own words, "archbishop Laud." Under how dark a cloud I was hereupon I was so sensible, that I plainly told the lord archbishop of Canterbury that I would be oblivious to those sneering tongues of his misfortune I would cast up my rochet. I knew I went right ways, and would not endure to live under undeserved suspicions. In truth he was well attached to the church of which he was a member, and wrote strong and forcible petitions to the king, when the danger of the times became imminent. In November, 1641, having joined others of the bishops in a protest against all laws made during their forced absence from parliament, he retired to the Tower, and was confined there till the following June on giving bail for 5000l. In the next year the revenues of his bishopric were sequestered, and during the rest of his life he suffered much from poverty and harsh treatment. In which he had some success in a piece called 'Hard Measure.' He removed in 1647 to Higham, near Norwich, and died there in 1656.

HALL, John, a scholar of King's College, Cambridge, and afterwards, about 1518, when Cardinal Wolsey founded various lectures at Oxford, he removed to that university. Having entered the University of Paris, he was called to the bar, and became first one of the common serjeants, and subsequently under-sheriff of the city of London. In 1533 he was appointed summer-reader of Gray's Inn, and in 1540 founded the house of the Bench in the King's Bench. He died in 1547, and was buried in the church of St. Benet Sherehog, London.

HALL, the circle of the Iaxt, and the kingdom of Württemberg, has 6500 inhabitants, six churches, including the ancient Gothic church of St. Michael, a handsome town-hall, and salt-works yielding 80,000 cwt. annually, among the most important establishments of the place.
It was formally a free Imperial city, and annexed to Württemberg in 1802.

HALLE, in Saxony, on the Saale, a town in the district of Merseburg, and on the province of Saxony, in Prussia, the chief town of the circle of the Saale. It is celebrated chiefly for its salt-works. Its first mention is in October 1369, when founded by A. H. Francke (Francke), and as the seat of the Frederick University. It consists of three towns, viz. Halle itself with five suburbs, and Glauchau, and Neumarkt, which have received town privileges. The University was founded in 1694, and by a decree of the king of Prussia was united in 1817 with that of Wittenberg. It has always maintained a very high character, and has a number of scientific institutions for its cult. In the medical faculty are the museum, theological and philological seminaries, a medical, surgical, and clinical institution for surgery, midwifery, etc., the anatomical theatre, the physical and chemical instrument, the observatory, the mining institute, with a cabinet of minerals, &c. The university library consists of above 50,000 volumes. The first professors having been divines of what the Germans call the Pietist party, the theological faculty had from its origin a very local character, and Halle has been the chief seat of that party, which, notwithstanding its prejudices and peculiarities, had a salutary influence on practical Christianity. A great change was, however, effected by Christian von Wolf, who inspired the students with a love of mathematics and philosophy; and though by the influence of the Pietist divines he was for a time exiled from the Prussian states, he, with his whole school, triumphed in the end. The university had attained its greatest perfection in the beginning of the nineteenth century, when Napoleon dissolved it after the battle of Jena. The Westphalian government indeed re-established it, but it had only 300 to 400 students, and in 1813 Napoleon again dissolved it. The university has since restored it to Prussia, and after its union with that of Wittenberg it had in 1829 1300 students, of whom 94 obtained divinity. The competition with the new University of Berlin however affected that number. The Transact. Phil. 1743 between 700 and 800 and 900. There are above 40 professors and teachers, among whom are some highly eminent names. There are several remarkable buildings, such as St. Mary's church, built in the Gothic style in the thirteenth century; St. Ulrich's church, built in 1339; that of St. Maurice's, the middle of the twentieth century; the cathedral, built in 1520-23; and the town-hall. The ancient castle, called the Moritzburg, formerly the residence of the archbishops of Meissen, was given to a hospital to be furnished with the 1400 of the Thirty Years' War, and only a wing now remains. Halle possesses many charitable institutions. There are numerous manufactories, but the most important are the salt-works, producing about 16,000 tons of salt annually. The salt was called Halleon, and are a peculiar race, distinguished by their physiognomy, costume, and customs: they are supposed to be descended from the aboriginal inhabitants, and enjoy many privileges and immunities of United Germany.

The 'Allgemeine Literaturzeitung,' one of the very best in Germany, originally published at Leipzig, has appeared at Halle ever since 1804. The population of Halle itself is about 17,000, and with Glauchau, &c., 44,000.

HALLE, or Hallein, in the circle of Salzburg, in Austria, with 5000 inhabitants, has extensive salt-works, which produce annually 450,000 cwt. of salt.

HALLE, ALBERT VON, was born at Berno, October 16, 1810, and resided there from 1776 to 1786. His father, Nicholas Emmanuel von Halé, was an advocate and had the reputation of being an able lawyer, died in 1721, but even at that time could foresee the distinction which his son would achieve and distinguished him over his fellow-pupils. In early life Halle was feeble and delicate, being affected with rickets, a circumstance which, as his friend and biographer Zimmermann observes, not unsuitably marked his future endowments and distinguished his youth. He is said, at the age of nine, to have been in the habit of writing down daily all the unusual words he met with. He composed also short lives of nearly two thousand distinguished persons, after the manner of Bayle's dictionary, and formed a Chaldean grammar. A satire in Latin verse upon his master was known to have been written by him when only ten years old, and two years later some verses in his native language. His father had intended him for the church, but his own inclinations leading him to the study of physic, he went in 1733 to the university of Tübingen, where he lived with Deumeroy, afterwards professor of anatomy at St. Petersburg. Being but little satisfied with his progress here, he resorted in 1725 to Leyden, where the zeal and talent of the professors afforded him an opportunity of pursuing his studies in anatomy. At this university Boerhaave was then in the height of his fame, attended by 120 pupils, whose instruction was his greatest delight; and Albinus was delivering the lectures on anatomy, which he had founded. Among the advantages of these, it is not extraordinary that Haller should ever after speak with the greatest satisfaction of his residence at Leyden. About this time he visited Bucyca at Amsterdam and Paris, with his assistanct Van Helmont, and received a portion of his celebrated collection of anatomical preparations, the superiority of which, he tells us, depended rather upon skill in manipulation than on any secret process. At the end of the year 1726 he offered himself for his doctor's degree, and delivered his thesis De ductu salivali Coehaniziano, which he showed to be merely a blood-vessel. In 1727 he visited London, where he became acquainted with Sir Hans Sloane and Cholseyden; thence he went to Oxford, and thence to Paris, whence having pursued his anatomical and surgical studies for some time under Winslow and Le Dran, he went to Bazel to study mathematics under Bernoulli, and then returned to his native country and began medical practice in Paris. In 1736 he was appointed physician to the hospital at Bern, and soon after principal librarian to the large public collection of books and medals; but these offices he did not hold long, for in the following year he was appointed personal physician to George, Duke of Saxony, at Göttingen, by George II., which after some hesitation he accepted. Having declined practising, he devoted himself to the duties of his office with the greatest zeal, and especially exercised himself in examining facilities for the study of anatomy. During eighteen years that he retained this appointment, while fully discharging all its laborious duties, he was a constant contributor to the different scientific journals, and was the founder of 'Prima Linorum Physiologisti,' which he had that year used as the ground-work of his lectures, having previously employed the 'Institutions' of Boerhaave. In 1751 the Royal Society of Göttingen was established, and Haller, at the house the first meeting took place, was appointed perpetual president. To their Transactions, of which the first volume appeared shortly after under the title of 'Commentarii Societatis Regiae Scientiarum Gottingensis,' he was a constant contributor, even when, in consequence of the delicate state of his health, being obliged to leave Göttingen, he retired to Bern. Here he resided during the rest of his life, constantly occupied in the publication of his most important works, which exposed him to all the honours of the science of his profession and of general literature, and in the active and honourable discharge of various duties in the service of the republic, in which he at all times strenuously advocated the cause of united Germany. In October, 1777, in the enjoyment of the highest reputation, both as a citizen, a scholar, and a philosopher, his literary labours ceasing only with his life.

It would be difficult to determine how large a portion of the facts of medical science now most familiarly known we owe to the extraordinary labours of Haller. Some idea of the extent of his works may be formed from the fact that the titles of nearly two hundred treatises published by him fill a whole volume, given by himself, in consequence of Haller, and that this list does not profess to be complete. He is unanimously received as the father of modern physiology, whose history commences with his writings. He was the first to introduce the idea of a natural economy, which had before been studied only in connection with the prevailing mechanical and chemical or metaphysical theories of the day. Commencing with a sound knowledge of his master's talents and discoveries of the dead body, he sought experimentally and systematically to discover the laws which governed their actions during life, proceeding from the most simple to the most complex phenomena, disregarding all the phenomena which Van Helmont and Stahl had invented, and all those deduced from mechanics and chemistry which were not clearly sufficient for the phenomena ascribed to them. He sought for powers peculiar to the living body, which he believed must govern the actions which he found occurring only in it. Those he thought might be restricted to
two—sensibility and irritability; the former seated in the brain and nerves, the latter in the muscular fibres. In this he had indeed been partially anticipated by Glisson [Glisson], who perceived the necessity of admitting an inherent property of muscle fibres, which its contraction or atrophy, which it does not take place under the influence of certain stimuli, but the laws of this property, and the distinction between it and irritability, had never been at all clearly determined. Haller thus illustrated the intestines and the muscles of the abdomen, or a muscle separated from the body, is irritable, for when pricked or otherwise stimulated, it contracts—yet it is not sensible; the nerves on the other hand are sensible but not irritable, by which its contraction is distributed to which they are distributed are thrown into action, they themselves do not exhibit the slightest motion. Hence irritability, he said, cannot be derived from the nerves, for it is impossible they should communicate what they do not possess themselves; but he attributed a nervous power to some of the muscles as a necessary condition of their irritability, and supposed it to be conveyed to them during life from the brain through the nerves, and to govern their actions under the influence of certain undetermined laws. Proceeding to investigate further the laws of irritability, he found that it differed in intensity and permanence in different parts of the body. He found that the muscular fibres of the heart, next to those of the intestines and the diaphragm, and that it ceased soonest of all in the voluntary muscles, and by reference to this superior degree of irritability he explained the constant action of the heart and the respiration by which its continued influence is transmitted from the nerves to the heart, and at the iris, and believed that the action of light upon it takes place through the medium of the retina, a view since proved to be perfectly correct. He supposed the arrector pili muscle to be capable of yielding out all his cellular tissue around them prevented any motion from taking place in them, and he explained the accumulation of blood in an inflamed part, partly by the contraction of the veins and partly by a certain capacity of the arteries. He endeavoured to prove by experiments that the tendons, the capsules of joints, the periosteum, and the dura mater are entirely insensible, and that the pain which occurs in these parts is not the result of any irritation of the nerves distributed to and around them; and in these and some other tissues which he held to be destitute of irritability he admitted a force analogous to elasticity, by which they contracted slowly and in a manner altogether different from muscular tissue when divided or exposed to cold, etc.

Such is a sketch of the great doctrine of irritability and sensibility on which Haller based all the phenomena of life, and around which he arranged all the facts of physiology known at his time. He is, as we have seen, the first impulse to the study of the laws of life as a separate and exclusive science, and though in some parts erroneous, and in many insufficient, it still contained enough of truth to make it a field rich in following developments during many successive years. His doctrines were strongly opposed by Whytt and others, and in the controversies that followed numerous new facts were advanced and the most important additions to physiological knowledge rapidly made. It was soon shown that the restriction of the vital powers to the two, as defined by Haller, was much too exclusive, for that there were many parts which, though they gave no evidence of possessing either of them, were not the less alive, while others to whom Haller refused these properties gave sufficient demonstration of possessing them when excited by other and appropriate stimuli. Hence first originated the discovery of the fact that for the action of each organ a peculiar stimulus is required, and that each tissue has what Bichat, who illustrated it most completely, called a vie propre.

But even if Haller had not attempted to establish such an exigence, it is evident from this, his learning and his admirable mode of studying physiology might have been sufficient to obtain for him a reputation nearly as high as that which he has always enjoyed. Possessed of a competent knowledge of all the sciences which could throw any light on the actions occurring in the living body, he pointed out in numberless instances what part of them was to be attributed to the laws of inorganic matter and what to the vital system, and he was not content with admiring any of the former as sufficient by themselves to explain the whole of the latter, which had been the chief error of nearly all his predecessors. He rarely drew any conclusion respecting the mode of action of any organ or part in the human body, without previously investigating the analogous function in the bodies of animals by dissection or experiment; and he tells us that he often found that questions to which no sufficient answers could be obtained by observations on the human body, were at once solved by his examinations in the various classes of animals. Deeply read in all the works that preceded him and in all those of his contemporaries in the new science, he did not attempt to decide anything till he had considered all their statements and compared them with his own investigations, and hence each of his works contains so perfect an epitome of the whole of all former historical investigations on the subject, and a mass of evidence so extensive, that whatever errors the conclusions he sometimes arrived at may contain, they can never fail to be records of the highest value. At no time the same elegant and lucid style in which he is written, the result of the combination, almost unique, of the poet with the anatomist, has rendered them attractive, notwithstanding their great extent, to his successors in every country.

Haller was fortunate in receiving the high honours which he deserved during his life-time. In 1739 he was appointed physician to the king of England. In 1743 he was elected a fellow of the Royal Society of London, and at different times subsequently of all the scientific societies of Europe. When George II. visited Göttingen in 1748 he was ennobled by the emperor: he was invited by Frederick the Great to settle in Berlin, with a handsome salary, to which no duties were attached, and in 1749 was made a member of the royals at Berlin and at Utrecht. He enjoyed throughout his life the friendship and esteem of the most eminent of his contemporaries throughout Europe; and, varied as his pursuits were, he acquired a reputation in all with moderation and success. It would be impossible here to give a complete list of his original writings and compilations; few writers have ever been so voluminous and it is extraordinary that, amidst his personal and public duties, he should have had opportunity for the composition of so extensive a library as they alone would form. A large portion were probably formed from the accumulation of his publications following his method of continuously recording everything which appeared to him worthy of notice; a plan, commenced, as we have seen, in childhood, he continued without intermission to the last year of his life. The following are his principal works:

His chief poetical production, Vorsuch Schweizerischer Gedichte, was published anonymously at Bern; afterwards two more editions of it were printed there, and four at Göttingen. Three editions of a French translation were also issued. From 1735 to 1744 he was engaged in publishing, in 19 vols. 4to., a number of the most select disquisitions and theses in anatomy, surgery, and medicine, and from 1757 to 1766 his Elements Physiological Corporis Humani, unedited and enlarged, have been published on medical science which the eighteenth century produced. It contains every fact and every doctrine of physiology at that time known, and is written in such a style of elegance and classical beauty that it is still a model for writers on the same subject. It appeared in eight 4to. volumes from 1757 to 1766, and a posthumous 'Auctarium' was published in 1782 in four 4to. fasciculi. From 1774 to the time of his death he was engaged in publishing part of his Bibliothecam Anatomiae, Chirurgiae, Medicinae Practicae, Botanici, et Historiae Naturalis, which form together ten 4to. volumes, of which the publication was completed posthumously. They are composed principally of abstracts of the writings of all the most esteemed authors on the subject, so as to form a complete history of the doctrines of each science. His 'Icones Anatomeic,' which were published from 1743 to 1756, contain most accurate and well-engraved representations of all the important changes that have taken place in the development of the Chick, on the formation of the Heart and the Bones, on the Circulation, and on the Eye. (Das Leben des Herrn von Haller von J. F. Wernermann, 1 vol. 8vo, 1755; Samhier, Elégie de Haller, Geneva, 1778; Histoire de la Médecine, par K. Sprengel.)

HALLEY, EDMUND. The materials for the personal...
Life of Halley are principally in the Biographia Britannica, which makes considerable use of a manuscript furnished by Mr. Price, Halley's son-in-law. Some years ago a manuscript belonging to the Bodleian library, purporting to be the life of Halley by some one acquainted with him, was read to the Royal Astronomical Society (see their Monthly Notice, December, 1834). We find some extracts from this manuscript, agreeing almost word with word with passages in the Biographia Brit., and conclude that the document in the Bodleian library is the original, or perhaps an abridged copy, of that cited in the printed work. The end of Halley in the Memoirs of the Academy of Sciences of Paris is also quoted, and is extant in the small collection of folios by that writer, Paris, 1747.

Edmund Halley was born October 29th, 1656, at Haggerston, near London, at a country-house belonging to his father, who was a soap-boiler in Winchester Street, London. He was educated at St. Paul's school, under the care of Dr. Gale, and was placed at Queen's College, Oxford, in 1673, being then possessed of much erudition for his age, and a strong turn for observation, as appears by his having discovered for himself before he left school the alteration in the variation of the magnetic needle. At the university, being well supplied with instruments by his father, he began to apply himself to astronomy, and before he reached the age of twenty he had given (in the Phil. Trans.) a memoir on the problem of Kepler, had invented a method of constructing the phases of a solar eclipse, and made many observations of Jupiter and Saturn, the results of which we shall presently see. Finding however that nothing could be done in planetary astronomy without more correct tables of the stars, and relying upon Flamsteed and Hevelius for the selection of new catalogues, he determined, with his father's consent and assistance, to appropriate to himself the task of forming a catalogue of the southern hemisphere. Furnished with a recommendation from Charles II. to the Earl of Devonshire, he set sail for the Highlands of Scotland in November, 1676, and remained there two years. His "Catalogus Stellarum Australium," published in 1679, was the result of this voyage, and contains, besides the positions of 359 stars, some other peculiar interest, particularly an observation of the transit of Mercury over the sun's disc, and a hint that such observations might be employed to determine the sun's parallax (afterwards so successfully carried into effect with the planet Venus). He also notes the increased curvature of the moon's orbit when in quadratures, which was afterwards explained by Newton. In his voyage out he had observed that the oscillations of a pendulum increased in duration as the instrument approaches the equator.

At his return from St. Helena the king granted him a mandamus to the university of Oxford for the degree of Master of Arts, for the election of a fellow of the Royal Society. The body sent him to Danzig in 1679 to judge of the observations of Hevelius, who maintained the superior accuracy of instruments with simple sights, in opposition to Hook, who advocated the use of the telescope. Halley was a man of rapid movements: in November, 1678, he returned from Danzig in July, and remained at home till the end of 1680, at which time he set out on a continental tour, accompanied by his schoolfellow Mr. Nelson, since well known as the author of a work on the fluxion of the earth and parts. In the summer of 1680, being of age to go to Paris, he saw the celebrated comet of 1680 in its return from perihelion, being the first who perceived it since it was lost in the preceding month. This body he observed to be going to the Bodleian library, purporting to be the life of Halley by some one acquainted with him, was read to the Royal Society. He returned in 1685, and is extant in the small collection of folios by that writer, Paris, 1747.

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the manner in which his name is mixed up with the affair of Flamsteed, he must have resided in town for some years previous to 1713. [FLAMSTEED]. In the article cited we have called Flamsteed's work the Principia mathematica a success, and it was to be wished the connexion of Halley with the printing of this one had been as creditable as that which links his name with the Principia of Newton. It is to be hoped this article will therefore provide some information of any of the unworthy proceedings to which we allude; and we must protest against his being made a scapegoat for Newton, in which position even Flamsteed speaks of it by such a man as he was, few modern writers on the controversy. Neither the position nor the character of Halley renders it likely he would prefer making a tool of Newton to any direct mode of obstruction. The committee appointed him in 1746 of Dr. Bernhard's investigation of all the formal proceedings; and in that committee the name of Halley is not found, though it is on the list of those who published the Commercium Epistolicum, a position which he cannot deny on the principle of Epiruxa (FLUXIONS).

At the beginning of 1720, after the death of Flamsteed, Halley was appointed astronomer-royal. In the previous years he had been employed in completing his lunar and planetary tables, and it would be most convenient to publish them. But upon his appointment to Greenwich he revived his old idea of observing the moon through a revolution of her nodes. It was doubtful if at the age of sixty-four he should be capable of this sort of activity, and his position had been advanced for twelve years; and he had not undertaken it, and he had not yet finished it. The result was the comparison of nearly 2000 observed lunar places with his previously formed tables, and he returned to the country. He died January 14, 1742, in the 66th year of his age.

The remarks on the personal character of Halley which appear in the Eloge of Maian were furnished (it is asserted) by his friends, his relations, and himself. He was always industrious, as far as they speak of his prolix information and activity. His disinterest in money matters is supposed to be attested by his request to Queen Caroline not to incurr a debt in his name. On his appointment to that office, lest it should afterwards become an object of ambition to incompetent persons; but, though allowing that Halley was not greedy of gain, we see little but to commend in this act of a man of independent fortune. The scientific qualifications of Halley were such as endeared him to his friends; and he could, when no partiality stood in the way, be fair and just to others. Thus Mairan remarks on his not having treated either Des Cartes or Vieta with the respect due to their authority; and the same remark may be made of Newton. On the other hand, he was a severe critic and an accurate mathematician. Lemaître and Flamstede received their due from him; and he was willing to suffer the abuse of his name which makes his name. On his being Halley's defect, as he was willing to give to his own. The memoirs of the latter (FLAMSTEED) he inserted a prefacing, containing a part of his observations, which is to be found in Mr. Baily's work. We shall also cite the following suppression, which is a parallel to that of Newton mentioned in the article FLUXIONS, since any presumption which can be afforded of the frequency of the practice may be some palliation for the particular cases. In all the editions of the Synopsis Cometic published during Halley's life a numerical deduction from observations is given, to which the following is appended: 'At the moment of the first example the comet was observed at London to be close to the second star of Aries, of which it was seen in the sky for three minutes east; the observer being Robert Hook. But in the augmented edition left by Halley to be published with his tables, the comet, at the same hour as in the preceding, was seen nine or ten minutes north of the star of Aries, and nearly in the same place and in the same position; and no evidence of Hook's observation, except the name of the observer, was given. Halley has quarrelled with Hook (as almost everybody was obliged to) in the interval; and though the example was evidently worked for comparison with Hook's observation, he was not willing to give his name to the observation. In the same moment, we find it struck out in favour of one by Baily in the same hour; but though the scientific fame of a philosopher be no excuse for that superscription of his faults to which biographers are prone, still less should the latter be allowed to colour our views of the former. Among the Englishmen of his day Halley stands second only to Newton, and probably for many years after the publication of the Principia he was the only one who both could and would rightly appreciate the character and coming utility of that memorable work. His own attention was too much divided to permit of his being the mathematician which he might have been; but nevertheless his papers on pure mathematics show a genius of the same order of power, though of much less fertility, than that of John Bernoulli. We shall close this article with a brief account of his more recent writings, and of the most remarkable points in them.

The separate works of Halley consist of the 'Catalogue Stellarum Australium, &c., London, 1679, translated into Latin by Dr. Thomas Flamsteed, &c.; C. Conic Sections of Apollonius, Oxford, 1710; the unfortunate edition of Flamsteed's 'Historia Coelestis,' London, 1712; and the planetary tables published in 1740, through McKenzie's will, in 1719-1719. The superintendence of this work is attributed to Bradley, though it is evident that he did not write the preface. Besides the preceding there are eighty to a hundred memoirs, including many of small importance, relating to the subject of the meetings of the Philosophical Transactions.

In astronomy we owe to Halley, 1. The discovery and the detection of the amount of what is called the long inequality of Jupiter and Saturn, which he confidently expected could be shown to be a consequence of the law of gravitation, as was afterwards done; 2. The detection, by comparison of antique and modern observations of eclipses, of the slow acceleration of the moon's mean motion. 3. The first application of the theory of tides to the sea; 4. The explanation of the appearance of Venus in the daytime at particular seasons, arising out of the new well-known method of estimating the brilliancy of the planet. 5. The recommendation of the transit of Venus for the determination of the sun's parallax.

The following list of the most remarkable labours of Halley out of astronomy, arranged in the order of publication, will illustrate the extent to which his mathematical powers were made use of: 1. For further information—1. On the variation of the compass. 2. The law according to which the mercury falls in the barometer while the instrument ascends, being the first application of the theory of tides to the sea. 3. Theory of the trade-winds. 4. Construction of equations of the third and fourth degree. 5. Estimation of the quantity of water raised from the sea. 6. Inquiry into the point at which Julius Caesar made his entry into Britain. 7. Tables of the position of the sun, the moon, and the planets. 8. Application of algebras to the problem of lenses. 9. Method of constructing logarithms, a celebrated paper, reprinted in Leibniz's 'Mémoires,' 1706, in English, 1707. Those papers only have been cited which refer to points on which Halley's name is inseparably connected with the history of the progress of science.

HALLEY'S method of comets which was proved to be a constituent part of the solar system, and to revolve regularly round the sun, deriving its name from Halley, the astronomer who first discovered that it had made several revolutions within the era of correct astronomical observation, and predicted the year of its return. For the other periodic comets now known, see Comet of Biela, and Encke's Comet. See also the general article COMET.

We can only attempt to give an account of this body in detail proportioned to the interest which its recent appearance excited; but such detail is rendered unnecessary by the number of publications since Halley's time. The chief of these is a paper by M. Biérard, published in the 'Mémoires de l'Académie des Sciences,' 1834; 'Notice sur la Comète de Halley,' by M. Porte-Coulant, Paris, 1835; and for the general history, an article in the 'Companion to the Almanac' for 1835; and for the history of mathematical methods, to the address of the Astronomer-royal to the Astronomical Society, on delivering their medal to M. Lasegger, in their 'Monthly Notices,' vol. iv., p. 50.

The 'Astronomie Cometic Synopsis' of Halley was
published in the Philosophical Transactions for 1705, and again at the University press in Oxford, and also in an English translation published in London in 1706, in the Miscellanea Curiosa. It was again reprinted in the second edition of Gregory's Astronomy, in an English edition of the same work, 1715, in Lemenirier's Theory of Comets, and was finally published, in an unaltered form, by himself, and was published with his tables in 1749. This work was a consequence of the Principia of Newton, in which the method of applying Kepler's laws to the computation of the paths of periodic comets, the identification of the comet with that of Halley, and the prediction and observation of new comets, led to the conclusion that the appearance of periodic comets is a natural consequence of the theory of terrestrial gravitational forces.

On looking over the list, it needed only a glance to see that three of these comets exhibited very nearly the same orbit, and that the intervals of the appearances were very nearly the same. The following extract from Halley's table will show this:

<table>
<thead>
<tr>
<th>Year</th>
<th>1531</th>
<th>1537</th>
<th>1562</th>
<th>1589</th>
<th>1652</th>
<th>1690</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comets appeared having</td>
<td>1746</td>
<td>1751</td>
<td>1756</td>
<td>1761</td>
<td>1766</td>
<td>1771</td>
</tr>
<tr>
<td>Long. of asc. node</td>
<td>25° 21'</td>
<td>82° 21'</td>
<td>14° 21'</td>
<td>20° 21'</td>
<td>26° 21'</td>
<td>32° 21'</td>
</tr>
<tr>
<td>Long. of perihelion</td>
<td>17° 56'</td>
<td>17° 56'</td>
<td>17° 56'</td>
<td>17° 56'</td>
<td>17° 56'</td>
<td>17° 56'</td>
</tr>
<tr>
<td>Perihelion distance, that of earth being 1.</td>
<td>5570°</td>
<td>5580°</td>
<td>5590°</td>
<td>5600°</td>
<td>5610°</td>
<td>5620°</td>
</tr>
<tr>
<td>Distance from perihelion,</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Motion</td>
<td>Retrog. Retrog. Retrog.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The interval between the perihelion passages of the first and second comet is fifteen months longer than that between the second and third, which might have puzzled a person not acquainted with the Principia. But the disturbing action of the planets, which has since been so successfully computed, has shown that the action of this body is now much better known than was that of the moon in the time of Halley, immediately suggested itself. He announced accordingly the return of the comet about the year 1758. It may seem perhaps that we have lessened the fatale of Halley by overlooking the very year in which he made his part of the work to seem to be mere calculation. But it must be remembered that though at this time an expert computer in the Nautical Almanac Office would perform the same work in half a year, yet Halley had all the difficulties of a less advanced state of pure mathematics. He had his method to organize, if not to invent; and so rare were those who had a competent understanding of the Principia, that, after a little hesitation, we agree perfectly with the astronomer-royal in saying that Halley was in all probability the only man in Europe who was competent to perform this labour.

The composition of the Synopsis Halley examined the elements of the comet's orbit further, and repeated his prediction still more confidently, desiring that all would remember that its author was an Englishman, 'Quoceara at secundae prorogationis termino circa annum 1758, hoc primum ab homine Anglo inventum sintisse non infidelitar a quaerstis.' Among the years preceding 1531, in which the same comet probably did become visible, 339, 1305, and 1436 are years of well attested comets. But there is no evidence for the years 1519, 1640, 1674, 1699, 1823, 1849, 1900, 1914, and 1915, all of which are described as years in which comets appeared in the collections of Leonard T. Upon various authorities.

The prediction of Halley caused various astronomers to compute orbits of the coming comet, but none of these took into account the perturbations caused by the planets. In 1757 Clairaut and Lalande (see these names) undertook the enormous labour of computing the effect of the perturbations of the principal planets through a period of 150 years. Assisted by M. de Lalande, a well known mathematician of that name, Lalande performed the drudgery of the process, while Clairaut, the first who extended Newton's application of his theory, applied the results. The consequences was, that, as it was essentially already expected, the announcement was made that it would arrive at its perihelion within a month, one way or the other, of April 13, 1759. The announcement of Clairaut was just in time for Mr. Godwin, an amateur astronomer in the neighbourhood of Dresden, to detect the comet. It was afterwards repeatedly observed in various parts of Europe, but it is not on record that any one saw it with the naked eye. It was not seen at all favourable for that purpose. Various orbits were computed, but no one seemed inclined to undertake the task of applying the corrections for perturbation, so as to predict the perihelion place for 1855. The comet averted in peace therefore until the improvement of methods of computing the perturbations, and the approach of a new appearance, induced first the Academy of Turin, and next that of Paris, to offer prizes on the subject. The first was gained by M. Danois, the second by M. de Pointcoulant (1817 and 1833). And M. Rosenberger at various times (Astron. Nachr., Nos. 196, 180, 240, 276, 286), computed the elements of the orbit for 1827 and 1829, and the whole of the period from 1682 to 1930. It has been a labour that has been duly appreciated, and has placed M. Rosenberger in a very honourable position among living astronomers.

The following list of elements (extracted from the Nautical Almanac for 1835) were given, the first by M. Pointcoulant from his own computer of perturbations, the second by M. Danois, the third by M. Lubbock, who applied the perturbations of M. Pointcoulant to the element for the year 1797, computed by himself. The fourth column contains the elements approximately correct, during the reappearance of the comet, by the superintendent of the Nautical Almanac, from 55 roughly reduced right ascensions and declinations.

<table>
<thead>
<tr>
<th>Place of perihelion on the orbit</th>
<th>Long. asc. node</th>
<th>Long. of perihelion</th>
<th>Excentricity</th>
<th>Semi. ex. maj.</th>
</tr>
</thead>
<tbody>
<tr>
<td>30° 37' 0&quot; 115° 0' 0&quot;</td>
<td>57° 57' 0&quot;</td>
<td>9° 11' 0&quot;</td>
<td>0.15075</td>
<td>17° 56' 0&quot;</td>
</tr>
<tr>
<td>30° 37' 0&quot; 115° 0' 0&quot;</td>
<td>57° 57' 0&quot;</td>
<td>9° 11' 0&quot;</td>
<td>0.15075</td>
<td>17° 56' 0&quot;</td>
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<td>9° 11' 0&quot;</td>
<td>0.15075</td>
<td>17° 56' 0&quot;</td>
</tr>
</tbody>
</table>

The comet was seen at Rome, on 3rd October, by M. Dunocheul, director of the observatory of the Roman college. From that time it continued to be observed till the end of the year in Europe, and through a great part of the ensuing spring in the southern hemisphere. During a part of the year 1836, the comet was visible to the naked eye. The number of good observations which were procured greatly exceeded, as might be supposed, those made on any previous occasion. And in full proportion to the increase of observers and instruments has been the means afforded to the astronomical public of turning their observations to useful account. We allude to the Appendix to the Nautical Almanac for 1839, in which will be found the result of the most complete combination for the treatment of observations which has ever been furnished for any heavenly body. Taking the elements above given as a basis, it contains the perturbations of the comet by all the planets from the beginning of August, 1836, to the end of March, 1836, the deduction of the variations of the elements during every four days, the computation of an ephemeris for the whole period, and finally the equations of condition by the help of which an observer may still, he may use to compare the elements of the orbit which his own observations should indicate. These last are given as often as eight times a-day, for the period of the comet's most rapid motion. Everything, therefore which could be done previous to the observation being made, was done to prepare for its reception. Strangford and his assistants for this voluntary addition to their already arduous labours has been awarded by judges more competent than ourselves.

The history of Halley's comet is a matter of such a magnitude that it is not yet completed, nor can it be until the reduction and comparison of all the observations are made to produce a new * From mean Equinox of November 15, 1835.
determination of the elements of 1835. Those who have collected the materials, both theoretical and practical to which we have alluded, have been working for posterity; and it is the year 1911 which must show the progress of astronomy between 1729 and 1835, just as the year 1829 was evidence of the change which took place between 1682 and 1729.

HALL’RHOA, the name proposed by Lamouroux for a group of fossil Polyp rgba, referred by many writers to Alcyna. The spheroidal figure, contracted base, deep central pit, and pores on the surface, appear the characters most relied on by Lamouroux. Goldfuss gives characters for the genus Siphonia of Parkinson, which may include the two species mentioned by Lamouroux from the vicinity of Caen and the Vaches Noires. Hallirhoes costata of Lamouroux is found in the greensand of Normandy and England.

HAMATURUS. [KANGAROO.]

HALO’DROMA. Illiger’s name for a genus of seabirds allied to the Petrels and Albatrosses. [LARID.] Halora’ge, a small group of Exogenous plants, many of which inhabit watery places, and all of which have minute inconspicuous flowers. In consequence of the calyx being superior, the embryo without much albumen, and some of them having four petals, they are often considered to form a peculiar section of Otagraceae, or if separated from that order, are at least submerged in the intermediate vicinity of it. Upon this supposition, they are looked upon as an imperfect condition of the Otagraceae type, bearing the same relation to it as Sanguinaria to Rosaces, Chamaelucida to Myrticae, or Mimosa to other Fabaces. But in the present uncertainty regarding the true affinity of many natural orders of plants, we must not consider this a settled point. On the contrary, it is not improbable that Haloragaceae constitute an imperfect form of the great Epigynous group of Exogenous, of which Otagraceae are only one of the members. What renders it peculiarly difficult to determine the real affinity of this little group is, that as it is now constituted, it offers striking modifications of development both in the organs of vegetation and those of fruitation. While Haloragaceae has a stem with a complete vascular organization, and regularly constructed leaves, Myriophyllum has its vascular system reduced to a rudimentary condition, and in some of the species the leaves themselves appear only in the form of filiform ramifications; and in Hippuris, the development of the vascular system of both stem and leaves is still further reduced. In like manner in the flowers, Haloragis has four petals, eight stamens, four stigmas, and four cells to the ovary; Proserpinaca has no petals, three stamens, three stigmas, and three cells to the ovary; and Hippuris has no petals, one stamen, one stigma, and but one cell to the ovary. This latter genus is a common plant in the marshes and meadows of this country, where it is generally called Stitchwort.

HALS, FRANCIS, an eminent portrait-painter, born at Mechlin, 1584, died in 1666. No artist of that time was superior to him except Vandyck, and very few could be compared with him. With the first spirit of a portrait, that of strong resemblance, his pictures were executed with remarkable freedom and boldness: his colouring was extremely good, and the effect very striking.

HALSTED. [ST.]

HALYATTS. [ALYATTS.]

HALYMENITES. Under this generic name Sternberg (Flora der Vorste) and Bronn (Leitha Geognostica) include several species of fossil fossil plants, found in the siliceous rocks of Siegen and Solenhofen.

HALYS. [KIZIL ERMAK.] We have referred to this head, because some further information on this river may be soon expected.

HALYSITES, the name given by Fischer to a genus of fossil corals, synonymous with Catenipora of Goldfuss. As having priority, it is adopted by Bronn in his 'Leitha Geognostica.'

HAM, EAST and WEST. [ESSEX.]

HAMADAN. [ECBATANA.]

Hamamelid’ae, or Hamamelidae, a very small group of woody Exogenous plants, characterized by having a superior calyx, a definite number of stamens, half of which are usually sterile, a two-celled ovary, and an embryo in the midst of horned albumen. There are only three genera in the gardens of this country, Hamamelis, Trichocladus, and Folkheria. It is at present uncertain to what order Hamamelidae may be most nearly referred; and further discoveries shall have been made, the question is not likely to be settled. Some of the species are large forest trees, affording good timber, but nothing is known of any other useful property in the order.

HAMBURG, the largest city in Germany after Vienna and Berlin, and by far the most important emporium of commerce, is situated in 53° 33’ N. lat., 9° 56’ 35” E. long. The origin of this city is attributed to Charlemagne. The founder chose for its site the most elevated spot on the north bank of the Elbe and the east bank of the Alster, about 75 miles from the German Ocean. Though at first merely a trading post, its position could not fail to make it in time a place of trade. It was several times destroyed by the neighbouring barbarians, yet it always recovered, and had attained considerable commercial importance at the beginning of the twelfth century. In the thirteenth century it concurred in the formation of the Hanseatic League. [HANSE TOWNS.] Till 1300 it was confined to the space between the Elbe and the east bank of the Alster; but the west bank was gradually built upon, especially by refugees from the Netherlands, who fled from the tyranny of the Duke of Alba. Hence arose the new town, which increased so rapidly that it was thought advisable to extend the walls so as to enclose it within the city. The actual fortifications of the city were not further enlarged after this time, though some outworks were made and a fortified line was formed enclosing the suburb of St. George. Its rights as an estate of the empire were confirmed by the Hanse, and though it was recognised as such in 1618, it did not obtain a seat or vote in the Diet. The kings of Denmark claiming the sovereignty as counts of Holstein, Hamburg was obliged to take different positions; in 1714 possession of a third of the town was settled, and a convention made, and a relinquishment of large sums, till a convention with the house of Holstein in 1765 removed all difficulties; and in 1770 it was confirmed by the emperor in its rights as a free city of the empire. By the Hanse, and though it had been always claimed by the archbishops of Bremen, but it was assigned by the treaty of Westphalia in 1648 to Sweden, and afterwards passed to Hanover with the duchy of Bremen. The general effect of the repeated wars in Germany to the end of the eighteenth century was favourable to Hamburg, by causing a great addition to its population and its wealth, and extending its commerce. In
HAM

1862 the cathedral and all the property hitherto belonging to Hanover in the city and territory were finally assigned to Hamburg, and its independence still further secured. Thus Hamburg at the commencement of the nineteenth century was one of the most flourishing, happy, and opulent cities of the continent. Its misfortunes commenced with

• the occupation of Hanover, in 1803, by the French, who seized Ritzebüttel, at the mouth of the Elbe, to prevent English ships from entering the river; the British troops made a sortie in this direction, and the British vessel Frigate captured a French brigantine.

In the year 1806 Marshal Mortier with his corps occupied Hamburg, and the city paid sixteen millions of francs as a ransom for the English goods in the warehouses. Though the French troops were withdrawn after the treaty of Tilsit, and the city had for a short time a shadow of independence, it was still subject to numerous extortions from the French generals. The decrees of Berlin and Milan ruined the lucrative trade of Hamburg, and the English goods which it had been forced to ransom were now confiscated and consigned to the flames. At the end of 1810 it was incorporated with the French empire as the capital of the departamento of the Hanseatic circle of the Rhine.

In 1813 the citizens sailed with capture the entrance of a Russian corps, at the approach of which the French had evacuated the city. The old constitution was restored; a burglar guard of 7000 men was formed, and the inhabitants were enrolled in the military service, and the Russians repaired the fortifications, which had been partly razed. But the French soon returned and attacked the city on the Elbe side. The Russians, being too weak, withdrew, and Marshal Davoust and General Gudin entered Hamburg, which they treated with a degree of wanton severity that excited in the highest degree the sympathy and indignation of Europe. They imposed a contribution of two million florins, being afterwards increased to four million, forcibly enrolled 40,000 inhabitants in the depth of winter, and even seized the treasure deposited in the bank, amounting to about 700,000£ sterling. An unhappy combination of circumstances enabled them to retain possession of it till May 1814. On the 26th of that month the old constitution was restored, and on the 8th of June, 1815, Hamburg joined the German Confederation as a free Hanseatic city. For all its severe sufferings in 1813 and 1814, the city was unrivaled in the history of the country, and it was founded from France at the peace. But the public spirit of the inhabitants, its internal resources, and its favourable situation, have gradually restored its former prosperity.

The city of Hamburg, including the area of the city (which is nearly an oval four English miles in circumference), is about 150 square miles, bounded on the south by the Elbe, and on the other sides by the Danish territory. The city has likewise some small islands in the river, and some parcels of land on the Hanoverian side of the river, and the bailiwick of Ritzebüttel at the mouth of the Elbe, in which is the harbour of Cuxhaven. Conjointly with Lübeck it has the bailiwick of Bergedorf, and the districts called the Vierlinden, 16 miles from Hamburg, with 10,000 inhabitants; the population of Hamburg and its suburbs is 100,000; and that of the territory, including Bergedorf, between 25,000 and 30,000. The great majority are Luth-

ers. The Roman Catholics may be from 5000 to 6000, the Calvinists 1500 to 2000, and the English may fluctuate between 1000 and 1500; the number of Jews is stated at 1400, of which it is believed to be more than double the real number. In 1824 it appeared from the bills of mortality that they could not exceed 4000.

The constitution is a mixture of aristocracy and demo-

cracy. The senate, consisting of forty burgomasters and twenty-four senators, with four syndics and four secretaries, has the executive power, and the sole right of proposing laws; but no laws can be made and no taxes imposed without the consent of the citizens. The citizens are divided into five parishes, each of which chooses 36 members to the council of 180, consisting—1, of 15 elders, who are the guardians of the laws, and have the administration of internal and criminal affairs; 2, of 40 assessors, 9 from each parish, who with the elders form the council of 60; and 3, of 24 subdelegates from each parish; all these are obliged to appear in the common hall, where at least 200 citizens must be present. From this council is chosen the board of 60, and out of that the 15 elders or alder-

den. Only the senators and the elders receive salaries. For the administration of justice there are various tribunals. In the last resort the decision is with the High Court of Appeal for all the free cities, sitting at Lübeck. In the German Diet Hamburg has one vote in the deliberations, but in the collective council it has five votes. As the sea ports of Bremen, and Frankfurt. Its contingent to the army of the Confederation is 1298 men, and its contribution to the general fund 500 florins per annum. It has also an admi-

rized organized burguer guard of 9000 infantry, cavalry, and artillery. However.

The interior of the city by no means corresponds with its commercial importance and its wealth. As in most of the old fortified towns of Germany, the streets are in general narrow, irregular and dark; the houses are generally dark, and yet not interesting to the lovers of antiquity.

In modern times handsome houses have certainly been erected in some streets, but they are exceptions. Some streets in the New Town are indeed broader and more regu-

lar, but that is all. Nor can Hamburg boast of its public buildings, either ecclesiastical or civil. The number of churches has been reduced of late years: the ancient churches have either been totally pulled down or converted into houses. There are now five principal and six smaller churches or chapels: the former, having been converted into houses, are profaned by the French, who used them as stables for their horses, and common as a lounge to the French chief, have been much more beautiful since 1814. The most worthy of notice is the great church of St. Michael, which was saved from French desecration. It was begun in 1721, and completed 1775. Except the apse, which was not erected till 1778. This church, built by Sonnin, is the pride of Hamburg; it is capable of accommodating 2000 persons: the height of the steeple is said to be 456 feet. These churches have been replaced in this respect by several smaller places of worship, except the chapels of the ambassadors of that religion; but the French seized for their use the small church of St. Michael, which has since been granted them by the city. Of the public edifices, the most distinguished for their style of architecture are the new bank, the new observatory, and the new theatre, built after a design of the celebrated Schinkel of Berlin. But if the public edifices have the less to recommend them, Hamburg may well be proud of the number of learned and mathematical institutions, the bare enumeration of which would exceed our limits, but of which it may be affirmed that they are on the most liberal plan, and managed in the most exemplary manner. They are only two—Johannsen, the state-aided to qualify young men for the university, and the gymnasion. Hamburg has been the birth-place of many learned men and the home of many others. The city has been the centre of the wealthy merchants in the Danish territory, at Blankenesse, on the banks of the Elbe, six miles west of Hamburg.
To give an account of the vast commerce of Hamburg would fill a volume. Every thing that can be bought and sold there is bought and sold; and the only limits to the facility of commerce which is as free as can be desired. The import duties are extremely low, and no transit duties are levied. This city is consequently the great receptacle for English goods imported from the colonies, and on the ships of all nations, which normally enter the port, at least one-third are English. Within these few years there has been a regular communication by steam-boats with London, Hull, Leith, Amsterdam, The Hague, Bremen, and Hamburg. These perspicuous treatises on the Spheres of Theodosius, which was followed by several other works on natural philosophy and astronomy. Upon the foundation of the Royal Academy of Sciences by Louis XIV. in 1666, Du Hamel was appointed secretary, which office he continued to hold till 1679, when he was succeeded by Fontenelle. His philosophical and astronomical works were collected and published at Nürnberg, 1681, in 4 vols. 4to., and in 1698 appeared his history of the Royal Academy and its transactions, from its foundation to the year 1760. This latter work, entitled "Regim Scientiarum Academiae Historia," is the only one which possesses any value at the present day.

HAMEL, a considerable town in the Hanoverian principality of Calenberg, at the confluence of the Hamel with the Weser, over which there is a bridge of boats. It has about 5,000 inhabitants, and is the seat of an episcopalsee.

HAMILCAR, BARCAS, the leader of the popular party at Carthage, was appointed in the eighteenth year of the first Punic war (B.C. 247) to the command of the Carthaginian forces. He possessed no particular merit in his early life or the time of his birth; but we learn from Nepos (Hamil., c. 1) that he was very young when he obtained the command. He ravaged with his fleet the coasts of the Euxine, and took the town of Scythopolis, which was given to him by Hannibal. He was afterwards invested with a strong fortress in Sicily, which was situated between Eryx and Panormus. In this place he continued for some years, with very little support from the Carthaginian government, and although the Romans were masters of almost the whole of the island, they were unable to dislodge him. He frequently ravaged the southern coasts of Italy as far as Cumae, and defeated the Roman troops in Sicily. On one occasion he took Eryx, which he held till the Romans, who had been fitted with a fleet to cut off all communication between Hamilcar and Carthage; the Carthaginian fleet sent to his assistance was defeated by the Roman consul Lutatius Catulus (B.C. 241), and Hamilcar's supply of provisions was cut off. The Roman fleet was granted by the Romans; and Hamilcar led his troops from Eryx to Lilybæum, whence they were conveyed to Africn. But a new danger awaited Carthage. The Carthaginian treaty was exhausted; and it was proposed to the Romans that they should relinquish a part of the pay which was due to them. The soldiers rejected the proposal, appointed two of their number, Spurius and Mastro, commanders, and proceeded to enforce their demands. Being joined by many of the native tribes of Africa, they defeated Hannibal, the Carthaginian general sent against them, and brought Carthage to the brink of ruin. In these desperate circumstances Hamilcar was appointed to the command, and at length succeeded in subduing them after the war had lasted three years and four months. After the end of this war Hamilcar was sent into Spain (B.C. 228) with a body of troops as remarkable for his partiality for his own province as for the valorous manner in which time he extended the dominion of Carthage over the southern and eastern parts of that country. He fell in a battle against the natives, B.C. 229. The abilities of Hamilcar were of the highest order; and he directed all the energies of his mind to diminish the power of Rome. Polybius states his belief (ib. iii. p. 165-6, Carabon), that his administration would soon have produced another war with Rome, if he had not been prevented by the disorders in which his country was involved through the war of the mercenaries.

Hamilcar was succeeded in his command in Spain by his son-in-law Hannibal, who must not be confounded with Hannibal of Carthage. He carried on the conquests of Hamilcar, and reduced almost the whole of the country south of the Iberus (Ebro), which river was fixed by a treaty between the Carthaginians and the Romans (Polybius, B. 26, as the Carthaginians of that time), which is as free as can be desired. The import duties are extremely low, and no transit duties are levied. This city is consequently the great receptacle for English goods imported from the colonies, and on the ships of all nations, which normally enter the port, at least one-third are English. Within these few years there has been a regular communication by steam-boats with London, Hull, Leith, Amsterdam, The Hague, Bremen, and Hamburg. These perspicuous treatises on the Spheres of Theodosius, which was followed by several other works on natural philosophy and astronomy. Upon the foundation of the Royal Academy of Sciences by Louis XIV. in 1666, Du Hamel was appointed secretary, which office he continued to hold till 1679, when he was succeeded by Fontenelle. His philosophical and astronomical works were collected and published at Nürnberg, 1681, in 4 vols. 4to., and in 1698 appeared his history of the Royal Academy and its transactions, from its foundation to the year 1760. This latter work, entitled "Regim Scientiarum Academiae Historia," is the only one which possesses any value at the present day.

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HAM, the British Museum came from the collection of Sir W. Hamilton. (See Library of Entertaining Knowledge, Townley Gallery, vol. ii., index.)

Mr. Hamilton took a lively interest in all subjects connected with art or with antiquity, especially in the progress of the excavations at Herculaneum and Pompeii, and the formation of the museum of Portici. He was earnest in recommending to them Ctesiphon. But the great work of opening up the Herculaneum manuscripts, but produced little effect on that most supine court. 'He himself bestowed a part of his income upon this object. Ten papers of his composition, upon matter observed during his abode in the 'Phil. Trans.' for the years 1767 to 1795 inclusive. His other works are, 'Observations on Mount Vesuvius, Mount Stna,' &c., Lond. 1772; and 'Lettera sul Monte Voltore,' Naples, 1790. (Chalmers' Biog. Dict.)—Wait, Bertie.'

HAMILTON, ELIZABETH, born at Belfast in Ireland, but probably of Scottish parentage, is deservedly remembered as an early advocate of an enlarged and intellectual system of female education, and as one of the leaders of that useful class of novelists who have placed the interest of their fictions, not in rare adventure and glowing description, but in the accurate portraiture of the daily workings of the human heart. We find very little to tell of her personal history. It appears that she filled the office of governess to the daughters of a Scottish nobleman, for the eldest of whom her 'Letters on the Formation of the Religious and Moral Character,' were written. She died July 10th, 1816, regretted and beloved. Her warm and sincere piety was unimpaired by her severe and her natural cheerfulness and lively talents rendered her delightful in society, and, in old age, universal favourite with her family.

The following is her chief work:—'Letters of a Hindoo Rajah,' 1796; 'Modern Philosophers,' 1800, a clever, popular, and effective satire, intended to throw discredit on the sceptical and republican doctrines taught by some disciples of the French Revolution; 'Letters on the Religious and Moral Influence of Education,' 1801; 'Life of Agrippina,' 1804, an attempt to make history interesting, by expanding it into something bearing the resemblance of a novel; 'Letters on the Formation of the Religious and Moral Character,' 1806; 'Cottagers of Glenburnie,' 1808; 'Exercises in Religious Knowledge,' 1809; 'Popular Essays,' 1813. Of these the 'Letters on Education' is the most sterling of all her works. She has been praised for the principles of metaphysics to the subject of education, and shown (we quote words ascribed to a female writer of still higher note) how the doctrine of the association of ideas may be applied in the formation of the religious and moral character of mankind, and to the principles of taste and morals; she has considered how all that metaphysicians know of sensation, abstraction, &c., can be applied to the cultivation of the judgment and the imagination of the child. No book is better known by children, she has done much in warning the parents of children, and of mothers especially, to future inquiry; she has done much by directing their inquiries rightly; much by exciting them to reflect upon their own minds, and to observe what passes in the minds of their children. As a novelist, she will be best recollected by the 'Cottagers of Glenburnie,' a lively and humorous picture of the soberly honest, the indolent temper, the baneful content which prevail among some of the lower class of people in Scotland. This piece, though only the picture of humble life in a remote and obscure district, can never lose its interest, for the characters are true to nature, essentially true; and the incidents and the admirable moral lessons, are of all time, and independent of the national peculiarities under which they are conversed.

(Note: For the more English, 'Monthly Mag.' 1815.)

HAMITÉES, a genus of Cephalopoda Moldusca proposed by Mr. James Sowerby. (Min. Conchol. of Great Britain.) It includes only fossil species, and is yet incompletely determined. According to the original views of Mr. Sowerby, only those chambered shells belong to hamites which have the form of a hook or siphon bent in one plane with parallel but unequal limbs, and sinuous septa. But the forms of these chambers are not always perfect, and when Professor Phillips found in Yorkshire many fossils, in other respects perfectly resembling hamites described by Mr. Sowerby, rolled in a plane spiral, the volutions in some species touching, in others free, and in a few terminating in a straight elongation (like spirals), he extended the use of the term. Dr. Buckland has adopted this view in his 'Bridgewatertreatise.'

In the 'Transactions of the Geographical Society of France,' June 11, 1837, M. Levellie gives descriptions and figures of species of fossil Cephalopoda, which might be considered as the spiral part of hamites (Phillips) and names a new hamite from this form which has recently been led to very similar results, and has proposed to call the same group Tropeum. Now as certain forms of ammonites in the has and olitice rocks (A. faber) has been called from Tropeum, Ceratites, or the spiral parts of Scaphites (e.g. Scaphites Yoannii in the British Museum), it is evident that the whole question of the true relations of these remarkable fossil genera to ammonites remains to be further examined. We shall therefore reserve till the article Tropeum a general view of these relations.

Hamites of the typical forms occur at Folkstone, Hamsey, and other situations in the gault, greensand, and other Eocene beds. Ceratites and Tropeum belong chiefly to the same groups of rocks in England, France, Switzerland, &c. (Tropeum.)

HAMMERFEST. [Norway.]

HAMMERSMITH. [Ct. Mdx.]

HAMMOND, HENRY, a learned and excellent divine of the church of England, was born at Chertsey, August 18, 1605. Having been educated at Eton, and Magdalen College, Oxford, he was presented to the rectory of Ponshurst in Kent, in 1633, ten years after which he was appointed archdeacon of Chichester. By birth and education a confirmed royalist, he continued to reside there while that city was held by the king, and attended the king’s commissioners to Uxbridge, where he disputed with Vines, a Presbyterian minister. He was appointed canon of Christchurch and public orator in 1644, and attended the parliament. In 1645, he fell into the hands of the army until the end of 1647, when his attendants were parted from him. Hammond then returned to Oxford, and was chosen sub-dean of Christchurch, from which situation, he was expelled in March, 1648, by the parliamentary visitors, and placed for some time in confinement. On his release he repaired to Westwood in Worcestershire, the seat of Sir John Puck- wood, where the remaining of his labours were in the parliament. ‘Doing much good to the day of his death, in which time he had the disposal of great charities reposed in his hands, as being the most zealous promoter of asling in the way of national religion. Great were his natural abilities, greater his acquired; and in the whole circle of his acts he was most accurate. He was also eloquent in the tongues, exact in ancient and modern history. A writer, well versed in philosophy, and a philologus, learned in schools, and great master in church antiquity.’ He died after long suffering from a complication of disorders, April 25, 1660. It is said that Charles II. intended for him the bishopric of Worcester. Of his numerous works, chiefly controversial, the following are some of the most remarkable: ‘Practical Catechism,’ 1644; ‘Humble Address to the Right Hon. the Lord Fairfax and his Council of War,’ 1649, concerning the impending trial of Charles I.; ‘Porprase and Annotationes on the New Testament,’ 1653, best edition 1702. He began a similar paraphrase of the Old Testament; but advanced no farther than the Psalms, 1659, and one chapter of Proverbs, 1660. The following were published posthumously, in his amanuensis Fulman, 4 vols. folio, 1674-94. (Life, by Bishop Full: Wool, Athen. Oxon.)

HAMMOND, JAMES, was the second son of Anthony Hammond of the parish of Torrington, in Somersetshire. He was born in 1710, and educated at Westminster; he sat in parliament for Truro, on the interest of the Prince of Wales, whose enemy he was. He died in 1742.

His works are collected in 4 to., are in the rapid style of pastoral sentiment, then in fashion, to a fictitious object, whom he names Dolia. He is said to have been in love with a Miss Dashwood, who refused him— if she read his poems it was hard to say how she could do otherwise — and to have lost his intellects in consequence of her cruelty.

An attempt has been made to defend his poetry, but we think there will be few in this age to differ from Dr. John—
HAMOAZI, (Cromwell).—HAMPDEN, JOHN, the eldest son of William Hampden, of Hampden, in Buckinghamshire, and his wife Elizabeth, second daughter of Sir Henry Cromwell, of Hinchingbrooke, who was born in London in 1594, and succeeded in his infancy to the estates of his antient and respectable family. He was educated first at a grammar-school at Thame, afterwards at the University of Oxford, and in 1613 was admitted a student in the Inner Temple, where he made considerable progress in the common law. In 1619 he married at Pyron, in Oxfordshire, Elizabeth, only daughter of Edmund Symonds, and for some years enjoyed a healthy country life, entering freely into field sports and other amusements of his age. His attention however was not thus wholly occupied, but was likewise attracted by the political struggles of the day; so that when the king was by necessity compelled to summon a parliament, Hampden became anxious for a seat in the lower house. The borough of Granpound first returned him to parliament; the borough of Wendorf next elected him three successive times. He was then chosen a member of the court of Buckinghamshire, and was being doubly returned to the Long Parliament by the constituents of Wendorf and Buckinghamshire, he made his election for the county. In 1634 his wife, to whom he was now married for the last six years, gave him two sons and six daughters; Elizabeth, the eldest, married Richard Knightley, of Fawsley, in Northamptonshire; the second, Anne, became the wife of Sir Robert Pye, of Farreham, in Hampshire; the youngest daughter died during the first year of the civil war. He married, for his second wife, Lettia, daughter of Mr. Vachel, of Coley, near Reading: by this lady, who survived him, it does not appear that he had children.

In the first short parliament to which he was elected, Hampden took no very forward part in the business of the house; but his opinions coincided with those of Pym, Seller, and others of the popular party, who were determined to resist the usurpation of the crown. The business of the house was the privileges of the parliament and the rights of the people. Gradually his influence increased both in and out of parliament, and especially in his native county of Buckinghamshire. At length his reputation became general. At the close of Charles I's second parliament, the king, in pursuance of his threat to resort to new modes of raising supplies, required a general loan; to this loan Hampden resolved to subscribe, but with this condition, that he should be allowed to demand it. In consequence of this refusal he was imprisoned in the Gate-house, removed thence in custody to Hampshire, but was afterwards, with seventy-six others, unpardoned. He was the eldest of the court of assistants. He became one of the most industrious members in the house, both in its general business and the superintendence and conduct of committees. His resistance to the arbitrary imposition of ship-money (1636) induced many other residents in Buckinghamshire to follow his example. Proceedings were instituted against him on the part of the crown. The case was argued in the Exchequer Chamber (1637) during twelve days before all the twelve judges, who, two excepted, gave a decision in favour of the crown. It is remarkable that there is no appearance of an assessment of ship-money having been made upon the county of Buckingham after Hampden's trial. The judgment however which was then given gave the strength of the crown, outside of the power of taxation in any manner and to any extent, and the fear of oppression began to operate as an inducement to emigration. Many, especially among the puritans, had already left the country; others, on hearing that many ships had sailed for America, took steps to obviate the passage across the Atlantic two no less considerable persons, it is said, than Oliver Cromwell and his kinsman Hampden; to this ship a licence was refused. (Lord Clarendon, Hist. Eng. vol. i. p. 25.)

For an account of Hampden's conduct generally in the Long Parliament we must refer to Lord Nugent's Memorials of Hampden, to Clarendon, Whitchock, and the general histories. His resistance to the undue influence of the king so irritated Charles I, that the king accused him, with three other members of the Commons and one of the Lords, of having traitorously endeavoured to subvert the fundamental laws and government of the kingdom, and even made an attempt in person to seize them in the House. The House protected them from seizure, but violent debates and tumults arose, which were shortly after followed by the civil war. The Lord Committee of the Whole House, to which he joined the parliamentary army, acting chiefly in Berkshire and the counties of Oxford, Northampton, Warwick, Middlesex, and Buckingham. Being a member of the committee of the whole House, he was incessantly and variously occupied in all the affairs of the war. His counsel was for vigorous and resolute attack; he considered that Essex, the parliamentary general, should have advanced with the utmost possible speed to lead the New Model army against Prince Rupert upon Chalgrove Field, June 16, 1643, Hampden placed himself at the head of the attack, but in the first charge received his death-wound. Two carbine balls struck him in the shoulder, and, breaking the bone, entered his body: he left the field, and obtained surgical aid at Thame, but the wound was incurable, and after six days' severe suffering he expired.

Histories of the most opposite parties unite in unani-
mous praise of this great man: all bear testimonies of his affability in conversation; his temper, art, and eloquence in debate; his penetration in counsel; his industry, vigilance, and enterprise in action; and his courage in war. He was a great friend to the welfare of his country. (Lord Nugent's Memorials of Hampden; Clarendon, Hist. Rebel.; Hume, Hist. of England.)

HAMPSHIRE, a southern maritime county of England, lying between the counties of Sussex and Dorset, and bounded on the west by the ocean, which extends 54 miles long. It is principally on the mainland of England, but includes the Isle of Wight. [Wight, Isle of.] The portion on the mainland approximates in form to a parallelogram, except for a slanting westward jut out to the westward: the sides of the parallelogram face the four cardinal points. Hampshire is bounded on the north by Berkshire, on the east by Surrey and Sussex, on the south by the English Channel, and on the west by Wiltshire and Dorsetshire. The length of the county (the mainland part) from north to south varies from 37 to 46 miles; the breadth varies from 28 to 41 miles. The Isle of Wight is in the form of a lozenge, having its longer diagonal from east to west 23 miles, and its shorter diagonal from north to south 14 miles. It is separated from the main part of the county by an arm of the sea averaging about 3 miles over; but in the narrowest part not more than one mile. There is a small detail at the southern end of the Isle of Wight, the most part less than half a mile wide, extending from near Haslemere in Surrey to Midhurst in Sussex. The area of the county, including the Isle, is 1625 square miles; in size it is greater than the county of Somerset and a little larger than Kent. The population in 1831 was 314,380, or 193 to a square mile. In absolute population it is the fifteenth, in relative population the twenty-fourth of the English counties. Winchester, the county town, is on the Itchen, 62 or 63 miles in a direct line south-west of St. Paul's, London; 65 miles from Hyde Park Corner by the road through Staines, Farnham, and Alton, or 62 miles by Basingstoke: but Southampton, from which the county derives its name, is 71 miles south-west of St. Paul's, London, in a direct line, or 77 miles from Hyde Park Corner by the road through Alton and Winchester.

Coast-line. Surface, Hydrography, Communications.—The coast of Hampshire (not including the Isle of Wight) is low towards the east side of the county, where there is a wide but not very deep bay or inlet, divided by Hayling Island, which is only 4 miles long, and Portsmouth and Langstone Harbour on the east, Langstone harbour in the middle, and Portsmouth harbour on the west. These harbours, when the tide is full, present broad sheets of water; and Portsmouth harbour, with its entrance, has, when viewed from the top of Portsdown, a striking appearance; but when the tide is out, little is seen but an assemblage of sand or mud banks, with channels of deeper water running between them. Hayling Island is about 4 miles long from north to south, and 1 mile wide, as much as a mile and a quarter which is next the open sea. It contains the two villages of North and South Hayling, with a population of 882. Portsmouth Island, 4 miles long from north to south, and
about 3 breadth, contains the ancient borough of Portsmouth and the town of Portsea, with their extensive suburbs. The principal naval dockyard in England, or indeed in the world, is at Portsea. The two towns have a population of 50,389. [PORTSMOUTH.] There are salt-works on both these islands.

From the entrance of Portsmouth harbour the coast runs north-west to the entrance of the inlet or estuary called South Water. In this 4 miles north of the town there are some low cliffs. Southamptom Water penetrates about 7 miles inland to the town of Southampton, at the junction of the Test and the Itchen: its breadth, when the tide is up, is from 15 to 2 miles; at low water, about half a mile. From the entrance of this water to the mouth of the Itchen, the coast runs south-west until opposite to the western extremity of the Isle of Wight. Along this low coast are extensive salt-works, and at its extremity, upon the point of a long sandy neck, stands Hurst Castle. From Hurst Castle the coast runs west, forming the shallow bay of Chichester, terminated at its western point by Hengistbury Head, from which the coast still runs west to the border of Dorsetshire. From the neighbourhood of Hurst Castle the coast is generally high and abrupt.

The surface of this county is rather irregular. The South Downs enter the county from Sussex on the south-west, near Petersfield, and run in a north-west direction into Hampshire: Butser hill, between Petersfield and Horndean, on the Portsmouth road, one of the highest points in this range, is 917 feet high. The North Downs enter the county from Southampton to Farnham, and extend across the county, by Odiham, Basingstoke, and Kingsclere, into Wiltshire, Highclere Beacon, one of the points of this range, in the north-western part of the county, near the border of Wilt and Berks, is 906 feet high. The New Forest forms a continuation of the east side of the county between the South and North Downs, and runs from Petersfield northwards past Alton. Portsmouth is an isolated eminence extending east and west just above Portsmouth and Langstone harbours; its highest point is 497 feet; its length 7 miles, and its breadth one. All these hills are in chalk formation.

A large part of Hampshire is within the basin of the Southampton Water; a small portion on the north and northeast sides of the county is in the basin of the Chichester, and a small portion on the south-east side is in the basin of the Arun, and a small portion of the west side is in the Wiltshire and Dorsetshire basin.

The principal streams which drain the Southampton basin are the Ant or Test, the Itchen, and the Hamble. One branch of the Test rises near Hurstbourne Tarrant (between Newbury, Berks, and Andover), and another near Whitchurch, Wiltshire, and runs through South Wigston, to Romsey to Southampton. The Itchen rises in the hills around Alresford and flows past Winchester to Southampton. The Hamble rises near Bishop's Waltham, and joins the Southampton Water near Fareham, and extends across the county, by Titchfield, which the maps assign no name, flows by the village of Titchfield into the sea, near the mouth of the Southampton Water. The length of these rivers is as follows: the Ant or Test to Southampton, 33 miles; the Itchen 25 miles (of which 13, viz. up to Winchester, are navigable); the Hamble 10, and the Titchfield river 20 miles; the length of the Southampton Water has been already given. The Itchen navigation does not coincide with the natural bed of the river.

The New Forest occupies nearly all that part of the county which has been represented as projecting at the south-west corner. It is drained by two small streams, the Ex and the Boldre, besides the Bolder Water, besides Thames.

The basin of the Thames is separated from the rest of the county by the North Downs, and drained by the Way, the source of which is in Hampshire and by the Auborne and the Auborn valley, which forms the border to Hampshire. The basin of the Arun is separated from the rest of the county by the Alton and Petersfield hills and the South Downs. It is drained by the Rother, which rises in this county and flows past Midhurst into the Arun.

The basin of the Test is separated from the rest of the county by Petersfield and the South Downs. It is drained by the Rother, which rises in this county and flows past Midhurst into the Arun.

The basin of the Itchen extends a narrow strip of the county to the west of the New Forest. It is drained by the Avon, which, entering the county just below Downham, Wilts, about six miles from Salisbury, runs south past Fordingbridge, Ringwood, and Christchurch, into the sea. That part of the river which is in the county is about 20 to 22 miles long. A small portion of the Dorsetshire Stour, and of the Great Leaunds Water, a tributary of the Stour, are in the county or upon its boundary; the Stour joins the Avon below Christchurch: its estuary forms Christchurch haven.

The country is well watered by several canals. The Andover Canal commences at Andover, and is carried along the valley of a small feeder of the Ant or Test, till the junction of this feeder with the main stream. The canal then crosses the Avon at Andover, and runs along the left side of the stream to Redbridge, three or four miles above Southampton, where it enters the Ant. Its whole length is 225 miles: its total fall is above 176 feet. It has a branch to Salisbury. It is chiefly used for the import of coal and other fuel, and of general goods from the continent and for the export of agricultural produce. The Basingstoke Canal commences at Basingstoke, and is carried in a very winding course 32 miles east on one level to the Lod-

At the mouth of the Itchen, which it crosses into the county of Suffolk, its further course through which to the navigable part of the river We at (near its junction with the Thames) is 15 miles, with a considerable fall. That part of the canal which is in Hampshire and Dorsetshire is 35 miles long and 13 feet deep. About four miles east of Basingstoke the canal is carried by a tunnel above a mile long through a chalk hill; from this, chalk, which yields a great quantity of water, the channel is carried. The chief supply of water to the canal is from a spring in the chalk. About three miles west of the county this canal is carried by an aqueduct across a valley three quarters of a mile broad. This canal serves for the conveyance of nearly every description of goods, from London, and for the export of timber, flax, malt, bales, and earthenware. Part of the canal from Arundel to Chichester to Portsmouth is in this county.

Three principal main roads cross the county, viz. the road from Winchester to Basingstoke, that to Southampton and Poole, and the great western road through Salisbury. The Portsmouth road enters the county between Godalming and Petersfield, but again quits it to pass through a projecting arm of the county of Sussex: it then continues north from Petersfield, and runs through that town and through the villages of Horndean and Cosham to Portsmouth. The Poole and Southampton road first enters the county and crosses a portion of it between Netley and Fareham, both in Suffolk; beyond Fareham it again enters it and runs by Alton, Alresford, and Winchester to South- ampton. From Southampton it runs by Ringwood into New Forest, and then on to Andover, and thence passes through Basingstoke, Whitchurch, and Andover to Salisbury, and thence into Wiltshire. At Andover it splits, the Basingstoke, Farnham, and Exeter mail, and by the Exeter mail, enters the county between Bagshot (just beyond which it branches off from the Southampton road) and Basingstoke, the New Forest and Southampton road, and extends across the county, by Titchfield, which the maps assign no name, flows by the village of Titchfield into the sea, near the mouth of the Southampton Water. The length of these rivers is as follows: the Ant or Test to Southampton, 33 miles; the Itchen 25 miles (of which 13, viz. up to Winchester, are navigable); the Hamble 10, and the Titchfield river 20 miles; the length of the Southampton Water has been already given. The Itchen navigation does not coincide with the natural bed of the river.

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about two or three miles, that of the South Downs about
four miles. Portdown hill is an outlying mass of chalk.
The country to the north of the great chalk district and of
the chalk marl and greensand, and lastly the country to the south of the great chalk district and of
the South Downs belongs to the Isle of Wight basin; and
these are almost entirely occupied by the strata above the
clay.

The country to the east of the great chalk district
and embraced between the North and South Downs is occupied
by the strata which underlie the chalk, and which extend
eastwards to the Chiltern Hills and to the Vale of the White Horse, in
the south-east of England. In the London basin the Bag-
shot sand, belonging to the upper marine formation, is found
at Frimley Heath, on the border of Surrey, and is surrounded
by the growing timbers of the Bassett district; but at Kings-
elmere and by the Weald the same formation is found only in the
east-north of the county, and are of small extent: the rest of this
basin in Hampshire is occupied by the plastic clay, except near Kings
easmine, where, for a short distance, the chalk marl, and greensand crop out from beneath the
clay. In the Isle of Wight basin that part of the
New Forest which extends from the Boldre Water to the Southam
ton Water is for the most part occupied by a sand probably agreeing in its principal characteristics with
the Bagshot sand; this district is peculiarly adapted to the
growth of oak. The remaining part of the New Forest, the
country around the Southamton Water, and the whole line of the
Stanage, Marlborough, and Hayling Islands, are occupied by the
London clay; the country west of the Avon and a belt varying from
three to seven miles south of the chalk, are occupied by the plastic clay.
The Weald district east of the chalk is occu-
pied by the plastic clay, and the eastern and the central and the small
detached part of the county included in Sussex, partly by these
formations and partly by the Weald clay.

No minerals are procured from this county to any extent,
except near Petworth, where chalk is quarried and
sent to Portsmouth dockyard to be burnt for lime.

Forest.—There are several forests in this county, namely,
the New Forest in the south-west, Alice Holt and Woolmer Forests in the north, and the Chichester Forest in the
east.

The New Forest, the most important of these, appears to have
been, at the time of the Conquest, a wooded tract thinly
peopled. William the Conqueror or his immediate successors
conquered or his immediate successors
conquered the tract extending from Godalming, near Fording-
bridge, to the sea, and from Ringwood to Hardley, near
Southampton Water, and comprehending 92,365 acres. The
bounds were so far enlarged between the commencement of
Henry II.'s reign and the reign of Edward I., that they comprehended all the country between the Southampton
Water and the Avon for several miles inland. These addi-
tions were disafforested in the reign of Edward I., in pursu-
ance of the Charta de Foresta, and those bounds remained
reconverted in the time of Charles II. The forest at present comprehends nearly 64,000 acres, and is
the property of the crown, subject to rights of common and
other antient claims. The crown has manorial
rights over some, and the absolute property of other plots
of ground included in the former, but not in the present
bounds of the forest. For local purposes the forest is divided into
nine bailiwicks, which are subdivided into fifteen walks.
The forest is under a surveyor for the navy attached to the
dockyard at Portsmouth, and under the surveyor-general of
woods and forests. The chief value of the New Forest is for the raising of oak and beech timber for the use of the
navy, but in certain circumstances, the management of the forest was very bad. Within the pre-
sent century many reforms have been made, from which
considerable benefit may be expected. There are many
deer kept in the forest; rabbits, which formerly bounded,
are now scarce; a diminutive breed of horses, and a pecu-
liar breed of swine, bearing considerable resemblance to the
wild boar, are found in a half-wild state in the forest.
There are now many several species of birds, which formerly
were abundant in the forest, and some of which are now
rare. The forest is also remarkable for the number
of deer kept closely cropped by sheep, and for the

The forest of Bere extends southward from Portsdown
hill, and its bounds, according to a perambulation made in
1688, and still observed, comprehend about 16,000 acres, of
which one-third is enclosed. It is divided into two larger
divisions, the Eastern and the Western. The perambula-
tions depend on these, and is under the control of a
warden and other officers. The quantity of timber grown
in this forest is trifling compared with what it once yielded.

Alice Holt and Woolmer Forest lies between the Ports-
mouth and Southampton roads. It is divided into two
parts by intervening private property, namely, Alice Holt, near the West Horsley, and Woolmer, nearer the Portsmouth road, between Lip-
hook and Petersfield. It contains altogether nearly 15,000
acres, more than half of which belongs to the crown. The
black oak is the principal timber, and its cultivation is
very productive. Like the other forests of the county it had during the last
century been much neglected. In the marshy bottoms of
Woolmer Forest many trees have been found and dug up
with the peat, and many hundreds of Roman coins, several of
them those of Marcus Aurelius and the Empress Faustina,
were dug up in the bed of Woolmer pond, when dried up
in 1741 by the heat.

Waltham Chase, a waste of 2900 acres, belonging to the
bishop of Winchester, is on the north-west side of the forest
of Bere, near Bishop's Waltham. It is connected in our
criminal annals with the atrocities of the deer-stalkers, called
'the Waltham hangers' or 'the Black Act,' passed for their suppression.

Agriculture.—The climate of Hampshire is generally
mild and favourable to vegetation. The southern part of
the Isle of Wight is considered to have the mildest climate in Great Britain, and is devoted to on that account to the
grazing of sheep. The climate of the southern parts of the county is probably the healthiest and the best for
milk production. The land on the western and
north-western borders of Hampshire consists of poor sands and gravelly soils or chalky hills, having between them low bottoms, with no ready outlet for
the water, which has been rendered more unhealthy by
such"
best sneeze-parers. If these downs are not sufficiently
stocked, or if those are reserved for cows, the furze and
brambles are apt to overrun them, and the coarse grasses
get the upper hand.
In the valleys and along the lower slopes of the chalk-
hills the soil is of a tough, well-drained nature, being a
mixture of chalk with small patches of chalk waste and
the hills by the rains and stiff clay. This is a soil very
difficult to cultivate. In spring it is extremely heavy,
and retains moisture a long time, and when dry it becomes so hard, that ploughing it has been
put off for many years, it has been
head, and the clogs are still friable, there are no means of
reducing it to a proper tilth. But when it is carefully
manured and well manured, it produces very good crops of beans,
which the land can stand cultivated seasonally, kept clean without occasional fallows, and the most pro-
fittable rotation is wheat, beans, oats, fallow. It is much too
heavy for turnips. In some spots which are not quite so
hence the Suffolk rotation of barley, after a long fallow,
clover, wheat, beans, and oats, might be introduced with
advantage. It is not at all adapted to the Scotch converti-
bility system; for although grass-seeds might grow well, the
land could seldom improve when a sufficient quantity is carried on
in spring, or autumn, and after a dry summer it would be almost
impossible to plough it up in good time to sow it with wheat.
On the eastern side of the county, bordering on Surrey and
Sussex, is a tract of land, which, properly named the
hamsley land, forming the vale of Petersfield. It has a grey,
tender, sandy soil of some depth, lying on a soft sandstone,
which is almost impervious to water. This circumstance
counteracts the advantages of a light soil, unless the water
be carefully controlled. On this soil the round the poor
sandy soil is only fit for plantations of fir.
The land in the New Forest, and on the opposite side
of the river, or estuary, below Southampton, is mostly of a
light nature, intersected here and there with heavier loams
and clays. Where it is sound and free from springs it is of
a good quality; and that which is not so may be materially
improved by judicious under-draining. Some spots in the New Forest are annually drained years ago by
Mr. Elkington, and have empy repaid the expense incurred,
both by the improvement of the land and the greater salu-
brity of the neighbourhood; for where the land has not been drained, boggy and marshy places are formed, which are
the cause of frequent fevers and agues.
Various kinds of marl are found in many places; some of
these are very useful on poor gravelly soils, which they
greatly improve when a sufficient quantity is carried on.
The value of marl depends on the union of carbonate of lime
and clay, and is readily discovered by its effervescing
when any acid is poured upon it. When the quan-
tity of carbonate of lime is small, but much well white or red
clay, the water-colour is caused by the calcarceous matter, the red by the presence of the oxide of
iron.
The Isle of Wight consists principally of chalk, over
which are found various soils, such as gravel, sand, and
very stiff clay. The mildness of the climate is favour-
able to vegetation, and there are some neat farms, in which
the land is well cultivated.
In traversing the whole country it will be observed that
the poorer soils predominate, and a great part of the land
will scarcely repay the expense of cultivation. There are
a few fertile spots, and some very valuable water-meadows
along the principal rivers, especially
through the western part of the county bordering on Dorset-
shire. Where a farm has a portion of water-meadow and a run for sheep on the downs, the occupier generally
will find that the greatest agricultural skill is displayed in the
cultivation of the poorer soils, where manure must be
made on the spot, and the cattle and sheep kept on the
produce of the arable land.
Hampshire, although it cannot be compared with some
coastal counties for agricultural improve-
ments, is not far behind them; and there are some farms as
well managed as any in England. The great fault lies in
the want of economy of labour; too many horses are used;
the threshing-machine is not yet general; the manure
stock is not fed so economically as it might be; the manure
is not so carefully collected, nor so well prepared, before it
is put on the land; and there is a great waste of the liquid
part of it on the best managed farms.
The old clumsy plough, once in general use, is now
replaced by a lighter and more durable plough, of which
the parts that wear out most are made of cast-iron. Two
horses now plough land which formerly was thought to
require four. The seed is put in by a drilling-machine
instead of being scattered by the hand. The corn is put
into neat stacks, raised on stone pillars, and well thatched,
instead of being exposed to the depredation of rats in a
huge barn. The farm buildings, as well as the house of
the farmer, are now commodiously arranged, and there is
a great general attention to the conservation of the
abuses of the old poor-laws, and the commutation of the
tithe for a fixed annual payment, will much encourage
the improvement of poor lands; and in half a century the
general face of the county will be very different from what
it is at present.
There are no breeds of cattle, horses, or sheep, peculiar
to Hampshire, unless we consider the small New Forest
ponies in that light. The cows are of various breeds. The
oxen are chiefly Sussex and Devon. The horses used
in husbandry are mostly bred in other counties. The sheep
are—common small forest breed, or heath sheep, which,
when tolerably fat, give the high-flavoured mutton
formerly known as New Forest mutton; the Dorset and
Leicester sheep, in the richer meadows; and the South
Down, on the chalky hills. The last are most
numerous, and preferred for folding on the land.

Hampery bacon is the best, and its curing of bacon; and a Hampshire hog is a very common sign
for a public-house; yet the native breed of pigs in this county is by no means remarkable for its qualities. The native
hogs, which are scorns and of the New Forest, although the flavour of their flesh may be good, are
course, raw-boned, flat-sided animals, and are now seldom
met with. The improved breeds produced by crosses of the Berkshire, the Suffolk, Essex, and Chinese pigs, are so
much better and more profitable, that the improvement to be noticed in the pigs bred on different farms is that
which arises from the predominant character of any one of the above-mentioned breeds.

The rearing of pigs for Hamps-
shire bacon is owing entirely
to the care with which it is cured. The hogs being
fattened on peas and barley meal, are kept fasting for twenty-
four hours, at least, before they are killed; they are used
as gently as possible in the act of killing, which is done by
inserting a long pointed knife into the main artery which comes from the heart. The hair is burnt off with lighted
straw, and the cuticle of the skin scraped off. The carcass
is hung up after the entrails have been removed, and the
next day, when it is quite cold, it is cut up into cheeses.
The spare ribs are taken out, and the bloody veins carefully
removed: the whole is then covered with salt with a small
quantity of salt-petre mixed with it. Sometimes a little
town sauce is added, which gives a pleasant sweetness to the
bacon.
The cheeses are laid on a low wooden table, which has a
small raised border all round it. The table slants a little
so as to let the urine run off into a vessel placed under it,
by a small opening in the border at the lower end. The
cheeses are turned and re-salted every day; those which
were uppermost are put under, and in three weeks they are
ready to be hung up to dry. Smoking the bacon is no
longer so common as it used to be, as simply drying it is
found sufficient to make it keep. Those who, from early
association, like the flavour given by the smoke of wood,
have the bacon smoked, or the smoke is used on the outside
under the cheeses. When they are quite dry, they
are either placed on a bacon-rack for the use of the family,
or are packed with wheat-choaff into chests till they are
sold.
The practice of cutting the hogs into pieces and pickling
them in a vat, being attended with less trouble, is very
generally preferred when there is only a sufficient number of
hogs killed to serve the farmer's family; but cheeses of
bacon, when properly made, are more profitable.
The fitting of hogs is profitable when a pound of green
bacon, when it is first dried, is worth more than the
tenth part of the price of a bushel of barley, for a bushel
of barley at sixpence a bushel, is worth £1 10s., while a
bushel of green hogs, produced on one acre of land, may
produce 10lb. of bacon. The risk and attendance are fully compensated by the value of the dung
made by the hogs, which is of the richest nature. Hogs
may be made fat with less expensive food, such as boiled
roasts mixed with meal; but in this case the bacon is much
HAM

less valuable, and is not superior to the Irish bacon, which is mostly fatted on potatoes.

The following are the principal fairs in Hampshire:- Alresford, last Thursday in July, October 17; Alton, Saturday before May 1, September 29; Andover, May 13, November 17 and 18; Basingstoke, Easter Tuesday, September 23, October 11; Bodel, July 23, August 20, November 13; Christchurch, June 13, October 17; Hambleton, February 13, October 2; Kingsclere, April 2, October 15; Lymington, May 12, October 2; Magdalen Hill, near Winchester, August 2; Newport, Isle of Wight, Whit-Monday, Tuesday, and Wednesday; Overton, May 4, July 10, October 18; Petersfield, March 5, July 10, December 11; Portsmouth, July 10, lasts 14 days; Runsey, Easter Monday, August 26, November 8; Southampton, February 17, May 6, December 15; Stockbridge, Holy Thursday, July 10, October 7; Weyhull, October 11, 12, 13, 14, 15, 16

Division. Situation. 
I. Alton, North Division. East. 
II. Andover Division. South-east. 
III. Andover Division. West. 
IV. Basingstoke Division. North-east. 
V. Fawley Division. Central. 
VI. Kingclere Division. North. 
VII. New Forest, East Division. South. 
VIII. New Forest, West Division. South-west. 
IX. Portdown Division. South-east. 
X. Isle of Wight Division. South. 
Separate Jurisdictions. 

Hundreds. 
Alton, Bishop's Sutton, and Selborne, and the liberty of Alresford. 
East Meon and Finchcomb. 
Andover, Bacon Stacey, King's Sombourn, Tornigate, and Wherwell. 
Basingstoke, Bermondash, Crowda, Hold- 
shott, Mitccleridge, and Oldham, and the liberty of Bunting. 
Bountisbury, Baddesgate, Fawley, 
Mansborough, and Mansbridge. 
Chuteley, Evingar, Kingclere, Overton, and Pastow. 
New Forest (East), New Forest (North), Redbridge, Bishop's Waltham (part of), Ringwood (part of), and the liberties of Beaulieu, Dibdin, and Lymington. 
Christchurch, Fordingbridge, and Ringwood (the greater part of), with the liberties of Breamore and Westover, and that part of the New Forest which is not included in any parish. 
Bishop's Waltham (the greater part of), Bosmere, Fareham, Hambleton, Meon-Stoke, 
Portsmouth, and Titchfield, and the liberties of Alverstoke and Gosport, and Havant. 
Liberties of East and West Medina. 
City of Winchester and liberty of Soke. 
Borough of Portsmouth, with Portsea and 
Portsea Guicable. 
Town and county of Southampton.

Population in 1821. 
Ham 

74,320 acres. 
44,169 acres. 
130,210 acres. 
144,600 acres. 
129,690 acres. 
102,500 acres. 
62,360 acres. 
133,870 acres. 
100,352 acres. 
86,610 acres. 
2,250 acres. 
5,909 acres. 
1,016,550 acres. 

By a subsequent arrangement made under the direction of the magistrates of the county, the divisions of the county have been increased to thirty; the Isle of Wight. They are as follows:- Alton, Andover, Basingstoke, Droxfor, Fareham, Kingsclere, Lymington, Oldham, Petersfield, Ringwood, Romsey, Southampton, and Winchester. Hampshire, not including the Isle of Wight, contains one city, Winchester; six parliamentary boroughs, Andover, 

Kingsclere, Lymington, Petersfield, Portsmouth, and Southampton; and thirteen other market-towns, Alresford, Andover, Basingstoke, Bishop's Waltham, Fareham, Fordingbridge, Gosport, Havant, Kingsclere, Oldham, Stockbridge, and Whitechurch, which last two were disfranchised by the Reform Act. Of these some are described elsewhere. [Alresford; Alton; Andover; Basingstoke; Bishop's Waltham; Christchurch; Lymington; Petersfield; Portsmouth; Southampton; Winchester.] Of the others an account is subjoined.

Fareham is in the hundred of Fareham, at the head of the west branch of Portsmouth harbour, 73 miles from London, at the intersection of the road from London to Gosport and that from Chichester to Southampton. The parish is extensive, containing 6670 acres; it constitutes the whole of the hundred, and had in 1831 a population of 4402. Fareham was in Leland's time a fishing village; it is now a tolerably thriving town, depending for its prosperity chiefly on its neighbourhood to Portsmouth. Several persons connected with the naval establishment of Portsmouth reside here. Some small vessels are built at Fareham; and cordage, sacking, and coarse pottery are made. Vessels of 300 tons can get up to the port; and

considerable trade in corn and coal is carried on. The market is on Wednesday, and there is one yearly fair. Petty trades and minor architecture of the church is of various dates and styles; the chancel is early English. The living is a rectory in the peculiar jurisdiction of the bishop of Winchester, in whose gift it is; the annual value is £672. There were in 1833 twenty-two day and four boarding-schools, with nearly 700 children: of these schools, one with 27 boys was an endowed free-school, another with 130 children, a national school, and a third with 62 children, a subscription infant school. There were also three Sunday-schools, containing above 100 children. There are congregations of Independents and Methodists.

Fordingbridge is in the hundred of Fordingbridge, on the right or west bank of the Avon, 92 miles from London on the road to Chichester. The parish is large, containing 5720 acres, and had in 1831 a population of 2892, more than half agricultural. Fordingbridge was formerly a place of greater extent than now, and has suffered several times from fire. There is a stone bridge of seven arches over the river. There are some manufactures of sail-cloth and bed- 


thincking. The market is on Saturday, and there is one yearly fair. The living is a vicarage, united with the parochial chapelry of Dibby, or Dibdibby, to the diocease of 

archdeaconry of Winchester, and in the gift of King's College, Cambridge: the annual value is £601, with a glebe-house. There is an Independent congregation. There were in the parish in 1833 one infant-school with

Portsea Guicable is a part of the parish of Portsmouth, not within the jurisdiction of the borough of Portsmouth, but comprised in the hundreds of Portdown.

* Portsea Guicable is a part of the parish of Portsea, not within the jurisdiction of the borough of Portsmouth, but comprised in the hundreds of Portdown.
HAM

45 children, eight day and boarding-schools with 153 children, one day and Sunday-school with 231 children daily and 113 on Sundays, partly supported by endowment, and one Sunday-school with 229 children.

Two miles from the town, on a hill called Godhall, overgrown with oaks, are the remains of an antient camp, perhaps of Saxon origin, secured on one side by a double tower and on the other by the elevation of the hill.

Havant is in the liberty of Havant (which comprehends only this parish), near the head of Langton harbour, 564 miles from London by Petersfield and Horndean. The population in 1831 was 2690, a population of 2083, about one-fourth agricultural. The church is in the centre of the town, in the form of a cross, with a tower rising from the intersection: some parts of it are of Norman architecture. The living is a rectory, a vicarage, and a Glebe House. The church of St. Mary Magdalene is a large, solid, structure, with a spire, and is dedicated to the memory of the Prince Consort.

Havant has little trade: some parchment is made, and some of the inhabitants are engaged in fishing and clothing. The market is on Saturday, and there are two yearly fairs. There were in the parish in 1833 two national-schools with about 200 children, one boarding and day-school and four day-schools with 118 children, and one Sunday-school with 130 children.

Kingsclere is in Kingsclere hundred, 55 miles from London through Basingstoke. The parish is large, containing 3630 acres, and in the town there is a railway station, with daily trains to London. The population, in 1831, was 1244, of which 372 were agricultural. The living is a vicarage, with a chancel and Timberbury annexed, in the diocese and archdeaconry of Winchester; of the yearly value of 400L. There were in the parish in 1833 one day and Sunday-school with 50 children daily and 60 on Sundays. At Kingsclere was an antient residence of the West Saxons, and there was a royal residence in the neighbourhood as late as the time of King John.

Oldham is in Oldham hundred, a little to the left of the great western (Salisbury and Exeter) road, 40 miles from London. The parish is large, containing 7350 acres, and is a market town with a grammar school. The population, in 1831, was 247, and the chief industry is the manufacture of woollen goods. The living is a vicarage, with a chancel and Timberbury annexed, in the diocese and archdeaconry of Winchester; of the yearly value of 537L, with a glebe-house. There is an independent congregation at Oldham. There were in the parish in 1833 one day and three day-schools with about 250 children; one of these schools, with 41 children, was partially supported by endowment. There was also one Sunday-school with 187 children.

Near Oldham are the remains of an old castle, which, in the civil wars at the close of King John's reign, was bravely but unsuccessfully defended by a garrison of thirteen against the Dauphin, Louis of France. In this castle David Bruce, king of Scotland, was confined for eleven years, according to the account at Nester's.

Romsey is a corporate town, locally situated in the hundred of King's Bournemouth, upon the left bank of the Anton or Test, over which is a bridge, and close to the Andover Canal. It is a market town, with a railway station, and contains a number of manufactories, including the manufacture of boots and shoes, in the diocese and archdeaconry of Winchester; of the yearly value of 528L, 8s. 10d. per annum gross, or 393L. 10s. 10d. clear. There is a church, a church, its exterior for the most part of Norman architecture, much enriched in some portions with sages and other ornaments: the central portion of the interior, the transepts, and the sides of the chancel, are also Norman: the west end of the church is in the early English style, very plain outside, but rich within. There are various windows of later date, inserted, especially some fine ones at the east end. On the roof of the church grows an apple-tree, which for many years has borne fruit. There are dissenting meeting-houses, a town-hall, an 'audit-house,' supported by the inhabitants, and a hospital for the aged poor, people, a small borough goul, and some almshouses. There were formerly considerable manufactories carried on at Romsey of sacking and shalloon, but these have much declined, and the town is now chiefly remarkable for the manufacture of flour-mills and tan-yards. The market is on Thursday, formerly on Saturday, and there are three yearly fairs. By the Municipal Reform Act, the council of the borough consists of a mayor, four aldermen and twelve common councillors. The living is a vicarage, in the diocese and archdeaconry of Winchester; of the yearly value of 365L. There were in the parish in 1833 twelve infant or dame-schools with 136 children, twenty day-schools with about 630 children, and seven Sunday-schools with about 700 children. Of the day-schools one is a free-school, another is a national-school, united with an old endowed free-school, and a third is wholly supported by Lord Palmerston and family. Sir William Petty was a native of Romsey, and lies buried in the church.

Stockbridge is a borough in the hundred of King's Bournemouth, on the left bank of the Anton or Test, and near the Andover canal; it is 664 miles from London on a road leading to Andover, and is 100 miles from Southampton. The borough limits include and comprehend 1220 acres; the population in 1831 was 851, about one-third agricultural. The town consists of one street, in which are seven bridges: there has little trade, and there are no considerable thoroughfares. There are races in the neighbourhood. The market is on Thursday, and there is a yearly fair (there were formerly three fairs), one of the largest in the county for lambs. Stockbridge returned two members to parliament during the passing of the Reform Act, but it was disfranchised: it is a borough by prescription; the town-hall is a neat building. The living is a chapel, in the diocese and archdeaconry of Winchester, annexed to the vicarage of King's Bournemouth, to which the chapel of Little Bournemouth is also annexed; their joint yearly value is 596L with a glebe-house. There were in Stockbridge in 1833 five day-schools with 99 children, and two Sunday-schools with 60 children.

Whitchurch is a borough in the hundred of Evington, 564 miles from London on the great Western road, between Basingstoke and Andover, near the head of the river Andover. The borough consists of a town and a population of 1673, about half agricultural. Shaloon and serge are manufactured; also paper for the exclusive use of the Bank of England. The market, held on Friday, is said in some of our authorities to be now disused. Whitchurch is a borough by prescription, and was disfranchised by the Reform Act before the passage of the Reform Act, and is now a county borough by act of 1832.

Near Whitchurch are the remains of an old castle, which, in the civil wars of the close of King John's reign, was bravely defended by a garrison of thirteen, and was only taken by the King's forces at the siege of 1221.

This county is in the Western circuit: the assizes and quarter-sessions are held at Winchester. For the election
of members of parliament, the county was by the Reform Act divided into two parts. The Northern division comprehends Alton, Andover, Basingstoke, Draxford, Kingsclere, Odham, Petersfield, and Winchester divisions; the chief places in this part are Alton, Andover, Basingstoke, Kingsclere, Odham, Petersfield, and Bishop's Waltham. The Southern division comprehends Fareham, Lymington, Ringwood, the Middle Poortown, and extends into the chief places in this part are Southampton, Fareham, Lymington, Portsmouth, Ringwood, and Romsey. The 'divisions' are those made by the Reform Act, and the chief place in each division is the seat of election, or Salisbury, and the polling stations are Newmarket and West Cowes. Formally, two members each were returned from the city of Winchester, the boroughs of Christchurch, Lymington, Portsmouth, Southampton, Andover, Petersfield, Stockbridge, and Whitechurch, and for the boroughs of Newport, Newtown, and Yarmouth, in the Isle of Wight. By the Reform Act, Stockbridge, Whitechurch, Newtown, and Yarmouth were disfranchised, and Christchurch and Petersfield were returned by one member each. The Act, by re- forming the franchise, opened the city of Winchester, and the boroughs of Portsmouth, Christchurch, Lymington, Petersfield, Andover, and Newport, which were all previously very close.

Parliament, _p. 49._—Before the Roman invasion, this county was inhabited by three tribes: the Regni ('Rgyn), Ptolomy, who occupied the coast, as well as the counties of Sussex and Surrey; the Belgæ (Belgæ), Ptolomy, who inhabited the middle of the kingdom, and extended into Wiltshire; and the Atrebates, or Atrebati (Arbætæ, Ptolomy), who occupied, it is likely, the northern part on the confines of Berkshire. Winchester appears to have been a British town antecedently to its being occupied by the Romans, and Silchester also, if it may be identified with Calleva Atrebatæ. This part of the island was reduced by the Romans, probably under Vespasian, who is distinctly recorded by Suetonius as having marched from Sirmium to the island of Wight, called by the Romans Vicia ('Vicia, Ptolomy). It was comprehended in Britannia Prima, and was crossed by several Roman roads, and contained several Roman stations. It was Camden's opinion that the Tresanton river mentioned by Ptolomy (Τρεζάντων, Tresantaus) and the Antôn or Test; perhaps it was the Southampton Water, with all the streams that flow into it. Others however identify the Tresanton as Arun, a name given to the river by the Romans, and it is the same with the Antôn, a designation peculiarly suitable to Southampton Water. The Roman station Caesareum, mentioned in the Iter vi. of Antoninus, is generally admitted to have been established after the conquest. The complete absence of Roman remains are found, and modern antiquaries seem to agree in fixing the station at this spot, which is on the east side of the Ithem, by a bend in which it is nearly surrounded. There are remains of the Roman works, a ditch and part of a rampart on the land side, composed of earth, flints, and large flint bricks, and faced roughly with small square stones. A quantity of Roman coins and of fine red pottery, a glass urn, and sculpture and other stones have been dug up. The area of the station is about half a mile in circumference; Southampton probably arose from its ruins. In the latter part of the name Claus-excuni we may perhaps detect the names of the two stations of Tri-on, Southampton, and Hamptons (now subverted into Hampshire). Another station mentioned by Antoninus is Venta (a Roman modification of the more antient British name Caer Gwent, the white city), distinguished from some other places of the same name, as 'Venta Belgarum,' Ptolomy mentions Venta, or as he writes it Venta, as one of the towns of the Belgæ. It is the modern Winchester, and was returned to the king by the Danes. At Basing, near Basingstoke, Ethelred I., king of Wessex, and his brother Alfred, were defeated by the Danes, a.d. 870. A year or two after, viz. in 871 or 873, in the reign of Alfred, the invaders made another attack. Winchester was, in 871, damaged the cathedral and murdered the ecclesiastics belonging to it. From the time of Alfred's restoration the county experienced scarcely any hostility till the time of the Danish invasions. In the reign of Ethelred II., the Danes ravaged the Isle of Wight. In the innumerable insurrections of the reign of Edward the Confessor, the same island was invaded by Godwin, earl of Kent, and his son Edgar in the reign of Harold I., and in the reign of Harold II., it was laid under contribution by Tostig, the king's rebellious brother. Winchester continued to be the principal seat of royalty in the reign of William the Conqueror.

The most remarkable remains of a Roman station are at Silchester, a village on the border of the county, due north from Basingstoke. It was certainly a station of importance, though it is difficult to determine whether it was the Caer of the Venta or the Caer of the Arun. Camden identifies it with the latter, and assigns to it the British name of Caer Segont, which is said to have been destroyed in the invasion by Ella, who founded the city of the Caer Segont. The remains of this station are among the most entire in the kingdom. The walls form an irregular octagon and are about a mile and a half in compass; they enclose a space of about 60 acres, dividing the site into seven crescent fields. In 1831 the Isle of Wight was by the same act severer from the county for parliamentary purposes, and allowed to return one member: the chief place of election is Newport, and the polling stations are Newport and West Cowes. Formerly, two members each were returned from the city of Winchester, the boroughs of Christchurch, Lymington, Portsmouth, Southampten, Andover, Petersfield, Stockbridge, and Whitechurch, and for the boroughs of Newport, Newtown, and Yarmouth, in the Isle of Wight. By the Reform Act, Stockbridge, Whitechurch, Newtown, and Yarmouth were disfranchised, and Christchurch and Petersfield were returned by one member each. The Act, by reforming the franchise, opened the city of Winchester, and the boroughs of Portsmouth, Christchurch, Lymington, Petersfield, Andover, and Newport, which were all previously very close.

The remains of a Roman station, supposed to have been the Brie of Antoninus, were observed by Mr. Gale at Broughton, not far from Stockbridge. The walls of Porchester Castle contain some portions of Roman archi- tecture, and are probably on the site of one of the stations denominated Portus, either Portus Magnus, or more probably Portus Adurni, mentioned in the Notitia Imperii. Roman roads may be traced running from Venta to Sordochium (Old Sarum); to Silchester and to Porchester; and from Silchester in various directions.

This county appears to have been the scene of contest in the Saxon invasion, and a number of portions of Roman archi- tecture, and are probably on the site of one of the stations denominated Portus, either Portus Magnus, or more probably Portus Adurni, mentioned in the Notitia Imperii. Roman roads may be traced running from Venta to Sordochium (Old Sarum); to Silchester and to Porchester; and from Silchester in various directions.

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The extension or formation of the New Forest by William the Conqueror, in the twelfth century, has been the subject of several attempts to trace its original design and boundaries. The establishment of the forest was a measure of protection for the royal deer and a means of military defense for the Norman lords. The forest was divided into several parishes, each governed by a lord of the manor. The forest was a source of income for the royal household, and the wood was used for fuel and building materials.

The chief menstake remains beside those mentioned elsewhere [Catherine of Aragon, Queen Elizabeth I, and Mary I]. Netley Abbey, and the Priory of St. Dionysius, near Southamton, beside the church of Romsey, mentioned above as having formerly been conventional. Netley Abbey is a short distance from the bank of the Southampton Water, about three miles south of the city. It was founded by the King of France and several kings of England, and is one of the most interesting of the old monastic foundations. It is a large and spacious building, with a central tower, and a numerous series of groined vaults, which are of great beauty and elegance. The church is dedicated to the Virgin Mary, and is a fine example of perpendicular architecture. It contains many monuments and tombs of the ancient nobles and gentry of the region. The abbey is now in ruins, and is a place of great interest to students of ecclesiastical history.

In the civil war between the supporters of King Stephen (1096-1154) and those of William the Conqueror (1028-1087), the town of Southampton was attacked by the French with their allies the Genoese and Spaniards. Their fleet was of fifty galleys. They took the town, burned the greater part of it, and slaughtered many of the inhabitants. About the close of the reign of Stephen, the town was rebuilt, and the new town was named by the monks of Netley. The town was then the chief town in the county of Hampshire, and was the seat of a bishopric. In 1295, the town was granted by Edward I. to the monks of Netley. The town was a important place for trade and commerce, and was a place of refuge for those who were opposed to the king. The town was a place of great importance in the history of England, and was a place of great interest to students of history.
**Summary of the County of Southampton (otherwise Hampshire, or Hants).**

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<td>Alton, South Division</td>
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<td>Andover</td>
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<td>Basingstoke</td>
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<td>Kingsclere</td>
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<td>Portsdown</td>
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<td>8,175</td>
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<tr>
<td>Winchester, City, and Soke Liberty</td>
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<td>Portsmouth, Borough, and Portsdown</td>
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<td>11,394</td>
<td>63</td>
<td>367</td>
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<tr>
<td>Southampton, Town &amp; County</td>
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<td>4,059</td>
<td>118</td>
<td>195</td>
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<tr>
<td><strong>Totals</strong></td>
<td>28,761</td>
<td>32,093</td>
<td>202</td>
<td>2,917</td>
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**County Expenses, Crime, &c.**

<table>
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<tr>
<th>The sums expended for the relief of the poor at the four dates of—</th>
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<tr>
<td>E.</td>
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<tr>
<td>1801</td>
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<td>1821</td>
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<td>1831</td>
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The saving effected on the whole sum expended in 1837, as compared with that expended in 1834, was therefore about 364 per cent.; and the saving effected on the sum expended for the relief of the poor was rather more than 39 per cent. in 1837, as compared with the expenditure in 1834.

The number of turnpike trusts in Hampshire, as ascertained in 1833, is 36, the number of miles of road under their charge is 810; the annual income in 1833, arising from the tolls and parish composition, was 30,321l. 13s. 6d., and the annual expenditure, 29,894l. 11s. 7d.

The county expenditure in 1838, exclusive of that for the relief of the poor, was 16,615l. 3s. 6d., disbursed as follows:

| E. | s. | d. |
| Bridges, buildings, and repairs, &c. | 1,247 | 3 | 5 |
| Gaols, houses of correction, &c., and maintaining prisoners, &c. | 590 | 9 | 3 |
| Shire-halls and courts of justice, building, repairing, &c. | 688 | 19 | 8 |
| Procuression | 2,999 | 8 | 5 |
| Clerk of the peace | 732 | 2 | 8 |
| Conveyance of prisoners before trial | 791 | 15 | 5 |
| Constables, high and special | 71 | 1 | 0 |
| Coroner | 298 | 12 | 0 |
| Debt, payment of, principal and interest | 6,165 | 10 | 0 |
| Miscellaneous | 2,412 | 12 | 7 |

The number of persons charged with criminal offences in the three septennial periods ending with 1826, 1827, and 1834, were 2085, 2190, and 3187 respectively; making an average of 298 annually in the first period, of 313 in the second period, and of 455 in the third period. The number of persons tried at quarter-sessions, in each of the years 1831, 1832, and 1833, in respect to which any costs were paid out of the county rates, were 109, 156, and 202 respectively. Among the persons charged with offences, there were committed for—

| E. | s. | d. |
| Felonies | 82 | 12 | 9 |
| Misdemeanours | 9 | 0 | 16 |

There are five or six species of the genus; but we shall select as our example the Common Hamster, Cricetus vulgaris, Mps Cricetus of Pallas, Le Hamster of Buffon and the French authors.

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extinct in the male line, Hanau-Münzenberg came, in 1736, to the electorate of Hesse Cassel, with which it has ever since been united (except from 1866, when the French took possession of it, to 1814, when the elector recovered it). It contains some mountainous tracts, extensive forests, and rich mines of copper, silver, cobalt, and salt. The inhabitants are Protestants, with the exception of between 400 and 500 Catholics. In 1683 a number of the Lutheran and Calvinist agreed to unite together as an evangelical church. There are some manufactories, chiefly in Hanau, the capital.

During the war was formerly nearly equal in extent to Hanau-Münzenberg, but the larger portion, lying in Alsace, is now part of France; and the remainder, which occupies about 100 square miles, with 20,000 inhabitants, belongs to the electorate.

Hanau, the capital of Hanau-Münzenberg, situated in an extensive plain on the river Kinzig, near its junction with the Main, consists of the old and the new town. In the former is the magnificent castle, the gymnasium, the second marriage, which his father, an eminent physician and surgeon, contracted after he had reached his grand clmerician. This son of his rather advanced age he destined for the profession of the civil law, but the child's passion for music, often of his meals, to its pursuit, and the determined manner in which he evaded or resisted all attempts to divert him from a purpose nature seems to have prompted, at length softened the father's heart, who, by the grace of Saxe-Weissenfels, placed him under Friedrich Zachau, organist of the cathedral of Hanau, an excellent musician. This professor soon made so willing a pupil acquainted with the principles of the science and the laws of harmony; he then placed in his hands the best works of the greatest composers, without directing his attention to any one in particular, thus leaving him to form a style of his own out of an acquaintance with numerous models of acknowledged superiority. So successful was this plan of education, that the youthful student composed a set of sonatas when only ten years of age, which was in the possession of George III., and most probably still forms a part of that collection that has descended to us.

Handel continued his attendance on the same master till he attained his fourteenth year, when he was taken to Berlin, where the Italian opera was flourishing under the direction of Bicciotti and Ariosti, afterwards so famous in London. He there attracted the notice of the elector, who proposed to send him to Italy, which offer, for some reason unknown, was declined by his father, who shortly after died for money. This period we lose all trace of the years 1716 and till the year 1703, when he reached Hamburg, in which city he may be said to have commenced his professional life. He there found Reinhard Keiser in the office of director of the opera, a composer of the highest celebrity, but whose expensive and somewhat dissipated habits led him frequently to absent himself from his post, on which occasions Handel was appointed to fill his situation, a preference so irritating to Matthaeus, an able musician and a voluminous writer on the art, that he violently assailed his favoured rival. A duel ensued, an nothing but a score, buttoned under Handel's coat, on which his antagonist's weapon broke, saved a life that soon proved of such inestimable value. Shortly after this he was employed to set a drama entitled Almèrià, the success of which was remarkable; it ran thirty nights uninterruptedly. In 1718 the Louisian and Calvins agreed to unite together as an evangelical church. There are some manufactories, chiefly in Hanau, the capital.

He then proceeded to Venice, and brought his Agrrippina, which was performed twenty-seven nights successively. In this, we are told, horns and other wind instruments were first used in Italy, as accompaniments to the voice. Here the charms of his music made an impression on the famous beauty and singer, Signora Victoria, a lady particularly distinguished by the grand-duke; but in this, as in every instance of a similar kind, Handel showed no disposition to avail himself of any particularities exhibited in his favour. His thoughts were nearly all absorbed by his art; and it is but just to conclude that he was also influenced by those sentiments of moral propriety which were strictly observed in his conduct throughout life. (Gallery of Portraits, vol. ii., p. 41.)

Quitting Venice, Handel went to Rome, where he was hospitably entertained by the Cardinal Ottoboni, who had in his service a daughter, who was fond of music, and was near Hanau when an army of Bavarians and Austrians, commanded by Prince Wrede, endeavoured to stop Napoleon on his retreat to France. The loss was very great on both sides. The first of the French, who were sent to the front, had 15,000 killed and wounded and 10,000 prisoners, but Napoleon made good his passage.

HAND. [Man.]
HAN

them. He there also produced most of his concertos, sonatas, lessons, and organ fugues, his Acta and Galatae, for which Gay furnished him with the poetry, and the oration of Esther.

The busiest, but not the most fortunate, period of Handel's life now arrived. The English nobility formed a project for converting the Italian theatre into an Academy for Music, to be conducted by the French, and engaged the subject of this biographical notice as manager, with a condition that he should supply a certain number of operas. In consequence, he went to Dresden to engage singers, and among them was one of his best favourites, that success which was unparalleled. But Bononcini and Ariosti, before alluded to, had been attached in some measure to the theatre, and having powerful friends, opposed themselves to the German intruder, as they very insolutely called the great composer. Hence those feuds, among the weak people of fashion, the remembrance whereof is perpetuated by Swift's well-known epigram. To calm these it was proposed that an opera in three acts should be produced, and he accordingly undertook to compose it. Hence he incurred the contumely of some of his most admired friends, and the success he incurred in a foreign country, the opera was called 'Muzio Scevola.' Handel's portion was declared the best; but, strange to say, though each, no doubt, strained his best for a title, not a single piece in the whole opera is known in the present day! Handel now, master of the field, produced about fifteen new operas; but the genius of his score, and the beauty of his orchestration, has converted it into a classic, performed in the temple of harmony, and that spirit of cabal often caused and always encouraged by the weak, that is the larger, part of the ranks of fashion, compelled the great composer and able manager to retire from the theatre in 1726, with the loss of 10,000 guineas, and a constitution much damaged by incessant labour and constant turmoil.

A slight paralytic affection was the consequence, which however the baths of Aix-la-Chapelle removed. He then made an attempt to give another opera at Covent Garden Theatre, but this proved equally mortifying and unprofitable. But the vexations and losses he encountered at the Italian theatre ultimately led to the advancement of his fame and the repair of his fortune. He worked quite away the Lent season, in imitation of the Concerto Spirituale, which he called oratorios, and at Covent Garden several, most of them composed for the occasion. But the receipts at these did not indemnify him, and he had to work more than ever. The Messiah was as ill-assisted as received in the capital of the empire, when first produced in 1741.

These failures were impeded, and, as usual, to the hostility of the Royal Family, after understanding the unwarranted patronage of the Royal Family, still pursued him with unabated vigour. From such persecution he determined to seek refuge in Ireland, then noted for the gaiety and splendour of its courts, and at once to this circumstances and the well-known appeal to the Goddess of Dullness:—

'Tis soon enough, sir; I'll go home as soon as I can. Strong in my arm, I'll grant Handel stands.

But old Bristow, with a hundred hands;
To stir, to shake, to shake the world he comes,
And Zenon's own wonders Marke Mans's arms.

Arrest him, pray, or you sleep no more
She banks—and down he is to Britannia's shore.'

On his arrival in Dublin,' says Dr. Burney, in his Commemoration of Handel, 'he was with all the humanity, and especially by performing The Messiah for the benefit of the city prison. He remained in Ireland about nine months, and had every reason to be satisfied with his visit. Returning to London in 1742, he renewed his oratorios at Covent Garden Theatre. In beginning with Aaron's rod, this time success attended all his undertakings. His last work drew crowds to the house, and The Messiah was equally attractive. The latter was, during a long period, performed annually at the Foundling Hospital, and alone added 10,300L. to the funds of that institution. It is next to impossible to calculate what it has produced to other charities; the amount must be prodigious. He could therefore, without consequence to himself, claim the advantage of deriving considerable pecuniary advantage from them; for though still opposed by most of the nobility, the king (George II.) and the people actively supported him.

Late in 1742 Handel was offered a chair with blindfolds, he nevertheless consented to conduct his oratorios, and, as usual, performed concertos and other organ pieces between the acts. He even composed, employing as his amanuensis Mr. John Christian Smith, and assisted at one of his oratorios a week only before his decease, which took place on a Good Friday (according to his wish, it is said), April 13th, 1759. He was buried in Poet's Corner, Westminster Abbey, where a monument was raised to him by his admirers—a work which never fails to arrest attention and excite admiration—is erected to his memory. 'But,' says the biographer before quoted, 'a still more honourable tribute to his memory was paid in the numbers and performances which took place under the roof which covers his dust. A century having elapsed from the time of his birth, it was resolved that a Commemoration of Handel should take place. The management was confided to the directors of the Antient Concerts, and eight of the most distinguished members of the musical profession. The king, George III., zealously patronized the undertaking, and nearly all the upper classes of the kingdom sealed the royal views. The receipts at five performances amounted to the sum of 12,736L.; the disbursements to rather more than 6000L.; of the profits 1000L. was given to the Westminster Hospital, and the remainder to the Society for Decayed Musicians.

Handel was great in every style. In sacred music, especially of the choral kind, he only not throws at an immeasurable distance all who preceded and followed him, but his oratorios to which he has given such peculiar life, and which are admitted, the art is capable of attaining. Till within the last few years his works were unknown out of the British Isles; now they are heard with admiration in every part of Germany—the town of Hanover was on Footed by a Russian. The United States we should also name, but that we consider them as morally a part of the country from which they were people. But Italy, who now scarcely knows her own Dante, is shocked by the energetic strains of a Handel.

It is worthy of remark, and encouraging to those who are unwilling to believe that the intellectual powers decay in proportion to the diminution of bodily activity, to know that the majority of Handel's oratorios were composed during the years between forty-five and sixty-seven years of age. Jephtha was produced at the last moment of that period. And here we may, in passing, observe that the finest offsprings of Haydn's genius had their birth after he had become a sexagenarian.

In the Queen's library are the original MSS. of nearly all Handel's works, filling eighty-two large folio volumes. These include 30 Italian operas, 23 oratorios, 116 anthems, 4 of cantatas, 3 of Te Deums and a Jubilate, together with concertos, sonatas, &c. Not in the royal collection are 11 operas, harpsichord lessons, fugues, organ concertos, water-works, &c. &c. Jephtha was first performed in 1733; Israel in Egypt in 1738; Saul in 1740; Messiah in 1741; Samson in 1742; Judas Macabaeus in 1749; Joshua in 1747; Solomon in 1749; and Jephthah in 1751.

HANDFASTING. (Betrothement.)

Handglass is a name given by gardeners to a portable glazed cover which they place over certain plants for one of two purposes, either to screen them from the effects of cold and wet without depriving them of much light, or to maintain around them an atmosphere of uniform humidity. Bell-glasses differ from handglasses in no respect with regard to the purpose they are intended to serve, but are blown from a single piece of glass instead of being composed of many pieces fastened together. Glasses of this description are principally used to assist cuttings of plants in the process of strikking root, or newly-planting individuals of plants. It is in consequence of a specific power, and especially direct solar light, of causing perspiration. Under ordinary circumstances the moisture they part with is lost in space, so that it cannot be re-absorbed; and as the atmosphere of the plants or cuttings in the rarefied ation will go on till the plant is exhausted or dead. The effect of a handglass is to invert this state of things: the moisture raised from the soil by evaporation, or produced by vegetable perspiration, necessarily accumulates beneath the handglass, the air enclosed by which gradually becomes...
more and more moist, and at last is saturated; this circum-
ambient humidity is re-absorbed by the leaves, or branches,
or soil, and thus restored to the plant which had lost it; in
addition to which, perspiration itself necessarily goes on
the more slowly in proportion as the air itself is charged
with moisture. If one would also be a friend to the Romans.
It does not appear how long Hannibal remained in Spain, but he
was at a very early age associated with Hasdrubal, who suc-
cceeded his father in the command of the Carthaginian army
in that country. Hasdrubal, after all these years, in 207 B.C.,
with a great deal of the undivided command of the army, and quite
conquered the Illyrians, the Vascons, the Carpeans, and the other
Spanish tribes that had not been subdued by Hasdrubal.
Hannibal, that habitant of Saguntum, alarmed at his success, sent
messenger to Rome to inform the Romans of their danger.
A Roman embassy was accordingly sent to Hannibal,
who was residing at the winter at New Carthage, to announce
the independence of Spain, which was guaranteed to them by a
treaty between the Carthaginians and Romans (con-
cluded n.c. 226), and that they should consider any injury
done to the Saguntines as a declaration of war against themselves.
Hannibal however no paid regard to this re-
minder.
More than twenty years had elapsed since the ter-
minal of the first Punic war, during which period the Carthaginians had recovered their independence, and had ob-
tained possession of the greater part of Spain; and the
favourable opportunity had arrived for renewing the war
with the Romans.
In n.c. 219 Hannibal took Saguntum, after a siege of
eight months, and employed the winter in making pre-
parations for the invasion of Italy. He first provided
for the security of Africa and Spain by leaving an army
of about 16,000 men in each country: the army in Africa
consisted principally of Spanish troops, and that in Spain
of Africans, under the command of his brother Has-
друбал. He had already received promise of support from
the Gauls who inhabited the north of Italy, and who were
anxious to deliver themselves from the Roman dom-
ination.
Having thus made every necessary preparation he set
out from New Carthage late in the spring of n.c. 216, with
an army of 20,000 foot and 12,000 horse.
In his march from the Ebro to the Pyrenees he was opposed by a great
number of the native tribes, but they were quickly de-
feated though with loss. Before crossing the Pyrenees he
left them his recent conquests, with a detachment from his own army of 11,000 men. He sent back the same number of Spanish troops to their own cities, and with an army now reduced to 50,000 foot and 3,000 horse, he advanced to the Rhone. Meantime two Roman armies had been levied; one, commanded by the consul P. Cornelius Scipio, was intended to oppose Hannibal in Spain, and a second, under the other consul T. Sempronius, was de-
signed for the invasion of Africa. The departure of Scipio
was delayed by a revolt of the Boii and Insular Gauls,
against whom the army was sent which had been intended
for the invasion of Spain, under the command of one of the
Romans who was therefore detailed to remain at Rome till a new army could be raised. When the forces
were ready he sailed with them to the Rhone and anchored in
the eastern mouth of the river; being persuaded that
Hannibal must still be at a considerable distance from him,
as the country through which he had to march was difficult,
and inhabited by many warlike tribes. Hannibal however
quickly surmounted all these obstacles, crossed the Rhone,
though not without some opposition from the Gauls, in
the Gauls, in the Gauls, in the Gauls, in the Gauls,
Hannibal continued his march up the Rhone till he came
to the Isere. Marching along that river, he crossed the
Alps (probably) by the Little St. Bernard, descended into
the valley of the Dora Balaen, and followed the course of the river
till he arrived in the territories of the Insular Gauls. The passage of Hannibal across the Alps has been
matter of dispute, but more probably he descended by
the 'Course of Hannibal over the Alps ascertained,'
Lond., 1794, 2 vols. 8vo., maintains that the passage
was made over the Great St. Bernard: those who wish for
further information may consult De Dessert's dis-
ssion on the 'Passage of Hannibal over the Alps,' by Wick-
Hannibal completed his march from New Carthage to Italy in
n.c. 215, in the spring of that year, and was received by a
great number of men, especially in his passage over the Alps. According
to a statement engraved by his order on a column at Laci-
nium, in Bruttia, which Polybius saw, his army was
fortified of Hannibal again prevailed: the Romans were
entirely defeated, and the troops which survived took
refuge in the fortified cities. In consequence of these vic-
tories the whole of Casalpine Gaul (the northern part of Italy) fell into the hands of Hannibal, and on his
first arrival were prevented from joining him by the
presence of Scipio's army in their country, now eagerly
assisted him with men and supplies.
In the following years (n.c. 214) 28,000 Spaniards, and 6,000
cavalry, when he arrived in the territories of the Insular Gauls.
After remaining some time among the Insubrians to
recruit his army, he marched southward and encountered
the other consul Servilius at Tenea (Teano). In the battle
which ensued the Romans were defeated, and Scipio with
the remainder of the army retreated to the left bank of the
Po, crossed the river before daybreak, and was quartered
at Placentia. He afterwards retreated more to the south,
and entrenched himself strongly on the right bank of the
Tiber, where he waited for the arrival of the army under
the command of T. Sempronius. Sempronius had already
crossed over into Sicily with the intention of going to Africa,
when he was recalled to join his colleague. After
the union of the two armies Sempronius determined, against
the advice of Scipio, to risk another battle. The skill and
fortunes of Hannibal again prevailed: the Romans were
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whole of the infantry engaged in the battle, amounting to 70,000, was destroyed, with the exception of 3000 men who escaped to the neighbouring mountains, and all the cavalry, with the exception of 300 belonging to the allies, and 70 that escaped with Varro. A detachment of 10,000 feet, which had been sent to surprise the Carthaginian camp, was obliged to surrender as prisoners. The consul L. Aemilius, and the two consuls of the African allies, being taken prisoners, fell also among the slain. Hannibal lost only 4000 Greeks, 15,000 Africans and Spaniards, and 200 horse.

This victory placed the whole of Lower Italy in the power of the Carthaginians. The news of such important results as might have been expected. Capua and most of the cities of Campania espoused his cause, but the majority of the Italian states continued firm to Rome. The defensive measures taken by the Romans, however, we cannot but consider as admirable, for Hannibal was unable to make any active exertions for the further conquest of Italy till he received a reinforcement of troops. He was in hopes of obtaining support from Philip of Macedon and from the Syracusans, with both of whom he formed an alliance; but the Romans found means to keep Philip employed in Greece, and Syracusae was besieged and taken by Marcellus, B.C. 214-212. In addition to this Carthage was returned to the Romans, B.C. 211. Hannibal was therefore obliged to depend upon the Carthaginians for help, and Hasdrubal was accordingly ordered to march from Spain to his assistance.

Hasdrubal, who was observed, was left in Spain to oppose Hasdrubal. He was afterwards joined by P. Cornelius Scipio, and the war was carried on with various success for many years, till at length the Roman army was entirely defeated by Hasdrubal, B.C. 212. Both the Scipios now crossed the Rubicon, in order to join his brother, but was prevented by the arrival of young P. Cornelius Scipio in Spain, B.C. 210, who quickly recovered what the Romans had lost. In B.C. 210 he took Hasdrubal, and the Romans were aware that he had entered Italy. After besieging this town without success, he continued his march southward; but before he could effect a junction with Hannibal he was attacked by the consul C. Claudia Nero and M. Livius, on the banks of the Metaurus, in Umbria, his army was cut to pieces, and he himself fell in the battle. This misfortune obliged Hannibal to act on the defensive, and from this time till his departure from Italy, B.C. 203, he was confined to Bruttia; but by his extraordinary skill he maintained his army in a hostile country without any assistance from his government at home.

After effecting the conquest of Spain, Scipio passed over into Africa, where he ruined the Carthaginian government. He reduced the power of the perpetual judges (as Livy, xxxiii. 46, calls them), and provided for the proper collection of the public revenue, which had been embarrassed by the wars and the new reforms; but he incurred the enmity of many powerful men, who represented to the Romans that he was endeavouring to persuade his countrymen to join Antiochus, king of Syria, to his interests. A Roman embassy was consequently sent to Carthage to demand his recall; but Hannibal, aware that he should not be able to resist his enemies, supported by the Roman power, escaped from the city, and sailed for Tyre.

For a season he remained off Tyre, B.C. 207, and contributed to fix him in his determination to make war against the Romans. If Hannibal's advice as to the conduct of the war had been followed, the result of the contest might have been different; but he was only employed in a subordinate command, and had no opportunity for the exertion of his great military talents.

At the conclusion of this war Hannibal was allowed to reside as a refugee at the court of Prussia, king of Bithynia, where he remained about five years, and on one occasion obtained a victory over Eumenes, king of Pergamus. But the Romans appear to have been uneasy as long as their formidable enemy was alive. They sent an embassy to demand his surrender, but Hannibal, afraid of offending the Romans, agreed to give him up. To avoid falling into the hands of his ungenerous enemies, Hannibal destroyed himself by poison at Nicomedea, in Bithynia, B.C. 203-202, and thus expatriated his life.

The personal character of Hannibal is only known to us from the events of his public life, and even these have not been commemorated by any historian of his own country; but the story of his achievements, and all that we have here presented a mere outline, even in the narrative of his enemies, without admiring his great abilities and courage. Polybius remarks (b. xii. p. 637, Cassiodor.), 'How wonderful is it that in a course of sixteen years, in which he maintained the war in Italy, he should never once dismiss his army from the field, and yet be able, like a good governor, to keep in subject so great a multitude, and to confine them within the bounds of their duty, so that they neither mutinied against him, nor deserted themselves. Though his army was composed of people of various countries, of Africans, Spaniards, Gauls, Carthaginians, Italians and Greeks—men who had different laws, different customs, and different languages, and a multitude among them that was common—yet so dexterous was his management that, notwithstanding this great diversity, he forced all of them to acknowledge one authority and to yield obedience. And thus, at the end of the war, he stood, in the midst of the various and accomplished fortune. How high as well as just an opinion must these things convey to us of his ability in war. It may be affirmed with confidence that if he had first tried his strength on land, and then entered the sea, and had come last to attack the Romans, he could scarcely have failed in any part of his design.' (Hampton's Translation.)


Hanno's Periplus is a small Greek treatise, entitled 'The Periplus (i.e. voyage) of Hanno, king (i.e. commander) of the Carthaginians, round the parts of Libya beyond the pillars of Hercules, which he prosecuted in the temple of Cronus, and the temple of Kronos, and the proclamation of the temple of Cronus, and the Periplus of the western coast of Northern Africa could not have been written by a person who had no knowledge of the localities. The treatise we possess appears to be a translation of the Carthaginian document preserved in the temple of Kronos. The time at which this voyage was performed is quite uncertain; Pliny (N. H., ii. 67) places it in the flourishing period of Carthaginian history.

The object of the expedition is stated at the commencement of the Periplus: 'It was decreed by the Carthaginians that Hanno should sail beyond the pillars of Hercules, and find Libyphoenician cities. He sailed accordingly with 50,000 men, and a body of men and women to the number of 30,000, and provisions and other necessaries.' The first city he founded was Thamiasterion, near the pillars of Hercules, probably in the neighbourhood of Marmora. He then doubled the promontory Boleos, which Rennell considers to be the same as Cape Bane, and the name of the city was thought to be the same as Cape Blanco, 33° N. lat. A little to the south of C. Cantini, five more cities were founded, namely, Karikon-teichos, Gute, Akra, Melitta, and Poseidus. As far south as the region of Libya, he arrived. The name of the city was afterwards changed to Cape Blanco, Hanno founded Kerne. From Kerne the voyage was one of discovery; and after advancing as far south as the region of Libye (sic) in the southernmost part of Africa, he sailed against the wind, and he was obliged to return through want of provisions.

The Greek text is printed in Hudson's 'Geographical Veteris Scriptores Graeci Minores.' It was also published in Vol. XII. of Cluver's.

Names of the countries of Hanno are mentioned. Of these the most celebrated was the leader of the party at Carthage which was opposed to a war with the Romans at the time of the first and commencement of the second Punic War.

HANOVER, THE KINGDOM OF, is situated between 52° 20' and 53° 51' N. lat., and 10° 51' and 11° 15' long. E. of Greenwich. It is bounded on the north-west by the German Ocean, on the north by the Elbe (which separates it from the territories of Hamburg, Denmark, and Mecklenburg), on the east and south-east by Prussia and Brunswick; on the south-west by Hessia-Cassel, Lippe, and Prussia; and on the west by Holland. The whole contains an area of 14,670 sq. mls.

Divisions.—The kingdom of Hanover is divided into six provinces, called Landrosten, and one Mining Intendency (Bergbauptmannschaft), the total population being 1,472,500. The latter about 25,000.

I. Hanover (320,180 inhabitants) consists of, 1, the principality of Celle (157,920 inhabitants), containing the towns of Hanover, the capital, Spaten, Hameln; 2, the county of Diepholz (20,100 inhabitants), chief town Diepholz; 3, the county of Delmenhorst (27,500 inhabitants), chief town Delmenhorst.

II. Hildesheim (352,186 inhabitants) consists of, 1, the principality of Hildesheim (155,014 inhabitants), chief town Hildesheim; 2, the principality of Oldenburg (183,866 inhabitants), chief towns, Oldenburg, Brunsbuttel; 3, the county of Lüneburg (131,876 inhabitants), chief town Lüneburg, Isehorst, Osterholz.

III. Lüneburg (303,114 inhabitants), chief town, Lüneburg, the capital, the northernmost town of the kingdom; next in importance are Hannover, the capital, and Bremen (69,450 inhabitants), Celle, otherwise Zell (10,137 inhabitants).

IV. Stade (241,142 inhabitants) consists of, 1, the duchy of Bremen (190,119 inhabitants), chief towns, Stade (56,850 inhabitants), Buxtehude (10,900 inhabitants), 2, the district of Wedel (17,400 inhabitants), chief town Osterndorf (2050 inhabitants); 3, the principality of Verden (33,563 inhabitants), chief town Verden (5,117 inhabitants).

V. Osnabrück (263,624 inhabitants) consists of, 1, the principality of Osnabrück (162,934 inhabitants), chief town, Osnabrück (115,800 inhabitants), chief town Herford (11,850 inhabitants), chief town Celle, chief town Stade (5,117 inhabitants), chief town Lingen (2,040 inhabitants); 2, the lower county of Lingen (23,014 inhabitants), chief town, Flessen (2,840 inhabitants), Lingen; 3, the county of Bentheim (27,209 inhabitants), chief town Bentheim (1530 inhabitants); 4, the circle of Minden, chief town, Minden; 5, the county of Peine (16,700 inhabitants), chief town Pappenburg (4700 inhabitants); 6, the circle of Emmerich, part of the county Rheine-Wolbeck (5,141 inhabitants), chief town Rheine.

VI. Aurich, or the principality of EAST FRISLAND (153,671 inhabitants), chief towns, Emden (12,780 inhabitants), Norden (6350 inhabitants), Leer (6753 inhabitants).

VII. The Mining Intendency of CLAUSTHAL, or the Upper Harz (28,572 inhabitants), chief town, Clausthal (8350 inhabitants), Cellerfeld (3870 inhabitants), St. Andreasberg (4310 inhabitants).

The Lower Harz consists of detached districts on the northern and western declivities of the Harz, lying in the territory of Osnabrück and Brunswick, and belonging to both in common. Hanover having four-sevenths and Brunswick three-sevenths of the revenue.

Hanover, as a member of the German Confederation, is the fifth in rank, with four votes on the Imperial Council. It furnishes 23,054 men to the army of the Confederation, which forms part of the 10th corps, and contributes 2000 florins annually to the treasury of the Confederation.

The Agriculture, Soil, Climate. — The southern provinces of Grubenhan and Göttingen are mountainous: in the former is the Harz [GERMANY], in the latter the Solflingerwald. Lower ranges, uniting these, traverse the greater part of the kingdom, and belong to both in common. Hanover having four-sevenths and Brunswick three-sevenths of the revenue.

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The tranquillity which Northern Germany enjoyed for nearly 30 years after the peace of Paris, 1763, and the vast increase of the commerce of England in North America, doubled the trade of Bremen, Hamburg, and Altona with the interior of Germany, which was still further augmented from 1792 to 1803 by the ruin of the commerce of France and Holland; and this trade being carried on from those seaports through Hanover, gave an extraordinary impulse to the prosperity of that kingdom.

From the spring of 1748 to the close of the Austrian War, in the war with France; but in 1795 was included in the convention between France and Prussia for the neutrality of the North of Germany. In the spring of 1801, when differences arose between England and the Northern powers, Prussia occupied Hanover, and placed King Christian VII. on the throne; but in 1806 Emperor Paul produced another change, and the Prussians left Hanover. Bonaparte took possession of it in 1803, and treated it like a conquered country. In 1805, when the alliance was concluded between Austria, England, Prussia, and Sweden, it was hoped that Prussia would join, but instead of that, Prussia declared, on April 1, 1806, that Hanover had been ceded by France in exchange for Anspach, Cleve, and Neuhaus; and was for ever incorporated with Prussia. Bonaparte however again took possession of it in the following year; when the greater part of it was included in the new kingdom of Westphalia, and the remaining part in the government of the Prince of Westphalia. The whole of the former electorate, except Lüneburg, was assigned to Westphalia; but before the end of the year Napoleon drew a line opposite Lüneburg, from the Elbe, through the Amelungs Odenwald and Harz, to the Elbe, and all to the north of that line, with the Hanseatic cities, Oldenburg, &c., was incorporated with the French empire. After the battle of Leipzig in 1813, the whole of Hanover belonged to the French government. In 1815 the title of King of Hanover, that of elector having in fact ceased by the dissolution of the German empire. In 1816 the Duke of Cambridge was appointed governor-general; in 1819 a constitution was introduced with a general assembly of the people, and the election of the governors of the several provinces.

In spite of many improvements, the people became dissatisfied with the government, and the French Revolution in July, 1830, gave the signal for disturbances at Osterode, on the 5th of January, 1831, and for more serious troubles at Göttingen on the 8th of May, which were however suppressed by the intervention of the military. In 1831 the duke of Cambridge was made viceroy, and a new constitution, agreed to by the estates, was in 1832, and was for ever incorporated with Prussia. Bonaparte however again took possession of it in the following year; when the greater part of it was included in the new kingdom of Westphalia, and the remaining part in the government of the Prince of Westphalia. The whole of the former electorate, except Lüneburg, was assigned to Westphalia; but before the end of the year Napoleon drew a line opposite Lüneburg, from the Elbe, through the Amelungs Odenwald and Harz, to the Elbe, and all to the north of that line, with the Hanseatic cities, Oldenburg, &c., was incorporated with the French empire. After the battle of Leipzig in 1813, the whole of Hanover belonged to the French government. In 1815 the title of King of Hanover, that of elector having in fact ceased by the dissolution of the German empire. In 1816 the Duke of Cambridge was appointed governor-general; in 1819 a constitution was introduced with a general assembly of the people, and the election of the governors of the several provinces.
and the augmentation of old tolls were great impediments to trade, which was likewise rendered unsafe by numerous banditti and pirates who infested the roads and the neighbouring seas and rivers. In order to protect the commerce on the Elbe and the German Ocean, Hamburg concluded in 1239 an alliance with the inhabitants of Ditmarsch, at that time independent, and those of the land of Hadeln. Two years later Lübeck concluded a similar alliance with the islanders of the hanseatic city of Sithgow Street, and facing the rampart now converted into public walks. A tract or suburb outside of the walls, called the Gartengemeinde, contains above 500 houses with handsome gardens. The most conspicuous buildings are the opera-house and palace church, which the French converted into barracks and an hospital, and which is now used for the government offices, the palace of the duke of Cambridge, the mint, the arsenal, the royal mews, the drill-room, a good library of 40,000 vols., the royal library with the archives, both situated on the esplanade (or parade). Hanover has also four Lutheran, one German Calvinist, one French Calvinist, and one Roman Catholic church, and a synagogue. Among the charitable institutions are the Orphan Asylum, inferences, hospitals, and poor-houses.

For the purposes of education there is a lyceum, a female school of industry, and a gymnasium, a seminary school for schoolmasters. The Georgium was founded in 1776, for the education of forty sons of Hanoverian nobles, who are admitted at the age of ten years, paying a small sum on their admission, after which the expense of education is defrayed by the state. A flourishing Society has been established here for some years. The manufactures are numerous, and the trade extensive. In the neighbourhood are the royal palace, the Montbrillant, the gardens formerly belonging to Count Salmèsen, and now to the crown, with fine collections of works of art, and the royal palace of Herrenhausen. The approach to this building, which is by no means remarkable for its architecture, is by a long avenue of lime-trees. The pleasure-gardens are extensive, in which there are remarkable water-works that throw up a column of water as thick as a man's body to the height of 120 feet. The orangery, greenhouses, and hot houses of Herrenhausen, were formerly the celebrated, and the collection of rare exotics supposed to be exceeded only by that of the emperor of Austria at Schoenbrunn. But the French carried away all the finest plants, particularly an almost unique collection of Cape beaths, as they did the awans from the parks, to adorn the empress Josephine's seat at Malmaison. Great efforts have since been made to replace the loss.

Hanover was founded at the latter part of the eleventh century, and in 1203 was assigned to the eldest son of Henry the Lion. In 1641 duke Christian Louis took up his abode in the palace which had been lately erected, and it has ever since been the residence of the princes of the capital of the country. In 1725 the alliance between England, France, and Prussia was concluded here: and in 1745 the convention which preceded the peace of Dresden. The walls, with five gates, and broad ditches, were partly levelled in 1786, and laid out in streets, and the remainder converted into a handsome esplanade, on which is the marble bust of Leibnitz, by an Irish sculptor of the name of Hewetson, placed under a cupola in the antique style; and the Waterloo Column, 126 feet high, with the figure of Victory on the summit, which was finished in 1832.

(Spielreise's Description of the City of Hanover, Hanover, 1819; and W. Lohmann, Geschichtsblatter und Topographische Nachrichten, Hanover, 1848; Brechenmacher, Bruch der Leibe des Königs, Hanover, 1792; C. P. Jansen, Statist, Handbuch des Königs Hannover, besides numerous local and provincial works.)

Hamburg, Tönning, Calern,

and the Hanseatic League, a celebrated commercial confederacy, which took its name from the ancient German word ' Hanse,' sig- nifying an association for mutual support, in which sense it is still understood by the Germans. It was formed by 54 towns in 1344, namely, Lübeck, Hamburg, Bremen, and other cities of Europe in exchange for their raw produce. The wealth which they acquired by their commerce excited the envy and the rapacity of the princes and nobles; the imposition of new
HANWAY, JONAS, born in 1712, deceased in 1786, was a Russia merchant, connected through his Russian dealings with the trade into Persia. Business having led him into that country, he published in 1753 his 'Historical Account of the British Trade over the Caspian Sea, with a Journal of Travels from London through Russia into Persia, &c.' 4 vols. 4to., a work of no pretension to literary elegance, but containing much information on the commercial subjects of which he speaks, and on the history and manners of Persia. The latter part of his work employed in supporting, by his pen and personal exertions, a great variety of charitable and philanthropic schemes: and he gained so high and honourable a name, that a deputation of the Magdalen Charity, both still in existence, owe their establishment mainly to him: he was also one of the great promoters of Sunday-schools. (Pugh's Remarkable Occurrences in the Life of Jonas Hanway.)

HAPTALE. The name of the genus of Simulidae, commonly known by the name of Sanguina, Sanguina, &c. [JACQUEVILLE.]

HAPPISBURGH, a village on the coast of Norfolk, remarkable for bold cliffs of diluvial clay and pebbles. These wasting cliffs are supposed by most geologists to be the original repositories of the numerous remains of the mammoth and other quadrupeds which are dredged from the beach of Norway. Some of the fragments of these specimens have been obtained from the face of the cliffs, it is conceivable that in the course of ages many may have been collected on the bed of the sea, out of the enormous quantities of earth and materials which have been undermined and carried by the waves. The specimens are in a peculiar state of conservation.

HAPSBURG. [HABSBURG.]

HARDICANUTE, HARDICANUTE, or HARDACNUTE, was the eldest of the sons of Canute the Great, king of England, Denmark, and Norway, by Emma, styled the 'Flower of Normandy,' daughter of Richard I., duke of Normandy, and widow of King Ethelred II., whom he had married in 1017. [ETHELRED II.] The death of Canute, in 1035, brought forward as claimants to the inheritance of his dominions Swen and Harold, his two sons by Alfgyva, daughter of Algibe, earl of Northampton, to whom however it is asserted by most historians that he never had been married; Hardicanute, his son by Emma; and Edward, the elder of the two sons of Emma by her former husband Ethelred II., who, styled the 'Norman,' had made no pretensions to that of England. Edward (afterwards Edward the Confessor) and his brother were with their uncle, Duke Richard II., in Normandy. Hardicanute was also deprived of his government, and had been some time before entrusted to him by his father. It has been supposed that Canute had intended that Hardicanute, as his eldest legitimate son, should succeed him in all his three kingdoms; it is certain that he designed him for his successor in the sovereignty of England, conformably with a special arrangement which had been made on his marriage with Emma. Harold however had the important advantages of being at the spot at the time of his father's death, and was thus enabled to triumph over the pretensions of both his rivals. A civil war was prevented by an agreement that the authority of Hardicanute should be confined to the country to the south of the Thames, constituting the unhappy alternative of Edward, the Constant, and Harold became undisputed king of all England. For the next two years Hardicanute did nothing to vindicate his rights. As last, on the repeated importunities of his mother, Ethelgyva, who died in 1018, he was induced to take arms against Harold, who defeated him out of that instance to that place, to advise with her before proceeding on his enterprise. While they were together, in 1049, news was received of the death of Harold, and soon after a deviation arrived from the English nobility, offering the crown to Hardicanute, who thereupon immediately came over and assumed the government. His short reign affords scarcely any events worthy of being mentioned. His character appears to have been that of a good-natured debauche, not wanting in generosity of sentiment, nor stained with any darker vice than the habit of inequitable eating. His plentiful table however, which was spread for a numerous company four times a day, is said to have won him the strong attachment of his thanes, who were admitted to feast along with him, however much it may have disgusted the body of the people. The chronicler John Rouse, in the end of the 15th century, writes that the anniversary of his death even then continued to be celebrated as a holiday by the people of England under the name of Hog's-tide, or Hinck Wednesday. That event happened on the 8th of June, 1042, in consequence of what appears to have been a stroke of apoplexy, by which he had been suddenly rendered speechless four days before, as he was about to swallow a cup of wine at the marriage feast of one of his Danish thanes, held at Lambeth, or, perhaps, Clapham. Hardicanute was never married, and left no issue. He was succeeded by his half-brother Edward, surnamed the Confessor.

HARDNESS (in mineralogy). The different degrees of hardness possessed by minerals of similar external characters will often serve to distinguish them from each other. Mohs has formed a scale, which affords an approximation in estimating the hardness of a mineral, by comparing it with other substances, and expressing it in numbers. The substances which he uses are such as are easily obtained in a state of purity. They are-

1. Talc, white or greenish.
2. Rock salt, pure and elevable, and gypsum, unconscious and semi-translucent.
3. Calcareous spar, elevable.
4. Fluor spar, which cuts perfectly.
5. Apatite, the asparagus-stone, from Salzburg.
6. Adularia.
7. Rock crystal, limpid and transparent.
8. Topaz.
9. Corundum, from Bengal, with smooth fractured faces.
10. Diamond.

Any mineral which neither scratches nor is scratched by any one of the substances above named is stated to possess the degree of hardness expressed by the number of that mineral. Thus, supposing a body neither to scratch nor to be scratched by fluor spar, its hardness is represented by 4; but if it should scratch fluor spar and not apatite, it would be represented by 5. Another method of trying the hardness of minerals is passing them very gently over a fine hard file, and judging by the touch and appearance of the file as to the degree of hardness.

HARDOUIN, JOHN, commonly called PÈRE HARDOUIN, was born of obscure parents at Quimper in Brittany, in 1647. He entered the society of the Jesuits at an early age, and devoted himself to the study of belles-lettres, the learned languages, history, philosophy, and divinity. A large portion of his life was spent in undertaking to prove, chiefly from medals, that the greater part of those writings which are considered as ancient, both classical and of the early Christian age, were forged by monks of the thirteenth century. He excepted only the works of Cicero, Pliny's 'Natural History,' Virgil's 'Georgics,' and Horace's 'Satires and Epistles.' These he supposed to be the only genuine works of antiquity remaining, except a few inscriptions and fasti; and that from these the monks had drawn up and published Terence's 'Plays,' Livy's and Tacitus's 'Histories,' Virgil's 'Aeneid,' Horace's 'Odes,' &c. See his 'Chronologicae et Historiae Antiquae,' 1717, 1733; 'Antiquae Litterae in Nummis Herediduam,' 4to., Paris, 1693. His opinions upon religious subjects were not less wild than those upon profane learning.

The Society of Jesuits at last interfered, and Hardouin, in 1708, published the recantation of his fancies.

His edition of Pliny's 'Natural History,' prepared for the use of the Dauphin, was published at first in five volumes, 4to., Paris, 1723, and reprinted in three volumes folio, Paris, 1723, with a more copious index than had up to that period been appended to

Père Hardouin died at Paris, Sept. 3rd, 1729. After his death a volume of his "Opuscula," in folio, was published by an anonymous friend.

HAROLD. PHILIPPE YORKE (first Earl of). He was the son of an attorney at Dover, where he was born the 1st December, 1696. His father was in very indigent circumstances, and wholly unable to afford him the education generally bestowed upon young men in his station of life. The singular success of the son enabled him however to surmount all difficulties. He was a great favourite with Mr. Samuel Morland, a man of considerable learning, who kept a school at Beithnal Green, at which he was placed for his education. When removed to the office of Mr. Salkeld, an eminent solicitor in London, his diligence and talents won the respect and esteem of that gentleman also. So sturdily was his perseverance, and so rapid his progress in the study of the Law, that Mr. Salkeld caused him to be entered of the Middle Temple, in November, 1708, as a preparatory step to his call to the bar. During the time he was keeping his term, he became acquainted with Mr. Parker, one of the chancellor's appointed solicitors. In consequence of this introduction to Lord Macclesfield, who highly appreciated Yorke's merits, and employed him as the companion and tutor of his sons. To this circumstance the rapid success of Mr. Yorke at the bar is mainly attributable. In May, 1715, he was called to the bar, when the support of his old benefactor Salkeld, who was in very extensive practice together with the favour and patronage of Lord Macclesfield, enabled him at the very outset to acquire an extensive practice: indeed the favouritism of Lord Macclesfield, even in court, justly offended and aggrieved many of his counsel's respect for him.

The elevation of Lord Macclesfield to the woolsack (1719) enabled him further to promote the interests of his favourite, and accordingly, through his interference, in the same year Yorke took his seat in the House of Commons as member for Hertford, the electorate of which was frayed by the ministry. In the same year he married Mrs. Lygon, a young widow, the daughter of Mr. Cocks, a gentleman of good estate in Worcestershire, and the niece of Lord Somers and Sir Joseph Jekyll, then master of the rolls.

In March, 1720, while upon the circuit, and within five years after his call to the bar, he was, through the influence of his patron the chancellor, appointed solicitor-general. This step was a very hazardous one; for besides the professional jealousy which was perhaps not unjustly excited towards him, he had to contend with the doubts felt by all parties as to the man of sufficient experience and learning to discharge the duties of a leading counsel. The talents however which he displayed in the conduct of the business in which he was employed soon proved the anxiety that was fully justified by his new station. Shortly after his appointment he was knighted, and in 1724 he was made attorney-general. It was after this period that his patron, Lord Macclesfield, was impeached for gross corruption in office, and Philip Yorke had great difficulty in procuring himself to be excused from the task of assisting the managers of the Commons in making good their charge. In 1733, having held the office of attorney-general nearly ten years, he was appointed lord chancellor of the king's bosom. He presided in the King's Bench for three years and a half, during which period he added largely to his former high reputation. On the death of Lord Chancellor Macclesfield in 1737, he was raised to the bench of the House of Lords. It is upon his judgments as chancellor that the reputation of Lord Hardwicke is principally founded; he held the great seat during nearly twenty years, dispensing justice through that period with the most consummate skill at a time when the principles of equity jurisdiction were by no means in a settled state. His integrity was never called in question; the wisdom of his decrees was the theme of universal eulogy, and it is a remarkable fact that during the whole time that he presided in the Court of Chantery three only of his judgments were appealed from, and those were confirmed by the House of Lords. In 1745 he retired from the House of Lords for the better to attend to his business in the court of King's Bench, and to the public. He continued to hold the great seat until the 19th of November, 1756; the Duke of Newcastle having resigned the premiership on the 11th. After his retirement from public life Lord Hardwicke divided his time between his seat at Wimpole in Cambridgeshire and his house in Grosvenor Square, enjoying unimpaired his vigorous intellect until nearly the close of his 73rd year, when he was attacked by a disorder which proved fatal on the 6th March, 1764. The labours of Lord Hardwicke's mind are recorded in his legal judgments. They are preserved, so far as the points decided by them, in the reports of Atkyns and Veseys, and in a volume published from Lord Hardwicke's own notes, by Mr. West. Some notes of his decisions have also been made public by Mr. Leo. These volumes however do not give any notion of the language in which the judgments were delivered. Few who have the good fortune of writing of his great "treatise," "A discourse of the Judicial Authority of the Master of the Rolls," has been attributed to him, and some few letters have been preserved by Dr. Birch. It has also been said that he was the author of the "Spectator," 28th April, 1712, signed Philip Homebred; but this statement is exceedingly doubtful.

This brief memoir and the facts and dates are taken from a very Life of Lord Hardwicke, in the 3rd No. of the "Law Magazine."

HARDYNG, JOHN, one of our old historians, descendent of a respectable northern family, was born in 1575, and in 1616 obtained his degree of B.A. at Cambridge. The son of Sir Henry Percy, eldest son to the earl of Northumberland, known by the name of Hotspur, with whom he fought as a volunteer at the battles of Homildon and Cokelaw. He afterwards became the felow of Peterhouse, taking the degree of B.A., and at the battle of Shrewsbury, as soon as a pardon had been proclaimed for the adherents of the Percies, Hardyng enlisted under the banner of Sir Robert Umfraville, who was connected with the Percy's by affinity, and by whom in 1405 he became constable of the castle of Warkworth in Northumberland. How long he remained at Warkworth is unknown; but his knowledge of Scottish geography seems soon to have engaged him in the secret service of his own country, the results of which are contained in his work to obtain restitution of the deeds of homage, which had been given up by Mortimer in the minority of Edward III., but does not appear; but it must have been early in the reign of Henry IV. He remained in the north of England during the first half, indefatigable in the search, and obtained some at the hazard of his life. In 1415 we find him, with Sir Robert Umfraville, attendant on the king at Harlour. His journal of the latter part of this campaign forms one of the most curious passages in his chronicle. In 1416 he accompanied the duke of Bedford to the sea-fight at the mouth of the Seine.

An original MS. of 450 marks of the Lansdowne manuscript of Hardyng's Chronicle intimates that he was at Rome in 1424. Soon after we find him again employed in ascertainment the fealty due from the Scottish kings. In one or two of these transactions he displayed such incurable injury received, as he himself expresses it, for England's rights; and in one or two others he states the offer of a thousand marks which had been made to him by king James I. of Scotland, on condition of his embarking some of the earlier instruments he had procured. The letter of protection from king James, making this offer, is still preserved among the ancient deeds in the Chapter House at Westminster. In another passage of his Chronicle he states that King Henry V. gave him an added estate, in the borough of Banbury, mention 450 marks as the price for which he obtained some other of the deeds of homage. Notwithstanding these declarations however several writers have considered our author at the early age and was a fugitive into the fabric of the deeds for which he sought reward. The spurious instruments by which king David II. and king Robert II. were made to acknowledge the superiority of England appear similar to those by which the most consummate fabrication. But whether Hardyng in his zeal for his country became the tool of some more powerful person, or was imposed upon in the purchase of the deeds, cannot now be thoroughly ascertained and notations he had procured. The Lansdowne manuscript already referred to closes with the life of Sir Robert Umfraville, who died January 27th 1436.

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under whom Hardying seems to have lived, in his latter years, as constable of Kyme Castle in Lincolnshire.

Of the rewards which Hardying appears to have received, the first was in the 18th Henry VI, when he had a grant for life of 16d, per annum out of the manor of Nuneby in the county of Lincoln. In the 19th Henry VI, a confirmation of the grant occurs for seven years, with the further grant after that time of the reversion of the manor, which should be passed by a generation to the heir of Hardying IV, who fell in the battle of Wakefield, December 31, 1460. It was afterwards presented to king Edward IV himself. The history comes no lower than the flight of Henry VI to Scotland. But, from the beginning of the 15th century, it is evident that he could not have finished his work before 1465. How long he survived is unknown, but he must then have been at least eighty-seven years of age.

The evening of Hardying's days was passed in the entire re-composition of his works. The book he was writing in the last stage of his life should be two editions of this work, both printed in the same month of the same year, January, 1463, differing in almost every page, and one, in Grafton's own portion, containing a new and additional period of the chronicle. In the present volume, both, together with that of a valuable manuscript of Hardying, was published by the booksellers of London in 1812, under the care of Sir Henry Ellis.

The present edition of Hardying's Chronicle is from the re-composition presented to Edward IV. The Chronicle as written for Henry VI, the only manuscript known of which is preserved in the Lansdowne collection in the British Museum, was a sheet page from the printed copy. Hearne had intended its publication. Several manuscripts of the later text of Hardying's Chronicle are extant: one in the Harleian Collection, No. 661; one in Selden's; another in the Bodleian Library, and one in the Ashmolean Library at Oxford. A sixth manuscript was formerly preserved in the library of Basil Earl of Denbigh.

HARE-LIP, a malformation in which the lip is divided in one or more situations by the formation of a free tissage towards its attachment. It has received this name from the resemblance which it bears to the divided upper lip of hares and other gnawing animals, and is one of the most common abortive effects in the embryo. [Monst.] In the embryo each lip is formed of four pieces which project separately from the jaws and unite with each other at different periods of fetal life; but if any of these pieces fail to unite, or if they unite so imperfectly that they remain permanently in the condition which they had at the time of its occurrence. The separate portions of the lower lip unite long before those of the upper, and fissure of the former is so exceedingly rare as to be seldom the subject of treatment. Of the portions of the upper lip the two middle unite first, and then the two lateral to them; hence a fissure in the middle line is more rare than on either or each side. Hare-lip may be single or double, that is, there may be one or two fissures—the one may be seated in the middle line of the lip, or opposite to the union of the two incisors with the canine tooth—if there be two, they will be found in the latter manner, one on each side. It may be simple or complicated with fissures of the gum or palate, which being developed in an analogous manner may be influenced by the same cause as the lips, though being earlier united they are less rarely affected.

Transfixing them with one or two hare-lip pins (according to the length of the fissure), and connecting them with silk wound round them in the form of an 8. These pins should be made of silver, with removable steel points; the lowest part of each should be passed by a generation to the heir of Hardying IV, and the nostril, and the remaining aperture should be closed with a suture or with sticking-plaster. The intervening portions of the lip are now to be compressed by the silk about the external border of the pin. In this case it is necessary to place a compress on each cheek, and there bandaging it firmly, so as to prevent the muscles of the lips from contracting and separating the cut edges. After the operation the whole part should be bandaged, and the sutures may be removed in four or six days the pins and other dressings may be removed, and the edges of the wound, which ought to be completely united, will now only need to be secured by sticking-plaster.

When the fissure is double, it is generally advisable to operate first on one side, and then the other; in some cases the whole may be done at once, by cutting off both edges of the middle line, and each of the lateral ones, and transfixing the whole by the same pins and sutures. In cutting away the edge of the lip so as to depress it by a third of the thickness, a bone projects much, it may be sufficient to draw the teeth from it, and then the lip may be stretched to unite over it; but often it will be necessary to remove it by cutting-forces, and to continue the operation with the aid of a bone-chisel, besides that young children are likely to be quiet and asleep all day, and that the healing processes are then very active, it has the great advantage of enabling them to rest at once to their natural habit, by restoring the power of the cure.

HARFANG, one of the names of the Saw-willow Owl, Sistrurus nigraea. [Strigidae.]

HARFLEUR, [Sire Infernalis.]

HARLOT, [Harlot.]

Harle, the French name for the Merganet. [Merganet.]

HARLIAN COLLECTION. [British Museum.]

Harles, Gottlieb (or THEOPHILUS) Chris
topher, an American printer, was born at Cunlamb, 1738, died November 2, 1815, held several academic offices in the university of Edinburgh. He published many editions of Greek and Latin authors, which however are not much esteemed; and, besides that he was a laborious student rather than of a judicious and able critic. Those of his works most highly recommended are his ‘Introductio to the History of the Greek and of the Latin Language,’ and his ‘Lives of the Most Eminent Philologists of our age,’ a very useful collection to those who are concerned with literary biography, 1770, 3 vols. 12mo., Bremo. See the Biog. Unit. for a list of the persons herein contained. The most important of his publications is an edition of the Bibliotheca Graeca of Fabricius, Hamburg, 1790-1811, in 12 vols. 4to., which contains great additions, and a new arrangement of the original matter. [Fabricius, A. J.] (Biographia Unit. &c. Britan.)

Harley, Robert, Earl of Oxford, was born in London in 1661, of a family long of distinguished note in the county of Hereford. His grandfather, Sir Robert Harley, was made a baronet in the reign of Charles I, and his father, Sir Edward, was governor of Dunkerque after the Restoration. In the troubles of the seventeenth century the Harleys acted with the Presbyterian party, of which the family was considered one of the heads, and, although both Sir Robert and his son Sir Edward took the side on the field of the parliament in the early part of the civil war, they went into opposition when the republicans obtained the ascendency, and Sir Edward afterwards took an active part in bringing about the Restoration. The subject of the present article entered parliament after the Revolution as member for Tregony, and afterwards sat for
Rednor, professed for some time the wig principles of his family. After a transition period however, in which he followed a course that perplexed and successively excited the expectations of all parties, he went fairly over to the other side, and became one of the most active and efficient combatants in the House of Commons. In the House which met under the tyrant administration of Rochester and Godolphin, in February, 1701, Harley was elected speaker by the Commons, and, after the death of the last parliament, in which he had been returned as early as December of the same year, although his friends now appeared in diminished numbers, they were still strong enough to place him again in the chair. He was elected to the same seat by Queen Anne's first parliament, in October, 1702, and retained it until April, 1704, when he was made secretary of state. He is believed to have been principally indebted for this promotion to the good offices of the late earl of Oxford and Bolingbroke, whom he had been introduced into the royal household by her cousin Sarah, Duchess of Marlborough, and who by this time beginning to supply her patroness in the queen's favour. Miss Hill's father, it seems, a merchant in the city, who had fallen into distressed circumstances, was as near a relation of Harley as her mother was of the duchess; and this circumstance had probably something to do in bringing him and not only the two together but also into the scandalous chronicle of the duchess of Marlborough, Miss Hill, having fixed her affections on Mr. Masham, the queen's page, applied to her cousin Harley for his aid in forwarding her object: by Harley's management she became acquainted with Mr. Masham; and in return, he caused her to attach the weak mind of the queen to Harley and his friends. It is certain that from this time she and Harley acted in confederacy against the Marlborough interest, and from the attack on the part of their late party began to seek a new support by inclining towards the whigs; and various circumstances favoured for the moment to favour this line of policy. In the parliament which met in October, 1703, the whigs were stronger than they had been six months before the beginning of the reign; this sufficed to introduce into the cabinet two distinguished members of that party, William Cowper Esq. (afterwards Lord Cowper), as lord canceller, and Lord Oglethorpe, as secretary of state; and Mr. Masham, who had been introduced into the House of Commons, as one of the secretaries of state. But the struggle was finally decided against Harley by the public suspicion and odium to which he became exposed in consequence of these transactions, and the conviction of one of his clerks named Gregg, who, relying on a treasonable correspondence with France, Gregg, who was executed for his crime, left a paper with the sheriff, in which he entirely excused Harley: even this however did not prevent the party (against the latter,) it was said that he himself was the writer of the pretended letters of correspondence: but he had induced Gregg to sign and to deliver by the promise of a reparation. On the other hand, Harley's friends asserted that the strongest endeavours were made by the opposite party to discredit him, and, to this end, induced Gregg to sign and to deliver by the promise of a pardon, to accuse Harley. In the beginning of February, 1708, after the conviction, but before the execution of Gregg, the Duke of Marlborough and Lord Godolphin intimated to the queen that unless Harley were removed, they would leave her service; on this, although it is believed that the queen was herself willing to incur the threatened risk of continuing to support him, the secretary resigned, along with his friend St. John (afterwards Lord Bolingbroke). Harley remained out of power for about two years and a half; at the end of which time the whig ministry was partly undermined by his intrigues and those of Mr. Yarmolinsky, who had been destroyed by his own imprudence and over-confidence. In August, 1710, Godolphin was dismissed, and Harley was appointed chancellor of the Exchequer, all the other wig members of the cabinet having at the same time resigned or been turned out, and taken to their places. A new parliament was soon after called, which completely sanctioned this arrangement; so inflated was the temper of the public mind against the last ministry, that only about a hundred of them were returned from all England. The duke and duchess of Marlborough, and all their connexions, were now completely discarded both from office and from the queen's favour, until the final accident of their friend Harley happened to be wholly engrossed by Mrs. Masham (whose husband was soon after made a peer), and by those to whom she lent her influence and protection.

On the 8th of March, 1711, an accident happened to Harley, which in the end proved very serviceable to his schemes of ambition: a French emigrant, who called himself the Marquis de Guiscard (he was in fact an abbé, and brother of the late Lord Count de Guiscard) having been prehended on a charge of high treason and brought for examination to the cockpit, suddenly seized a penknife and struck at the minister. Harley's wound was very slight, but he took care to remain as long as possible in the sur- rounding crowd, and, the Frenchman being brought before the high treasurer, being about the same time created earl of Oxford and lord Mortimer, and invested with the order of the garter. As the victories of Marlborough constituted the great situation of this year, a law was passed by the Queen of Utrecht, concluded 4th May, 1713, is the event for which that of Harley is chiefly memorable. It was after this that the jealousy between the premier and Bolingbroke assumed an alarming character. All, at all events, is believed to have been fermenting in secret for years before, one account deducing its origin from so remote a date as the affaire de Guiscard, of whose blow, which he asserted was intended for himself, Bolingbroke never forgave his colleague for taking all the credit and resiping all the advantage. The ambitious and intriguing dispositions of the men, both, it is probable, equally unprincipled, made it impossible that they should long continue to act together after their one common object, the achievement of influence with France, ceased to unite their efforts. Bolingbroke had now the art to gain the favourite's good opinion. Lady Masham, whose influence Harley, on the other hand, seems to have erroneously calculated on, was to prove a source of his distress. It was soon proved that he was wrong: on the 27th of July, 1714, the lord treasurers received his dismissal. It is said that a few days before he had excited the determined enmity of his lordship, by opposing his purpose of an influx of 1500f. a year which she had obtained from the queen. The queen's death, three days after, put an end for ever to the political existence of both Oxford and Boshingley, as the Jesuit, in his account of Marlborough, gives it. The Commons not appearing to prosecute their impeachment, the prisoner was on the 1st of July acquitted and discharged. After this the earl of Oxford lived in retirement till his death, Dec. 21st, May, 1724. He was married in his titles and estates by Edward, his eldest son by his first marriage with Elizabeth, daughter of Thomas Foley, Esq., whose brother was made Baron Foley in 1711, being one of the twelve peers then introduced in a body into the House of Lords. He married, by the same ceremony, from a younger brother of the lord treasurer, the peerage having been bestowed with remainder to the issue male of his grandfather. By his second wife, Sarah, daughter of Thomas Monson, and Elizabeth, daughter of the late Duke of Marlborough, he showed his attachment to literature both by his patronage of Swift, Pope, and others, and by the extensive and valuable library of printed books and manuscripts which he spared no pains or expense to collect. [Burton's Monasticon,

His own writings do not show much literary talent. They are, A letter to Swift on Correcting and Improving the English Tongue; an Essay on Public Credit; an Essay on Loans; and a Vindication of the Rights of the Commons of England. He has given an account of his own administration in a letter to the queen, written a few days before his dismissal, which is printed in Tindal's History and elsewhere. In August, 1711, many of his creditors, having succeeded by the Oxford family. The proceedings on the trial of Lord Oxford are in the 'State Trials.' Some very strong evidence, implicating both Bolingbroke and Oxford in the crime of corrupting on secret negotiations with the French court for some years back, the peace of Utrecht was laid before the public in the 'Edinburgh Review,' No. 125, in an account of the collections made by the late Sir James Mackintosh, in 1814, from the archives of the foreign office at Paris. [Harmer, p. 391.]

HARMER, THOMAS, a Protestant dissenting minister, was born at Norwich, a.d. 1715, of pious parents. He received his education under the care of Mr. Evans in Lon-
HARMONIUS. [ARIOSTOGITON.]

HARMODYTES, a genus of tubular stony corals, proposed by Fischer and adopted by Bronn. The same species were formerly designated by Goldfuss, Syringopora, a name generally adopted.

HARMONIC PROPORTION. The reciprocals of numbers which are in arithmetical proportion are themselves said to be in harmonic proportion; thus

\[
\frac{1}{a} = \frac{1}{b} + \frac{1}{c} + \frac{1}{d}, \quad \text{etc.}
\]

is a series in harmonic progression.

A line AB is said to be harmonically divided when two points, C and D, one within it and one on its continuation, are so placed that AC is to CB as AD is to DB. In this construction, CD is an harmonic mean between AD and BD, and AD, DB, AC, and BC, are as the reciprocals of terms in arithmetical proportion.

HARMONICS (Acoustics). By the harmonics of a musical note are meant all those other notes in which the number of vibrations per second are twice, three times, four times, or any multiple of the number of vibrations which produce the note in question. Thus the harmonics of a note which is sounded by 200 vibrations per second are those notes which require 400, 600, 800, etc., vibrations per second for their production. From relations incidentally contained in the formulae for the determination of the fundamental frequency of a string, it follows that whenever any string is plucked or struck, it vibrates in a number of different modes, producing, as the result of these vibrations, a number of sounds which are in arithmetical progression, and from which the first harmonic is the fundamental note of the instrument, and the others are the first, second, third, fourth, etc., overtones.

HARMONY (In Music). Musical sounds simultaneously produced according to certain rules, forming a chord, or a combination of notes. The triads, or triads of the diatonic, are the most used, and form the chief part of chord music. The triad is the result of the vibration of all sonorous bodies, and the foundation on which much artificial harmony is built. Under the word Chord the reader will find this matter further explained. M. Czerny, a modern French theorist of great authority, has divided harmony into natural and artificial, including in the former all chords not requiring preparation; in the latter, all that are formed by retardation, suspension, etc. But we cannot acquiesce in this arrangement, for it places the chord of the seventh, which is the source of the three real chords of dissonance, in the same category as the triad, or the chord of nature, which of course will never be admitted. It is true that the chord of the seventh requires no preparation—that is, the dissonant note need not be heard as a discord in the immediately preceding chord [Discord]; nevertheless this privilege cannot make natural that which is essentially artificial.

Harmony and Counterpoint are now practically considered as synonymous terms, and for some rules concerning the latter, as well as for examples, we refer to that work. To what has been said under the heads of the Harmonic and Temperament we here add a few following:

1. No two perfect concords, namely, two 5ths or two 8ths, are allowed to succeed each other in the same progression, but are permitted in contrary motion, as when the one rises and the other falls. Examples:

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disputed and, we believe, undecidable question, as to the knowledge of counterpart possessed by the Greeks and Romans, or compromising any opinion delivered or entertained on that most obscure and perplexing subject. By Harmomia (ἀρμομία) the Greeks meant simply to express the proper relationship of sounds; as one sound to another. It is the agreement of intervals, in a melody, and nothing beyond. Though, however, they employed the word harmomy in a very different sense from that given to it in later ages, it does not appear that they were ignorant of the high branch of the science to which we apply the term. That they played and sung in octaves is undeniable; and it is almost equally certain that they occasionally used simultaneous tones, and vocally; so that it seems unlikely, then, that so active, so ingenious and musical a people, furnished with an abundance of many-stringed lyres, of double-flutes, as well as other instruments, should not have discovered, even by mere accident, something of harmomy, and have been led to investigate its nature and cultivate its practice. But on the other hand, if they were acquainted with the effect of combined sounds, and, as a sure consequence, had converted their knowledge into a useful purpose, they would, to almost a moral certainty, have left, among the numerous disquisitions and lengthened conversations on the subject of music which have reached us, some undeniable evidence of so important a fact.

HARMOTOME. Andricote; Ercutio. This mineral occurs in attached crystals, generally intersecting each other lengthwise. Primary form a right rhombic prism; cleavage parallel to the primary planes, and to both the diagonals of the prism of Hesse 4:1; cleavage 4:1; Colour greenish; yellowish white; fracture uneven; lustre vitreous, and sometimes pearly; streak white; sp. gr. 2.35, 2.4.

By salts, unless heated, harmotome is scarcely acted upon. Before the blowpipe it fuses into a clear glass. It occurs at Strontian in Scotland, and at Andrasberg and Oberstein in Germany.

The analyses of this substance do not greatly differ in general. The name of Strontian yielded, by the analysis of Mr. Coumell—

<table>
<thead>
<tr>
<th>Substance</th>
<th>Sp. Gr.</th>
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<tbody>
<tr>
<td>Silica</td>
<td>47.04</td>
</tr>
<tr>
<td>Alumina</td>
<td>15.24</td>
</tr>
<tr>
<td>Barites</td>
<td>20.65</td>
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<tr>
<td>Lino</td>
<td>0.10</td>
</tr>
<tr>
<td>Soda or polysil</td>
<td>0.88</td>
</tr>
<tr>
<td>Water</td>
<td>14.92</td>
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<td></td>
<td>29.03</td>
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HAROLD I., surnamed Harfoot, was the younger of the two sons of Canute the Great, by his first wife, or, according to others, his first wife Aelfgiva. On the death of his father, in 1035, Harold disputed the possession of the English crown with his half-brother Hardicanute, whom their father had designated for his successor, and succeeded in acquiring the sovereignty of London and all the country to the north of the Thames. [HARDICANUTE.] In 1037 the thanes and people of Wessex also submitted to him, on which he was crowned king of all England, although it is stated that Egelneth, the archbishop of Canterbury, at first refused either to perform the ceremony himself, or to permit any of his brother bishops to officiate in his stead. No events of the reign of Harold, after he became king, have been preserved. Even his character may be said to be unknown—some of the chroniclers representing him as a friend to the church, others as not even professing a belief in Christianity. He died in 1040, and was succeeded by his brother Hardicanute. The common account of his surname of 'Harfoot' is that it was given him for his swiftness in running; it is said that, in his favourite amusement of the chase, he used often to pursue the game on foot. According to Bremet, he was merely to be distinguished for his walking to and fro in a courtyard. The English writers call him the son of Wulfith, a 'child' (which may perhaps mean a peasant) of Sussex. One writer, Radulphus Niger (whose MS. chronicle is in the
British Museum), say distinctly that he was the son of a cowherd ("filius bubulci"). These statements are consistent, as is his daughter when she tells how Mr. Turner has translated from the Knittinga Saga, and which represents Godwin to have been the son of a peasant named Ulfhrad (evidently the same name with Wulfnoth), and to have died on the battle of Skirrige, or Steesonan [EINDE 1153] in the reign of King Godwin of England, and was by him conducted in safety first to the cottage of Ulfhrad and then to the camp of Canute. This story however makes Ulfhrad to have had an uncle Edric who seems to be himself, a noble station to be duke or chief governor of Mercia. Godwin's talents and address, his handsome person and fluent speech, speedily enabled him to make his way at court. In course of time he married Gyda, or Githa, the sister of Ulf, who was himself married to a sister of Canute; and on this Canute made him a Jarl, or earl. Earl Godwin's first appearance in political history is after the death of Canute, as a supporter, in concert with Queen Emma, in the dismission of Harold Gudbrand [Hardi-CANUTE]. On this occasion, as in the general course of his after-life, he attached himself to what was considered the Saxons, in opposition to the Danish or other foreign interest. In a subsequent fashion he then seems to have been a party, as the historians after the Norman Conquest allege, to the treacherous murder of Prince Alfred, the younger brother of Edward the Confessor. [EDWARD THE CONFESOR, after this story, stands Godwin in this instance acted again in concert with Queen Emma; but, besides the extreme likelihood that the mother should thus plot the destruction of her own child, with which his name is involved, it is certain that the act, except Harold Harefoot, the enemy of herself and of her families by both her husbands, the actual immediate result of this murder was her own exile as a fugitive, and the confiscated crown, for the time, of whatever power sie or her son Harold possessed in England. The contemporary author, it may be further observed, of the "Encomium Emmae," addressed to her, and written by her orders, never would have made the murder, as he does, one of the subjects of his history, if there had then been the least suspicion of her participation in it. If Emma was innocent, Godwin, who was and had all along been her associate in governing Wessex for Hardicanute, was the man to inform him of the absence of the deed, and to make it known; it is true that a few years after, in the reign of Hardicanute, he was, in a quarrel with Alfric, archbishop of York, passionately accused by that prelate of having been the instrument through whom the murder was committed; but this was only to the charge of being accused by the demand of being put upon his trial, and the result was his complete acquittal. When Alfred and his followers were fallen upon by the soldiers of Harold, they were under the protection of Godwin, who had made as if to receive them as nobles, and having, as he asserted, been sent by Emma to be their conductor; this circumstance seems to have formed the sole ground for an imputation which pursued him to his grave, and after his death was eagerly taken up by the Norman historians, when everything that could blacken the characters of Godwin and his family was grateful to the reigning dynasty. After the accession of Hardicanute, Godwin was employed in conjunction with Archbishop Alfric to disinter the body of Harold Harefoot, of which the two events are seen by the commentators to have been the steps which led into the Thames. It was a disregard arising out of this barbarous commission that gave occasion to the quarrel between the archbishop and the earl. The history of Godwin and his family is sketched in the notice of Edward the Confessor. The historians after the Conquest assert that his death, which certainly happened in consequence of a sudden seizure of illness, was occasioned by having drunk too freely at a banquet, which, by the form of the story, is a tissue, so to speak, of the contemporary annals, is of a kind too well adapted to the credulous superstition of the age in which it is related. It has all the grace and force, as well as the evils, of prejudice, to leave much doubt as to its origin. At the time of his death Godwin was the most powerful subject in England, he and his sons dividing among them the government of a large portion of the kingdom, while his only daughter was the wife of the king. His eldest son, Sweyn, indeed, after having been repeatedly pardoned for resistance to the royal authority and other crimes, had died abroad a short time before the death of his father. On Godwin's death, his eldest sons, who had been only reared under the witenagemot, on a charge of treason which Harold brought against him; on which flying to Ireland he speedily returned with a force of Danes from that country, and of auxiliaries from Wales, to open war against the Saxon king. Harold was despatched with the rebels; but a contest of arms was prevented by a negotiation which restored his earldom to Alfgar, who soon after also succeeded to the honours and estates of his father Leofric, but not on the condition that he should enter into the witenagemot, or on a charge of treason which Harold brought against him; or on the demand of William, duke of Normandy (afterwards king of England), delivered over to that prince. William did not violate his promise, nor would he appear to have been already well understood, or at least generally suspected, that the English earl looked to this prize for himself. Immediately after he returned home Harold found himself involved in a new affair of difficulty. This was the insurrection of the people of Wardtuneland against his younger brother Tostig, who a few years before had been appointed their earl on the death of the great Siward, but whose misgovernment and savage exactions were the cause of the insurrection. The insurgents had placed at their head Morcar, the eldest of the two sons of the recently deceased Earl Alfgar; and he and his brother Edwin had come to their assistance, with the means of their own, being the eldest and a brother, and also a body of Welsh auxiliaries. Harold, who was sent to meet them, either deemed their force too formidable, or their demands too just, to be resisted; it was agreed, without coming to blows, that Harold should be removed from Tostig and given to Morcar. On this Tostig retired to Bruges, brooding, as it presently appeared, on schemes of vengeance. The death of Edward the Confessor (5th January, 1066) followed in little more than a month after this pacification, which had been perhaps the more readily accorded by Harold in consequence of the near prospect of that event: he was at hand when it took place. On the evening of the same day, a report having been circulated, Edward had named him for his successor before he breathed his last, he was proclaimed king in an assembly of the thanes and of the citizens of London, held in the cathedral of St. Paul's. The next day he was solemnly crowned in the same place, a few hours after the interment of the late king.

For more than half a year Harold was left to occupy the throne he had thus obtained in quiet. His accession evidently took place without a struggle, and he gained the nobility with few exceptions, and the bishops with scarcely any, avowed themselves its authors and supporters; the acquiescence of the people was complete everywhere, except, for a brief space at first, among those nobles who were however easily induced to lay aside their scruples by the influence of their Earl Morcar, whose sister Editha Harold had married; and on the whole there was no reason to suppose that the crown was served by any treason, either asserting himself if he had been allowed to remain un molested by attacks from abroad. Two foreign enemies however at
length assailed him nearly at the same time. His brother Tostig, having formed a confederacy with Harold Har- 
drad, king of Norway, first made a descent upon the Isle of 
Wight, and after had levied contributions from the in- 
habitants, sailed round at the head of his fleet of sixty 
vessels to the mouth of the Tyne, where he was joined about 
the beginning of September by Hardrada with a navy of 
three hundred ships. In December they took back East 
Moor and Edwin, and made themselves masters of the 
entire province of York before Harold came up. On the 
25th however he engaged them at Stamford Bridge, on the 
Derwent, when both Hardrada and English king obtained a complete victory. Only three 
days after this the Duke of Normandy landed at Calv- 
hitch, between Pevensey and Hastings, on the southern 
coast, with a mighty armament, which he had spent the 
preceding eight months in assembling. Gyrth and 
Harold, having first proceeded to London, did not reach the Norman camp 
till the 13th of October. On the morning of the following 
day battle was joined at a place then called Scelsae (now 
Runcorn) on the River Mersey. Harold had eleven 
memorable engagements, which lasted the whole day, 
was the complete defeat and rout of the English, after 
Harold himself had fallen, pierced through the head by an 
arrow of five ounces, whilst Gyrth and Godred were already 
slain. This victory, as all know, gave the 
crown of England to the Duke of Normandy, by whose de-
scendants it has ever since been worn.

Harold had been twice married. By his first 
wife, whose name has not been preserved, he had three 
sons, Edmund, Godwin, and Magnus, who, on the death of 
their father, fled to Ireland, from which they afterwards 
attained a certain degree of greatness on the western 
coast of England; but eventually retired to Denmark. His second wife, 
Editha, otherwise called Algitha, the daughter of Earl 
Alfgar, is said to have been the widow of Griffith, the Welsh 
prince, who, having been taken prisoner by Har- 
da, was not only a fine affair, but as a peace-offering to Harold. By her Harold is asserted to 
have had a son and two daughters; but, as it is admitted 
that he was only married to her some time in 1065 at 
the earliest, it is fancied that if the child was already 
produced, it was accounted a considerable family. The son, named Wolf, is said 
to have been knighted by William Rufus: Gunilda, the 
eldest daughter, became blind, and passed her life in a 
nunnery; the second, whose name is unknown, is supposed 
to have gone to Denmark with her half-brother. Queen 
Editha survived her husband many years, during which 
she is said to have lived in obscurity in Westminster. This 
larly, according to the Scottish historians, was the mother, 
by whom he was regent of her son, the afterwards 
son of Banquo, thane of Lochaber, whose son Walter, marry-
ing a daughter of Alan the Red, earl of Brittany, became 
the progenitor of the Stewart. (On this story see appendix 
No. 14 at the end of the work of Haile.)

HARP (harp, Aerop, Saxo), a musical instrument which, 
under different forms and denominations, may be traced 
to the remotest ages. According to Holy Writ, Jubal, seventh 
only in descent from Adam, was its inventor: he 'was the 
father of all such as handle the harp and organ,' as Moses tells 
us. Notwithstanding the wonders related of Amphin's 
byr, or harp, we are compelled to believe, judging from representa-
tions in sculpture and on coins, that the Greeks themselves did 
not so much improve the instrument as their writings 
would lead us to conjecture. But there now seems little 
doubt that the Egyptians brought the harp to a compar- 
tively high degree of perfection; the fresco painting 
covered by Bruce near the ruins of Thebes, which he 
thinks was executed by order of Sesostris, who reigned 
between fourteen and fifteen hundred years before the Chris-
tian era, exhibits a harp so much resembling that of the 
present day, in form, dimensions, and ornament, that it 
might, upon a hasty inspection, be mistaken for one of mo-
 dern manufacture. He describes it as wanting the pillar, 
an omission, most likely, of the painter. The back part, 
he says, 'is the sounding-board, composed of four thin 
pieces of wood, joined together in form of a cone, that is, 
growing wider towards the bottom. . . . . . . . Besides that 
the principle in which the harp is constructed is so 
propriate and ingenious, the ornamental parts are likewise 
executed in the best manner. The bottom and sides of the frame 
seem to be veneered, or inlaid, probably with ivory, tortoise-
shell, and the mother of pearl, the latter produce of the 
neighboring seas and deserts. It would now imposes 
be to finish an instrument with more taste and elegance.'
But though the harp in this highly improved state may be used for the performance of any music written for the piano-forte, yet in executing compositions in which there is much modulation, the difficulty is of an extreme kind, and uncontrivable without devoting more time to practice than ought to be bestowed on an accomplishment, however elegant.

HARPA (Conchology). [ENTOMOSTOMATA, vol. ix., p. 455.]

HARPALIDÆ, an extensive family of Coleopterous insects of the superfamily of Goebelgias, the species of which are distinguished by the tarsi of the two anterior pairs of legs being dilated in the male sex.

In these insects the tibiae of the anterior pair of legs have a deep depression in the inner angle; the head is almost always short and rounded in front; the thorax is generally broader than long, somewhat convex, but slightly narrower behind than before, and nearly equal in width to the elytra. The body usually approaches more or less to a cylindrical form; the elytra are almost always rounded at the apex, and never truncated at this part. They are usually found under stones.

Of the family Harpalidæ, Dejean, in his 'Species Général des Coléoptères,' enumerates twenty-seven genera: others however have been discovered since the publication of that work.

The number of species known is probably upwards of five hundred.

The most convenient way perhaps of grouping the genera of this family is to take, in the first place, the form of the mentum as a guide. We then find almost all the species divided into two groups, those in which the mentum is simply emarginated, and those in which there is a small projecting process in the middle of the emargination. Besides these there are certain species (the natural situation of which is perhaps somewhat doubtful) which have the mentum trifoliate, and there are others in which the mentum is bilobed.

The various genera described by Dejean are as follows:—

Section I.—Mentum bilobed.

Genus 1. Plectus (Kirby), containing two species, both inhabiting the Brazils.

2. Erius (Höfner), containing two species, one of which is from California, the other inhabiting Mexico.

Section II.—Mentum emarginate, and without central tooth.

5. Daptus (Fischer); two species. Found in New America.

6. Cratognathus (Dejean); one species. Probably from Buenos Ayres.

7. Agonoderus (Dejean); five species; three of which are from North America, one from India, and one from Senegal.

8. Brysonus (Dejean); Two species from India, and one from Mexico.

9. Amblygnathus (Dejean); Five species. All inhabitants of Cayenne.

10. Platynetus (Dejean); Ten species. From Africa and India.

11. Selenophorus (Dejean); Fifty-nine species. From North and South America.

12. Anisodactylus (Dejean); Twenty-three species. Chiefly from Europe and North America.

13. Brasiddius (Dejean); Three species. From Senegal.

14. Stenolophus (Mecher); Twenty-two species. Almost all European.

Section IV.—Mentum emarginate, and with a small projecting process in the middle.

15. Ctenoporus (Dejean); One species. From Brazil.

16. Somoplatus (Dejean); One species. From Senegal.

17. Axinomura (Dejean); One species. From Senegal.

18. Aesopus (Ziegler); Six species. Chiefly European.
HARPOCRATI(IRUS), a Greek rhetorician of Alexandria. We have no particulars of his life, nor of the time in which he lived. He wrote a 'Lexicon to the Ten Orators,' which contains an account of many of the persons and facts mentioned in the orations of the ten principal orators of Athens, and also an explanation of many words and phrases in their writings.

The 'Lexicon' was first printed by Aldus in 1503, with the scholia of Ulpius on the Philological orations of Demosthenes. The work has been also published by Masson, 4to., Paris, 1614, with musical notes; Blanchar, with a Latin translation, Leyden, 1663, 4to.; Gronovius, 4to., 1696; W. Dindorf, Leip., 1824, 2 vols. 8vo.; Becker, 8vo., Berlin, 1833.

Suidas also mentions another work of Harpocrates, entitled 'A Collection of Flowerly Extracts,' which has not come down to us.

HARPSICHORD (originally, and with some reason, written Harpticon), a keyed musical instrument, in form the same as the grand piano-forte, but smaller, strung with steel and brass wires, two to each note, which are struck by joches armed with small pieces of quill, acting as plectrums, and thus made to render a brilliant but somewhat harsh sound, wholly unlike that produced by the hammers of the piano-forte. The compass of the harpsichord did not at first exceed three octaves, but by degrees reached five, from double f below the base to f in allissimo or —

All harpsichords had stops, which increased or diminished the string power: they also were generally furnished with a snell, or a means of opening and closing the lid: and were either supplied with two rows of keys, the upper acting on a separate set of strings, which gave a very soft sound, intended as an imitation of a muted violin, &c.

It is supposed that the harpsichord was invented in quite uncertain. It is not absurd to surmise that the organ speedily suggested some instrument of the keyed kind, in which strings were substituted for pipes, but that of under notice there are no traces before the fifteenth century. Indeed we find no intimation of the harpsichord having been introduced into England till the early part of the seventeenth century; and in less than two hundred years it had fallen into disuse in this, as well, we believe, as in every other country. During the present year (1658) Mr. Muschow, writing at his Soirées Musicales to perform some of the lessons of Scarlatti, Handel, and Seb. Bach on the instrument for which they were written, had great difficulty in finding, in the vast city of London, a harpsichord to enable him to accomplish his purpose.

HARRY, HARRY SAGLE. [FALCONER, vol. x., pp. 170, 171.]

HARRIEUS, [Arms.] HARRIER (Ornithology), a name applied to certain Hawks (Circus). [FALCONER, vol. x., p. 187.] and see, among other works, Gould's 'Birds of Europe,' and Yarrell's 'Birds of the British Isles.'

HARRIER, the English name for the hound employed in hunting the Hare. The size and breed of the Harrier depend upon the taste of the owner, and that is most frequent in the hunter in which country in which he is to be employed. Mr. Beckford, a great authority in such cases, says, 'The hounds, I think, most likely to show your sport are between the large slow hunting harrir and the lines, for the latter are too big, too heavy, too slow; the latter too lively, too light, and too fleet. The first, it is true, have most excellent noses, and, I make no doubt, will kill their game at last if the day be long enough, but you know the days are short in winter, and it is bad hunting in the dark. The other, on the contrary, flying, dash, and are all alive; but every cold blast affects them, and if your country be deep and wet, it is not impossible that some of them may be drowned. My hounds were a cross of both these kinds, in which way it was my endeavour to get as much bone and strength in as small a compass as possible. It was a difficult undertaking. I bred many years, and an infinity of hounds, before I could get what I wanted. I at last had the pleasure to see them very hand some; small, yet very bony; they ran remarkably well together; went fast enough; had all the acrality that could be desired: and I could hunt the galloway.'

HARE-hunting, it has been said, is generally followed by sportsmen in the decline of life; though when the district is tolerably open and the hare 'flies' the country, there is more chance from the other hounds of the hunt upon themselves. But these capital runs come 'few and far between,' and the old fox-hunter can seldom break the change. In a close or woody district, the constant repetition on the same scene, and the discovery that in consequence of a sudden double of the hare a rustic upon this galloway who knows the country is frequently as near the hounds as the man who is mounted on a first-rate hunter and has taken some daring leaps at the first burst, prove rather disgusting both to the ardour of youth and the experience of age. The rapidity, variety, and dangers of a fox-chase are more congenial to the young man and the good horse, and are not readily forgotten by the old sportsman. In most of the countries where harrriers are kept, a bag-fox, or 'bagman,' as he is sometimes facetiously termed, is occasionally procured by way of giving the weary 'thistle-whippers' a taste of the noble hunting. But this apply to which we have just strongly reprobates this practice. 'Harrirrs to be good,' says Mr. Beckford, 'like all other hounds, must be kept to their own game: if you run fox with them you spoil them; hounds cannot be perfect unless used one scent and one style of hunting. Harrickers run fox in so different a style from hare that it is of great disservice to them when they return to hare again; it makes them wild and teaches them to skirt. The high scent which a fox leaves, the straightforwardness of the running, the eagerness of the pursuit, and the noise that generally accompanies it, all contribute to spoil a harrier.'

HARINGTON, SIR JOHN, was born at Kelton near Bath, in the year 1561. His mother was a natural daughter of Henry VIII, and his father held an office in the court of that monarch. This pair having on one occasion shown great fidelity to the princess (afterwards queen) Elizabeth, she manifested her gratitude by standing godmother to his son John. She was afterwards wont to speak of him as 'that witty fellow, my godson,' or 'that merry poet, my god son,' or in some such way.

Having been educated at Eton and at Christ's College, Cambridge, and having afterwards for a short time made a pretence of studying law, he, by means of his wit and many accomplishments, gained the notice of Queen Elizabeth, and became a member of her court. He had exercised his pen, or, rather, his 'pensane,' in translating 'Orlando Furioso,' (the story of Giacomo, in the twenty-eighth book), and he circumscribed this among the ladies of the court, who were greatly pleased with it. When the queen saw it, we are told that she affected great indignation at the indiscretion of some passages, and, by way of punishment, forbade Harington the court until he had translated the whole poem. This he accomplished in 1591, and dedicated it to the queen.

When the Earl of Essex was appointed Lord Lieutenant of Ireland in 1599, Harington was made a commander of horse under Lord Southampton, in his service. When the last Earl of Essex was made a prince, Harington was one of the few officers whom he chose to accompany him, and he came in for a share of the queen's indulgences. She was angry also, we are told, that Essex had allowed Harington a 'faire island' on Harington's coming in to court, 'to satisfy his knightthhood. 'I came to court,' wrote Harington to one of his friends, 'in the very heat and height of all displeasures; after I had been there but an hour, I was threatened with the guillotine; I answered pithily that 'coming so late from the last licence, I hoped that if I did not know how to serve in her majesty's fleet in Fleet Street.' After three days every man wondered to see me at liberty.' But the queen shortly relented, and, then, writes Sir John in the true style of his runer, 'I sereno and, like St. Paul, rapt up in the third heaven, where he heard words not to be uttered by men.' On the accession of James I. in 1603, Harington continued in possession of royal favour; for with the new monarch, who affected learn-
ing, a literary reputation was everything. He now wrote for the private use of Prince Henry his "Brief View of the latter part of the Church," in which he mentions, Sir John Harington wrote a satirical poem entitled "The Metamorphosis of Ajax," a volume of epigrams, and several occasional pieces in verse, most of which have never been printed. His father to me, and letters, none of which are preserved in Harington's Nuga Antiqua, show him to have been a man of wit and taste; and the "View of the State of the Church" is pleasantly written. On the death of Lord Protector, and ten years after his fall, passed the following criticim: "Although executed without spirit or accuracy, unanimated and incorrect, it enriched our poetry by a communication of new stores of fiction and imagination both of the romantic and comic species, of Gothic machinery and familiar manners." (History of English Poetry, vol. iii., p. 485.)

The above sketch of Sir John Harington's Life is taken entirely from an account given in Park's edition of Harington's Nuga Antiqua, 2 vols. 8vo., 1804.

HARRINGTON, JAMES, descended from an ancient and noble family in Rutlandshire, and the eldest son of Sir Thomas Harington, was born at Ashwell, in the parish of Hoby, in the county of Rutland, on January 21, 1579, and was educated at Trinity College, Oxford, in 1629, and had there the advantage of Dr. Chillingworth's instructions. At the close of his residence at the university, during which his father had died, he set out on a course of travel in France, Germany, and the Low Countries, and the other parts of Europe, and resided for some time at the Hague, where he lived on terms of familiarity with the queen of Bohemia, daughter of James I., who was then a fugitive in Holland, and with the prince of Orange. With the latter he visited the court of Denmark; and the prince of Orange subsequently confided to Harington the management of all his affairs in England. From Holland he proceeded to France and Italy.

On his return to England, Harington principally passed his time in retirement, cultivating the family affections and pursuing his studies in political science. But in 1646 he was requested by the commissioners whom parliament had appointed to carry king Charles I. from Newcastle near the Tyne to London, to undertake the task of waiting on his Majesty, as being personally known to him, and as being no partisan. He complied with the request, and the manner in which he performed the task having pleased the king, he was shortly after made a groom of the bedchamber. The king now became much attached to him. "His Majesty loved his company," says Anthony Wood, "and, finding him to be an ingenuous and conversant man, he treated him with as much respect as he did with others of his chamber. They had often discourse concerning government; but when they happened to talk of a commonwealth, the king seemed not to endure it." On the king's removal from the Isle of Wight to Hurst Castle, Harington, who had offended the parliament commissioners upon his refusal to resign, was ordered to the Tower, and imprisoners at Newport, was removed from the king's service, and on his subsequently refusing to swear that he would not or could not support the king's escape, he was placed under arrest, and detained until an application of General Ireton obtained him his liberty. He afterwards showed his attachment to the king by accompanying him to the scaffold.

"After the king's death," says Mr. Toland, "he was observed to keep much in his library, and more retired than usual, which was by his friends a long time attributed to melancholy or discontent." He was engaged however in the composition of his 'Oceana.' And when he needed some way in its composition, making no secret of his views on government and of his partiality towards a commonwealth, he found that he had already brought down upon himself the suspicions both of Cromwell and of the Royalists. His book was seized, while in the press, by Cromwell's order. Harington, having failed in other attempts to recover the book, betook himself at last to an address to Lord Protector, who was personally unknown to him, but of whose affability and kindness he had heard much. Being ushered into her room, he found there at first only a child of three years old, named John, and who wisely imagined, that she suffered him to take her up in his arms till her mother came; whereupon he, stepping towards her and setting the child down at her feet, said, Madam, 'tis well you are come at this nick of time, or I had certainly stolen this pretty little lady. Stooping then in his mother's lap, the child asked her what do with her? for she is yet too young to become your mistress. Madam, said he, though her charms assure her of a more considerable conquest, yet I must confess it is not for any more but revenge that I repaired me to this place, to be Lord, answered the lady again, what injury have I done you that you should steal my child? None at all, replied he, but that you might be induced to prevail with your son, by bestowing nothing less than the crown, by marrying me to him for an advantage. But surely oh, Madam, the Protector's wit fascinated the lady, and through her intercession he succeeded. Cromwell afterwards read the book, which, according to promise, had been dedicated to him, and professed to admire it.

The 'Oceana,' on its appearance excited great attention. Answers were published, and those Harrington in turn answered. Richard Baxter's 'Holy Commonwealth' was written principally against the 'Oceana,' but so far was this work from gratifying the party for whose favour it was designed, that in 1653 it was publicly burnt by a deacon of the University of Oxford, together with some of the writings of Baxter and others works on the subject. How ever the 'Oceana' was not included. In 1659 Harrington published an abridgment of the 'Oceana,' under the title of the 'Art of Lawgiving,' and he subsequently published several tracts, many of which are quite of a temporary nature, more or less connected with the subject as the 'Oceana.' He had also founded a club, called the Rota Club, at which he gave nightly discourses on the advantage of a commonwealth and of the ballot. The club was broken up after the Restoration. But the members of the club had become marked men.

On the 28th of December, 1661, he was seized by order of the king on a charge of treasonable designs and practices, and was carried to the Tower. He was a resident of the precise charge against him; but on a private examination taken by Lord Lauderdale, Sir George Carteret, and Sir Edward Walker, it came out that he was suspected of having taken part in a conspiracy to subvert the monarchy and establish a commonwealth. He stoutly denied all cognizance of the proceedings which those gentlemen with great show of circumstance and deceit attributed to him; but his denial was set down, and it appears, to faithfulness to an oath. He subsequently presented through his sisters several petitions to the king, praying that he might either be released from confinement or brought to a public trial. Having preferred his petitions he made application for a Habeeas Corpus; and shortly after this had been granted he was removed without previous notice, and without any communication being made to his friends, to a rock opposite Plymouth, the island of Nicholas's Island. The close confinement here soon produced an effect upon his health, and upon petition he was allowed to be removed to Plymouth. Shortly after he became deranged, owing, it is supposed, to a medicine recommended to him for the cure of the scurvy. Lord Bath, the governor of Plymouth, then made intercession with the king, and Harrington was released from imprisonment. On being removed to London, and obtaining the best medical advice, he rallied considerably as regards bodily health, but his mind was never again right. At his advanced age, and in this unsatisfactory state of health, he married. He died of palsy on the 11th of September, 1677, in the sixty-seventh year of his age.

The 'Oceana,' which is Harrington's chief work, is an imaginary account of the construction of a commonwealth in a country of which Oceania is the imaginary name. It opens with the exposition of the ground upon which a commonwealth is established, and the principles which are there established are afterwards sought to be applied in detail. Harrington lays great stress on a doctrine which he enunciates in his prefatory dedication thus: 'That the form of government by which he means that the form of government in a state must depend on the mode in which property is distributed therein. Proceeding on this doctrine, he requires what he calls an equal Agrarian law as the foundation of his commonwealth. Its other chief features are popular election of councillors by ballot, and the going out at certain periods
of a certain number of these councillors, which is also managed by ballot. Harrington is a very powerful advocate of, and vote by ballot.

HARRIOT, THOMAS, an eminent mathematician and astronomer, was born at Oxford in the year 1560. He took his degree of Bachelor of Arts in 1579, and in 1584 accompanied Sir Walter Raleigh in his expedition to Virginia. He returned to England in 1588, when he directed to Sir Walter Raleigh the Earl of Northumberland's zeal for the promotion of science had led him to maintain several learned men of the day, such as Robert Hoes, Walter Warner, and Nathaniel Tarpory. This enlightened nobleman received Harriot into his house, and settled on him an annual salary of 300L, which he enjoyed to the time of his death, in July, 1621. His body was interred in St. Christopher's Church, London, and a monument was erected to his memory in the church.

This description was destroyed by the great fire of 1666. During his lifetime Harriot was known to the world merely as an eminent algebraist; but from a paper by Zach in the 'Astrologia Nova' of the Royal Academy, and a letter by Zach in the 'Correspondence of Stevinson,' Berlin for the year 1778, it appears he was equally desisting of eminence as an astronomer. The paper referred to contains an account of the manuscripts found by Zach in the library of the fund of a university at Oxford, and these manuscripts were descended from the Earl of Northumberland. From it we learn that Harriot carried on a correspondence with Kepler concerning the rainbow; that he had discovered the solar spectrum, theENTION having been made of them by Galileo, Scheiner, or Phynius; also that the satellites of Jupiter were observed by him January 16, 1610, although their first discovery is generally attributed to Galileo, who stated he had observed them on the 7th of that month. A correspondence with Kepler on various optical and other subjects is printed among the letters of Kepler. Ten years after Harriot's death his algebra, entitled 'Artis Analyticae Principia Algebrae Nova Methodo,' was published by his friend Walter Warner. It is with reference to this particular work that Des Cartes was accused of plagiarising by Valla, whose admiration of its author was so high, that he could not even see the disadvantages of Vieta anywhere but in the 'Praxisc' of Harriot. This charge however has sunk with time, though the French writers still continue to answer it. The geometry of Des Cartes appeared in 1637, six years after Harriot's death. *Harriot's Algebra.* (Harriot's Thesaurus Mathematis, Tractatus, vol. ii., &c.; and Montucla's Histoire des Mathematiques, tom. i., p. 165.)

HARRIS, JOHN, D.D., born about 1667, died Sept. 7, 1716. He was a writer, in the course of whose writings we find numerous sermons, treatises on algebra and fluxions, geometry, trigonometry, astronomy, and navigation. He also wrote, Remarks on some late papers relating to the United States and the Earth; and the Earth; *History of Vagrants* &c.* Itinerarium Biblicum, or a complete collection of Voyages and Travels,* &c., 1705, 2 vols. fol., reprinted with additions and corrections in 1744 and 1764; *Lexicon Technicum, or an Universal English Dictionary of the Arts and Sciences,* explaining not only the terms of Arts, but the Arts themselves, 2 vols. fol., 1704-10. From this, says Watt, 'have originated all the other dictionary of science and cyclopædia of sciences.' He was the originator of this important and useful class of works that his memory best deserves to be preserved. [Dictionary]. *History of Kent,* 2 vols. fol. 1719. Harris was secretary and vice-president of the Royal Society, and possessed considerable church preferment, but was reduced to poverty by neglect of his affairs. He died in want, and was buried at the expense of his friends.

HARRIS, JAMES, born July 20, 1709, was the eldest son of James Harris, Esq., of Salisbury, by the Lady Eliza, Ashley Cooper, sister of Lord Shaftesbury, the author of the *Cato.* He was educated at the grammar school in his native place, and passed thence to Wadham College, Oxford. In his twenty-fifth year he lost his father, and thereby became independent in fortune, and able to devote himself more entirely to his taste than the law, in which he had been engaged. For fourteen years of his life he did little else than study the Greek and Latin authors with the greatest diligence, and his works show how deeply imbued he was with their spirit. In 1745 he married the daughter of John Clarke, Esq., of Sandford, near Bridgewater, by whom he had five children. In 1761 he was returned for Christchurch, which seat he retained till his death. In 1762 he was appointed to the post of a pensioner of the Admiralty, and next year to that of a pensioner to the Treasury, which he held for a little while his party went out of office. In 1774 he became secretary and comptroller to the queen. He died in 1780.

Harris is best known by his *Hermetica, or a Philosophical Inquiry concerning the True Nature of the Universal Grammar,* a work which Lowth characterized as one of the most beautiful pieces of analysis which had appeared since the days of Aristotle. He begins by defining grammar, and then proceeds to shew that the grammatical or universal grammar, turns directly to the latter, which he proposes to treat in two ways; first, by dividing speech into its constituent parts; and secondly, by re- 

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through which we now derive our only channel of communication. Having now got through the subject-matter of his essay, he concludes it by a rapid glance at the genius of different languages; and in his admiration of the Greek, what scholar is there who will not go along with him?

The real merits of this work of Harris is perhaps best expressed in the few words from the first sentence of his sensible preface: 'The chief end proposed by the author of this treatise in making it public has been to excite his readers to curiosity and inquiry.' A careful perusal of the whole work will make this statement more accurately, though he may, as he ought to do, reject some of the writer's premises.

Harris's 'Hermes' was published in 1751. Some years before, he had ventured forth on Art, on Painting, Poetry, and Happiness; and in 1773 he published his 'Philosophical Arrangements,' a part of a large work on the Aristotelian Logic. His last work is called 'Practical Observations on Happy and Miserable Lives.' It was published in 1771, and so it is as a matter of fact a work of this date.

His private character appears to have been excellent, and his son's admiration for him proves that his moral nature was so perfect as to secure the respect of those who had the least opportunity of knowing him. It rarely happens, let a man deceive the world so completely, that he succeeds in deceiving his own children.

HARRISON. [HOLINSHED.]

Poems on Several Occasions. 1713.

The life of one of the most successful of the famous Puritans, who had a hand in the establishment of this government, and who is now remembered only in the history of the Puritan movement.

In 1714 an act was passed offering a reward of £10,000l., £5,000l., and £20,000l. respectively, for a method of ascertaining the longitude within 60, 40, or 30 miles. In 1733 Harrison came up to London with a timepiece which he had constructed. Having obtained certificates of its excellence from Halley, Graham, and others, he was allowed, in 1736, to proceed with it to Lisbon in a king's ship under the patronage of the Duke of Cumberland.

Next to the principle of the different expansibility of metals, which is applicable both to the pendulums of clocks and the balance-wheels of watches, the most important of the modifications of nature is that of the going fusee, by which a watch can be wound up without interrupting its movement.

The life of one of the most distinguished of the 18th century, and in 1773 in his 83rd year. His phraseology is said to have been unceaseably on mechanics and subjects connected with that science he could converse with considerable clearness; but he found great difficulty in expressing his sentiments in writing, as is evident in his 'Description concerning such Mechanica as will afford a nice or true Memuration of Time.' In the last volume of the Biographia Britannica, published in 1766, there is a memoir of him written from materials furnished by himself. See also Hutton's Mathemat. Dict. and the Gallery of Portraits, vol. v. p. 135. --HARROW. [MIDDLESEX.]

HARRY, BLIND, was a blacksmith, commonly called, or Henry the Minstrel, lived towards the close of the fifteenth century. Major, the Scottish historian, remembered him to have been alive in his own boyhood, and he was born about the year 1430. There is another tradition to the contrary. The work for which Blind Harry is celebrated is a poem on the adventures of Wallace. It is in eleven books, in the heroic metre. Readers of Walter Scott will remember a note to one of his poems where he alludes to Blind Harry's being at the council of Wallace's meeting with Fawdoun in the 'Gask Hall.' There are many other very spirited descriptions in the poem, particularly those of fighting and war. Blind Harry is still, will probably appear to most in the poem, be pursued to the account, true or false, which we have of Homer. (Warton, vol. i.; The Bruce and Wallace, by Jameson, preface passim.)

HARTE, WALTER, was educated at Marlborough school and Oxford. The dates of his birth and academic life are uncertain; he seems to have been born about 1700, and to have graduated as M.A. of St. Mary Hall, January 21, 1730, according to the Catalogue. At an early age he became acquainted with Pope, whose style he imitated; and in return the great poet corrected his admiral's verses. With this advantage Harte published a number of 'Essays on Various Subjects.' 1730; 'Essay on Reason,' 1735, to which Pope is said to have contributed very considerably; 'Essay on Painting,' date unmentioned; 'The Amaranth,' 1767, his last work. As a poet however he is not distinguished from those who have been successful but now forgotten; but he has made a valuable addition to our literature in his 'History of the Life of Gustavus Adolphus,' 2 vols. 4to., 1759; republished in 5vols., corrected and improved, in 1765. An affected, and cast in verse, style, he has lost the confidence of those who were pleased with the masterly and dignified, but did not approve of the skill of Lord Chesterfield, whose son's tutor he had been, canon of Windsor. He died at Bath in 1774. (Biog. Univ.)

HARTLEPOOL. [DURHAM.]

HARLEY, Viscount, was born on the 30th of August, 1705, and was the son of a clergyman of Armeley in Yorkshire. Having been first educated at a private school, he entered, at fifteen years of age, at Jesus College, Cambridge, and became in that college a fellow, and then would not allow him to subscribe the Thirty-nine Articles, which prevented him from afterwards entering the church, as had been originally intended: and he applied himself to the medical profession. In this profession he practised with success, and attained to considerable eminence.

He commenced the composition of the work by means of which he has become universally known, the 'Observations on Mias, his Prin, his Duty, and his Expectations,' at the age of twenty-five. It had been the subject of his thoughts even previously to this. He tells the world in his Preface, that the fundamental idea of the work, the possibility of explaining all states of mind by association, was first sug-

F. C. No. 731.
on the 25th of August, 1757, at the age of fifty-two years. Combining as he did with his profession the pursuit of learning, he enjoyed through life the friendship of many distinguished literary men of his time. Among these may be mentioned Bishops Law, Butler, Warburton, and Hoadley, Dr. Jortin, Young the poet, and Hook the Roman historian. One of his children by his first wife, his heart which endeared Dr. Hartley to his private friends: 'His thoughts were not immersed in worldly pursuits or contentions, and therefore his life was not eventful or turbulent, but placid and undisturbed by parochial ambition. Furthermore, his mental ambition was pre-occupied by pursuits of science. For his hours of amusement were likewise betost upon objects of taste and sentiment. Muse, poetry, and history were his recreations and ideas, which he resolved into valuations and correct, his language and expression fluent and forcible. His natural temper was gay, cheerful, and sociable. He was addicted to no vice in any part of his life, neither to pride, nor to sensuality, nor intemperance, nor ostentation, nor envy, nor to any sordid self-interest: but his heart was replie with every contrary virtue. The virtuous principles which are instilled in his works were the invariable and decided principles of his life and conduct.' In an article like the present nothing more than the most general notion can be furnished of the character and object of Hartley's great metaphysical work. Its chief end and its great achievement is the application of the principles of association of ideas to the states of mind, or, as he himself calls them not very happily: 'our intellectual pleasures and pains.' But before proceeding to set forth and apply the principle of association, he attempts to explain physiological sensations and ideas, which he resolves into valuations of the medullary substance. The first hints of this his doctrine of vibrations were derived, he tells us, from Sir Isaac Newton. But, while such speculations as these do not properly belong to the province of the psychologist, it is obvious that they can never rest upon any better foundation than conjecture. The commencement therefore of Hartley's work deatraets from rather than enhances its value. But this has not counterbalanced the advantages being discussed, the principle of association, of which little more than hints had previously been given by Hobbes and Locke, is explained and applied by Hartley with a fulness and acuteness which will ever render the work valuable. The second part of the work is wholly occupied with natural and revealed religion.

HARTS HORN, the horn of the Cervus Elaphus, the common stag [DEER], which has a place in the pharmacopoeia, because it contains less earthy matter, more gelatine, than other bones. It is kept in the form of shavings, of which a sufficient quantity boiled in water yields a jelly suitable to convalescents, which may be flavoured with lemon-juice or wine. &c., and sold at the market for jelly made from calves' feet. It is sometimes a useful addition to milk for young children, but it possesses no alkaline properties, and the further addition of a little lime-water is often necessary to fit it for irritable stomachs.

HARTS HORN, SPIRIT OF. [AMMONIA, Carbonates.]

HARUN AL RASHID. [ABASSIDES.]

HARUSPICES, a class of priests in ancient Rome, whose principal duty was to inspect the entrails of the victims which had been sacrificed, and thereby to foretell future events. They also interpreted various phenomena, such as the flight of birds, the flight of bees, &c. ( Cic. Deiur., ii. 41.) This art, called HARUSPINa, was derived from Etruria, where it is said to have been discovered by one Tages. (Cic. Deiur, ii. 23.) The Romans used frequently to send their children to Etruria in order to be instructed in this art (Cic. Deiur., ii. 41.); and Etrurian haruspices often practised their profession in Rome. The duties of the Haruspices in many respects resembled those of the Augurs; but it is not recorded that they ever acquired that political influence which the Augurs possessed. (Augura.) They were formed into a college or corporation at Rome, of which the chief was called 'Summus Ha- ruspicus.' (Cic. de Rec. Publica.) They were amongst the well educated Romans in the later times of the republic. Cicero ridicules their pretensions of foretelling future events, and relates a tale of Cato, who used to say that he wondered how one haruspex could meet another without laughing. (Cic. Deiur., ii. 24.) The Emperor Claudius wished to revive the study; and under his directions a decree of the senate was passed for that purpose (Tac. Ann., xi. 15); but it probably produced little effect.

HARVEST is a most important period to the husbandman. When by his skill and industry the ground has been well prepared to receive the seed, and every circumstance is favorable, he is anxiously waiting for the good time. For if he may be deprived of a great portion of his reward by an unseasonable time of harvest. Although the state of the weather is beyond his control, he may, by an attentive observance of the usual changes at particular periods of the year, for instance, in the first year in any particular situation. The precautions which are necessary in a northern climate, where the fruits of the earth come late to maturity, would be superfluous in more southern latitudes. It is from this circumstance that we have the saying that it rains on grain. This is a country that we are likely to learn the means of obviating the effects of an unfavourable season and a late harvest.

In those southern climates where the heat and want of moisture are not too great for the growth of corn, the only care of the farmer is to procure hands sufficient to reap it. The heat of the sun and air soon dry the straw, and harden the grain. A spot is levelled in the field, and the corn is threshed out immediately, either by the tread of cattle driven over it, or by the flails of numerous threshers. The straw is winnowed and stored in granaries; and the straw is reserved till winter, when it forms the chief fodder of horses and cattle. A little dirt is allowed to remain in the grain; no ungeneal weather disappoints the hopes of the husbandman. But in northern climates, where the harvest is later, and cold rains and storms are frequent in autumn, the ingenuity is often taxed to save the corn from being entirely spoiled. This is accomplished by when it is valuable, the barns are erected to secure it in the straw, till it can be threshed; and the joy of harvest is frequently interrupted by the anxiety which is the consequence of sudden changes of weather.

To lessen the casualties of harvest in a moist climate, the experienced husbandman endeavours to arrange the time of sowing each kind of grain, so as to insure its coming to maturity before the rains have set in. The total number of grains, and the care to attend to the precautions of which experience has taught him the utility; and if the duration of harvest is longer, there is less danger of all his crops being spoiled by a wet season.

It was long the custom through the whole of the north of Europe to store all the produce of the farm into barns, especially the corn; and it was thought that as soon as thehouses were collected under one roof, all danger was past. The increase of the produce raised on most lands by an improved system of agriculture gave rise to the practice of stacking corn in the open air, and securing it by a covering of straw. It was soon found that the grain thus stacked in the straw was better preserved in the barn; and the invention of stone, or cast-iron pillars, as supports for the frames on which the grain was stacked, not only secured it from the depredations of vermin, but kept it in a much drier state than when stacks were made on the ground. This was a great improvement; and now, in the best managed farms, the only barns required are those in which the corn is threshed; and if there is sufficient room to hold the contents of one stack of the usual dimensions, it is all that is absolutely required.

The want of room in the barns was probably one of the reasons why the reapers were permitted to cut the straw five feet higher than the corn. (Cic. de Rec. Publica, iii. & iv. 41.) This art, called HARUSPINa, was derived from Etruria, where it is said to have been discovered by one Tages. (Cic. Deiur., ii. 23.) The Romans used frequently to send their children to Etruria in order to be instructed in this art (Cic. Deiur., ii. 41.); and Etrurian haruspices often practised their profession in Rome. The duties of the Haruspices in many respects resembled those of the Augurs; but it is not recorded that they ever acquired that political influence which the Augurs possessed. (Augura.) They were formed into a college or corporation at Rome, of which the chief was called 'Summus Ha- ruspicus.' (Cic. de Rec. Publica.) They were amongst the well educated Romans in the later times of the republic. Cicero ridicules their pretensions of foretelling future events, and relates a tale of Cato, who used to say that he wondered how one haruspex could meet another without laughing. (Cic. Deiur., ii. 24.) The Emperor Claudius wished to revive the study; and under his directions a decree of the senate was passed for that purpose (Tac. Ann., xi. 15); but it probably produced little effect.
stacked with the corn. The subsequent separation of them is a very trifling additional labour, where a winnowing machine is in use. It may therefore be admitted as a general rule in reaping, to cut the straw as near to the ground as possible: this is best done by an instrument called a cradle scythe, which mows the straw, and collects it so as to be readily gathered into sheaves.

The Hainault scythe has a very short handle, and is used with one hand, while the other collects the straw into a sheaf by means of a large hook at the end of a wooden rod. It is a most useful instrument, and greatly preferable to the scythe used in the Eastern counties, or in the adjoining counties, where straw is valuable and sells at a high price. It cuts more straw at each stroke, and is less fatiguing to the reaper, because his position is nearly upright when he is engaged. The straw is also more nearly perfect as a sheaf, than when cut into smaller slips, or when cut with old corn into sheaves, except rye, wheat, and beans. Barley and oats are usually mown, raked into heaps, and carried into the stack or barn when dry, like hay; but this is a slovenly practice, which should not be recommended. With good tillage and proper manuring the straw of barley and oats will be strong, and of sufficient length to require being tied up into sheaves; and much less of the grain is shaken out and lost in this way than by the usual method.

In rainy seasons it frequently happens that the sheaves remain a long time in the field before they are sufficiently dry to be carried and stacked. If the ears are not secured from the rain, some of them have usually got into the ear. This is a great loss; for sprouted grain is very inferior, and can only be sold at a low price. A little attention will often prevent the bad effect of rains. In some places the tops of the ears are bent downward, with the butt-ends diverging, so as to admit the air to circulate among them; a sheaf is opened by spreading out the ears, and is placed inverted over the ears which lean against each other, forming a truncated cone. Thus the butt-end of the top sheaf is the only part in which the rain can lodge; and the first sunshine will soon dry this: the rain runs off the sides of the inverted sheaf, and the ears pointing downwards, will not long retain the wet. The tops of the sheaves are placed outwards, and project gradually over the sides of the frame, and over one another, so as to build the stack in the form of a bowl, with a cone or pyramid over it, according as the frame is round or square; this is carefully finished with straw, and the outer surface is cut smooth by means of shears. This not only saves all the ears which chance to lie outwards, and which would have become the prey of birds, but it also prevents the rain from beating into the stack and injuring the corn. It may then be considered as safe.

Where there are no raised frames, and the stack is built on the ground, a belt of plastering or stucco is sometimes laid, a foot wide, round the stack, about 18 inches from the ground, after the surface has been cut quite smooth and even. This precaution is intended to prevent the rats from lodging in the stack, and it is very effective. A frame made entirely of iron, and supported upon iron columns, has lately been invented. It may be readily taken to pieces and put together again when it is wanted. The advantage of it is, that it is cheaper and more easily moved than any other; and it is very convenient for a temporary purpose.

Harvest is proverbially a joyful time, and one when hospitality is practised with more good-will than at any other season of the year. A feast is always provided on its approach to farmers and women, when the last corn is carried, has been observed from time immemorial; and it must be regretted that in many farms it is now omitted, or a mere gesture is given to it. It may therefore be admitted as a general rule never to exist between the master and his servants or labourers, is most effectually kept up by occasional friendly intercourse; and a harvest-home supper was formerly a kind of State dinner, which used to be prepared by physicians or chirurgeons at court, and presented to the guests in the most ceremonious manner, and without fear of offence. The anticipation of it was an incitement to exertions in the field; and the farmer was amply repaid the expense which the feast occasioned. The stimulant to labour is of course always welcome to the farmers, and is contrived so as to make the labourers feel the want of it. No task is quite so disagreeable to the labourer as that of spending long hours of toil without food to finish the harvest, whether it is a longer or shorter time. In others they have the usual weekly wages, and a gratuity at the end, with plenty of beer so long as it lasts: accordingly as labourers are abundant or not, the price is less or greater. Many thousands of Irishmen come over to England and Scotland in the time of harvest, and are of great use in finishing it in a short time.

Harvey, William, was born at Folkestone on the 1st of April, 1578, and after having been some years at the grammar-school of his native town, was admitted at Caiso College, Cambridge, in the year 1593, when he was in the eleventh year. Having devoted himself to the study of logic and natural philosophy for six years in that university, he removed to Padua, at that time a celebrated school of medicine, where he acquired a knowledge of the science of botany. He first became a pupil of Aquapendente on anatomy, of Minadous on pharmacy, and of Casserius on surgery. He was admitted doctor of medicine there, and returned home at the age of twenty-four. At thirty he was elected fellow of the College of St. Bartholomew's Hospital. On the 4th of August, 1615, he was chosen by the College to deliver the Lumien lectures on anatomy and surgery, and upon this occasion he was supposed to have first brought forward his views upon the circulation of the blood, which he afterwards more fully established, and published in 1628.

The importance of this great discovery was such, that it will be necessary to investigate from the writings of the author the steps by which it was attained. We are informed by Boyle in his 'Treatise on Final Causes,' that in the only correspondence he had with Harvey, he was displeased with him that the idea of the circulation was suggested to him by the consideration of the obvious use of the valves of the veins, which are so constructed as to impede the passage of the blood through those vessels, while they permit it to pass through them to the heart. Before the time of Harvey the opinions on the circulation were numerous and inconsistent. The blood was supposed to be distributed to the various parts of the body by means of the veins, and that interference for the circulation of blood was done by the action of the right side of the heart. According to the same doctrines the arteries were destined for the conveyance of the vital spirits, which were formed in the left side of the heart, and conveyed to the veins and lungs by the action of the left ventricle. Opinions did not agree upon the mode in which the blood found its way to the left side of the heart, for whilst some supposed that it was conveyed with the air from the lungs, others maintained that it transuded by certain imaginary pores in the septum between the ventricles. These opinions, it is evident, rested more upon imagination than any careful observation on the facts. Those of Harvey were the correct ones, and he the most accurate dissections of dead and living animals, and supported by arguments depending entirely upon the anatomical structure and obvious uses of the parts. The result of these observations is thus established: that the heart has periods of action and of rest, and in warm-blooded animals its motions are so rapid, that the different steps of them cannot be distinguished. In cold-blooded animals they are more slow, and in warm-blooded also after the examination of its action, by opening the chest in a living animal, has been continued some time. During its action the heart is raised, and its point tilted forward so as to strike against the parieties of the chest. It contracts in every direction, but more strongly on its side than any other; but when blood runs out of the blood-vessels, the blood is ejected from it during its contraction. From these facts Harvey concluded that the essential action of the heart is its systole, and not its diastole, as was supposed by some, and that the other action or contraction is the expulsion of the blood into the pulmonary artery and aorta. The diastole of the arteries or pulse is synchronous and caused by the propulsion of the blood through the vessels by the systole of the heart. It is not, as was previously supposed, an active operation of the vessels. If the motions of the heart be carefully observed for some minutes, it will be seen first that the two auricles contract simultaneously, and force the blood contained in them into the ventricles; and secondly, that the ventricles
in their turn assume the same action, and propel most of the blood into the pulmonary artery and veins, from which it is propelled by the heart through the vessels distributed at the entrance of those vessels. The author next proceeds to describe the manner in which the blood passes from the right to the left side of the heart.

He says he, this is sufficiently evident. Part of the blood passes directly from the right to the left auricle through the foramen ovale, whilst the rest is conveyed into the right ventricle, and by its contraction forced into the pulmonary artery, and so conveyed into the lungs, and, as the question was so much obscured that physicians were unable to give a correct explanation of the phenomena. However the consideration of the obvious use of the valves of the artery remain unaltered. He Harvey carried this argument further, and maintained from it that the whole of the blood which is propelled from the right side passes through the lungs to the left side of the heart. In like manner he showed that the blood is propelled from the left ventricle into the arteries and so distributed to all parts of the body. He next proceeded to give approximate calculations of the quantity of blood which passes from the veins through the heart in a given time. This he showed to be much more than that which is required in the nutrition, or can be supplied to the body by the absorption of alimentary substances, that the surplus must of necessity return through the various tissues of the body to the veins again. He then argued from the consideration of the valves of the veins that the course of the blood in them must be from the smaller to the larger divisions, and thus to the heart again. These views he still further confirmed by reference to the well-known effects of ligatures of the veins, and the limits with which the ligature interferes with the pulsations of the artery. If the ligature be so placed as to compress the veins alone, they become swelled and turgid beyond the ligature, and quite empty between it and the heart, whilst the pulsations of the artery cease beyond, but are felt more violent than usual just within the ligature.

Such is a brief abstract of the principal steps in this the greatest and most original discovery in physiology, which was so directly opposed to all the previous notions of physicians, that its author might well observe, 'Adeo nova sunt et inaudita ut non solum ex invisi quorumdam metum hanc, sed etiam de haecis in ab terris tantum conceptum aut semel imbibita doctrina aliusque de fixa radicibus quasi altera natura, apud omnes valet, et antiquitatis veneranda suspicio cogit.' This anticipation probably delayed Harvey's communication to his friends, that his practice fell off considerably after the publication of his treatise 'On the Circulation of the Blood,' and it is well known that the doctrine was not received by any physician who was more than 40 or 50 years old. His opinions were violently opposed by Primiorius, Parianus, Riolanus (1647), and others. Parianus was ably refuted by his friend Dr. George Gent, Fellow of the College of Physicians, and other advocates of Harvey's views appeared on the Continent. The only man who was convinced by a reply from Harvey himself was Riolanus, professor of anatomy in Paris, in answer to whom he published two letters. In 1652 Harvey had the satisfaction of seeing one of his cases observed by Pleminius, professor of medicine in Tournay, who adopted himself a convert to his opinions, and by his example many more were induced to withstand their opposition. In the whole of this controversy, says Sneppen (Hist. of Med., sec. i. c. i.), the discussion and refutation afford the best model for naturalists and scientific writers. Harvey had been so much disgusted with the disputes in which he was involved on the publication of his views on the circulation, that he had nothing more to publish, and it was only at the earnest request of his friend Dr. Ent that he induced him to allow his 'Exercitationes de Generatione' to be printed. This work consists partly of his Latin lectures and partly from the writings of Gessius a Aquapendente on the same subject, and partly of details of his own observations and experiments. The earlier
to the milk. This fact was known to Aristotle. He corrected the error of Fabricius, who supposed that the egg is chipped by the hen, and showed on the contrary that this process is performed by the chick itself. He supposed that the whole of the cuticle of the ovum is obtained from the uterine or its horn. This view, as is now well known, is incorrect. His description of the vessels and of the placenta is of considerable value. The smaller divisions of the uterus are named by superstition rather in toto cava and porta. The two arteries arise from the branches of the descending aorta. These vessels arise from and pass to the cotyledons of the placenta. In like manner the maternal vessels are distributed to the same cotyledons.

A layer of honey-like matter is interposed between the maternal and fetal portion of the placenta; and it is by absorption from this substance that the nutrition of the fetus is carried on, for there is no vascular connection between the mother and the fetus.

He noticed the late union of the lateral parts of the upper lip and assigned it as a cause of the frequency of hare-lip. He insisted on having, first to discover the connection between the bronchi and that of the heart, but that of the birds, and to show that in all birds, serpents, oviparous reptiles, quadrupeds, and fishes, kidneys and ureters exist, a fact unnoticed by Aristotle and all succeeding writers. This discovery, the outcome of 221 investigations and experiments, is of importance to the discoveries of Harvey in this branch of physiology, and to make us withhold our assent to the assertion of Sprengel (sect. 12, ch. 6), that the Treatise De Generatione animae Europaeum.

In 1625 Harvey was appointed physician extraordinary to James I., with a promise of succeeding on the first vacancy to the physician-in-ordinary, on the duties of which he actually performed. It is curious that, on the death of Charles I., and was in the habit of exhibiting to him and to the most enlightened persons of his court the motion of the heart and the other phenomena upon which his doctrine was founded. Under this auspice, he was allowed to travel, with the king, and while staying for a short time in Oxford was made by him master of Merton College, and received the degree of Doctor of Medicine. He held the mastership however for only a few months, when Brent, who had been expelled by the king for favouring the parliamentary cause, was replaced by that party, which had now gained the ascendency. Soon after his house was plundered and burned by the same party, and unfortunately several un- published works, of which some of his other writings, were destroyed. The latter years of his life were chiefly spent at his country-house at Lambeth, or at his brother, Mr. Richmond. In 1654 he was elected president of the College of Physicians and educated and his must infirmities he was induced to decline that honourable office. But he testified his regard for the society by presenting them with his library, and conveying over to them, during his lifetime, a farm which had been left him by his father. He died on the 3rd of June, 1657, in the 90th year of his age, and was buried at Hampstead in Essex, where a monument was erected to his memory. The best edition of his works, which were written in correct and elegant Latin, is that published by the College of Physicians in 1 vol. 4to., in 1766, with an engraving by Hall from the portrait by Cornelius Jansen, in the college library. They contain 'De Motu Animalium'; 'Exercitaciones de Circulatione Sanguinis'; 'Exercitationes de Anatomico Circulativo Sanguinis ad J. Riolanum, Fil.;' 'Exercitationes de Generatione Animalium; 'Anatomia Thome Parri; and nine Letters to celebrated contemporaries on different anatomical subjects. Among the works destroyed were, 'Observations de usu Lusiaci; 'De Motu Locali; 'Observations Medicines'; 'De Amore Luidine et Coitu Animalium; 'De Insetesto rubramento; 'Exercitatio Sanguinis Singula Cordis Pulbationis Prostrata;' and 'Tractatus Physiologicum.' Two other MS. works by him are preserved in the Library of the British Museum; one, 'De Musculis et Membratis Sanguinis;' and another, 'De Anatomie Universalis;' in the latter of which, which was printed on April 1616, the principal propositions of the doctrine of the circulation are contained.

The Life, prefixed to his Works; Sprengel's History of Medicine.

HARWICH, a parliamentary and municipal borough and seaport town in the hundred of Tendring, and county of Essex, 71 miles north-east from London. On the east it is bounded by the sea, and on the north by the parishes of the Stour and of the River. The town derives its name is derived from two Saxon words, Here, an army, and Wic, a fortification (Morgan's Essex, vol. i. p. 499), from which circumstance it is supposed that a Saxon army was always stationed here to prevent the approaches of the Cidian Danes. It was not a place of any importance till after the Norman conquest. In 1318 Edward II. made it a borough corporate, and several charters and letters-patent were granted by subsequent sovereigns either in the time of Edward III. or of the reign of James I., and are now extant. Under the Municipal Corporation Act the council of the borough consists of a mayor, four aldermen, and twelve councillors. The revenue of the corporation, in 1831, arising from lands, port dues, and other property, amounted to 671l., and its expenditure for the same year was 585l. The borough returns four members to parliament, a privilege which it had enjoyed previous to the time of Edward III., in whose reign it was discontinued, and was not restored till the commencement of that of James I. The town consists of three principal streets, is well paved, and lighted with gas. The church, dedicated to St. Nicholas, is a spacious structure of brick, with stone buttresses and pinnacles, and contains the remains of the chapel, founded, about the commencement of the 13th century, by Roger Bigod, earl of Norfolk. The living is a vicarage in the patronage of the crown, with an average net income of 400l. and residence attached. For purposes of ship-building and other maritime occupations, but the trade of the town is in a declining state, which is partly attributed to the removal of the government packets. Within the last twenty years a great diminution in the circulation of the port, and the custom-house receipts, have fallen off considerably. The harbour is deep and spacious, the anchorage good, and there is a lighthouse, erected upon a hill below the town, for the guidance of vessels entering or leaving. In 1831 was 4927. There is a free grammar-school for the education of 32 boys, the children of residents. The master, who is always the vicar of the parish, receives a salary of 40l., besides board. A house rent-free. Immediately opposite to Harwich, and at the south-east extremity of the county of Suffolk, is situated Langland Fort, a fortification of considerable strength, maintained by the government for the defence of the town. Population 1831 was 4927. There is a free grammar-school for the education of 32 boys, the children of residents. The master, who is always the vicar of the parish, receives a salary of 40l., besides board. A house rent-free. Immediately opposite to Harwich, and at the south-east extremity of the county of Suffolk, is situated Langland Fort, a fortification of considerable strength, maintained by the government for the defence of the town. The population 1831 was 4927. There is a free grammar-school for the education of 32 boys, the children of residents. The master, who is always the vicar of the parish, receives a salary of 40l., besides board. A house rent-free. Immediately opposite to Harwich, and at the south-east extremity of the county of Suffolk, is situated Langland Fort, a fortification of considerable strength, maintained by the government for the defence of the town. The population 1831 was 4927. There is a free grammar-school for the education of 32 boys, the children of residents. The master, who is always the vicar of the parish, receives a salary of 40l., besides board. A house rent-free. Immediately opposite to Harwich, and at the south-east extremity of the county of Suffolk, is situated Langland Fort, a fortification of considerable strength, maintained by the government for the defence of the town. The population 1831 was 4927. There is a free grammar-school for the education of 32 boys, the children of residents. The master, who is always the vicar of the parish, receives a salary of 40l., besides board. A house rent-free.
the author had combined with energy and industry great attainments in the sciences of his day. It is rich in observation and description. The record of his researches, insects, mollusca, plants, minerals, and materia medica of the countries he visited, and is to this day a standard work of reference. His science was not the flimsy, superficial, and uninteresting sort, but the solid, sound matter-of-fact, precise, and definite information of which use may be made so long as science endures, whatever changes it may undergo in its forms. His name is perpetuated, not by having been given to a curious genus of Egyptian Apiaceae.

HASSEL. [LINZ]

HASTINGS, a parliamentary borough and the chief town of the county of Sussex. It is situated in the hundred of Guesting and county of Sussex, 64 miles south-east from London. Hastings is a town of considerable antiquity, but nothing is known with certainty respecting its origin, or whence it derived its name. It was, however, in his 'History of Western Sussex,' says, 'In 892 the Danes, in 230 ships, commanded by the pirate Hastings, landed at the mouth of the river Rother, near Romney Marsh, and immediately possessed themselves of Apulonia, where they probably built their borough.'

HASELQUIST, FREDERIC, a Swedish naturalist, and botanist, was born in Stockholm on the 3rd January, 1722, old style. His father, Andrew Hesselquist, a poor curate, having died young, without having made any provision for his family, his wife's brother, a clergyman of the name of Pontius, took charge of young Hesselquist's education, and placed him with his own children in the school of Linköping. After the death of his benefactor, Hesselquist was transferred to the university of Upsala, where he entered in 1741. He there acquired a taste for natural history, became a pupil of the great Linnaeus, and was led very particularly to apply himself to the study of the properties of plants. An inaugural dissertation on the 'Anthemium,' which he prepared in 1744, evinced him to be a young man of a strong original mind, and worthy of his master. He showed how peculiar were the notions at that time entertained regarding the medicinal properties of many plants, how much the whole of vegetable medicine stood in need of reformation; and he pointed out a philosophical mode of investigating the facts connected with it, by insisting upon the old doctrine of 'like forms, like virtues.' This truth, which is one of the most important among those connected with the practical application of botany to useful purposes, had been so obscured by want of science in the age immediately preceding Linnaeus, that it had ceased to be a point of belief, while a great many of the medical men of that age, in such a leap out of the common path, and set up the superstition of forgotten theorists. Hesselquist however maintained its accuracy, and with so much skill that he may be said to have established it, upon a solid foundation, from which it could never afterwards be shaken. This, and his general proficiency in other branches of science, procured Hesselquist some of the royal stipends provided for travelling students, and he was thus eventually enabled to carry into execution his favourite project of visiting the Holy Land for the laudable purpose of investigating its natural history. Having sailed from Stockholm in August, 1747, he proceeded to Smyrna, thence to Egypt, and afterwards to the Holy Land. The entire consumption sunk upon the exertions of his enterprising spirit, and he died at Smyrna, on his return homewards, on the 9th February, 1752, in the 31st year of his age. The result of his investigations of these, at that time little known countries, was published in Stockholm in the year 1757, under the name of 'Izer Palestînum.' Like most travelling's' books of that age, this work showed...
HAS

HAS

olitic system in England, is thus named from its character-
tistic development around Hastings in Sussex. In the
Hastings sands we may distinguish four divisions, which lie
in the following order:—
The Horsham beds. — Piau-coloured sand and friable
sandstone, with a good flagstone occurs here.
The Tifigate beds. — Sandstones often calcarceous, with
various grits and conglomerates, resting in the middle of one
of the middle divisions; [IGNeous and HylcROuS-
RUs].
White sand and friable sandstone, alternating with clays and sand-
stones.
The Ashburnham beds. — Nodules and beds of limestone,
alternating with clays and sand-
stones.

The axis of elevation or forest ridge of the Weald of Kent
and Sussex is chiefly formed of Hastings sands, which rise in
Crowborough Beacon to 804 feet above the sea. [Geo-
LOGY. — Mantell’s Tertiary Forest; Floton’s Geology of
Hastings, etc.]

HASTINGS, WARREN, a memorable name in the
history of British India, was born in the rank of middle life
in 1733, and after receiving the usual education at West-
minster School, went out in 1750 as a writer in the service
of the East India Company. His fate was, however, due to his
own industry and discernment, which led him to
master the Persian and Hindustanee languages, a study at
that time almost universally neglected; and he was there-
fore particularly noticed and made useful, employed, and
employed in the interior. After residing about fourteen years in India, he returned home with
a moderate fortune, intending apparently to pass the
remainder of his life in Europe.

His powers were enlarged by the al-
ternation of the Indian constitution by act of parliament, in
virtue of which he became, January 1, 1774, governor-general and
knight of all our Indian dependencies. Affairs were
at this time in great disorder. The territories of the
Company had been greatly extended by the conquests of
Clive and his successors; but their dominion, authority, and
influence were still unorganized, and were exposed before
the government of Mr. Hastings to great danger from the
divergent enmity of Hydrock, and its allies, sup-
ported by the Maharratas, and others of the native powers.

He did many things under the pressure of circum-
stances, which nothing but expediency could justify, is
hardly denied by his enemies; and indeed it seems to have been part of his defence, that Indian state-
ment were not to be bound or judged by European rules of justice
and morality. Right or wrong, he weathered the dangers
to which the British Empire in India was exposed; and
he left the provinces under his charge wasted and depopu-
lated, the increased revenue more than counterbalanced by
the increased debt, he also left the power of our enemies
broken, our own consolidated, and an easier task to his suc-
cessors than fell to his own share. Notwithstanding his
services, he gave satisfaction neither to the home adminis-
tration nor to the Court of Directors. The public ear was
offended by the blemishes of his conduct; and his
ag-reession; the directors censured the lavish and corrupt expend-
iture, and the presumptuous independence of his conduct.
Repeated attempts were made to obtain his dismissal, but
those were uniformly defeated by the Court of Proprietors.
Thus supported, he carried matters with a high hand; neg-
lected or positively refused to obey the orders sent by the
Directors; overruled the opposition of the Council, of which
a majority was, or made no change in his views, by [FRANCIS, SIR PHILIP];
and practically exercised an absolu-
te and irresponsible power until February, 1785, when he
resigned his office and set sail for England, well aware that a
change could not be long deferred.

As soon as Mr. Hastings had arrived, Mr. Burke in-
timated his resolution of instituting an inquiry into the late
Governor-General’s conduct. Proceedings however were not
commenced until the session of 1786; in the course of
which articles of impeachment were brought forward by
Mr. Burke, charging him with numerous acts of injustice and
oppression committed against native princes and people de-
pendents or allies of the Company; with the impoverishment
and desolation of British dominions; and with the illegal
reception of presents from himself; with the corrupt
exercise of his great influence by conniving at unfair con-
tracts, and granting inordinate salaries, and with enormous
extravagance and other mismanagement of the Company’s
funds, and the charges of receiving presents and conniving at unfair con-
tracts and extravagant expenditure. The sessions of 1786-7
having been consumed in preliminary proceedings, the
House of Lords sat again in Westminster Hall, January
13th, 1788, to try the impeachment, and on the 15th, the
preliminary forms having been gone through, Mr. Burke,
in the name of the Commons of England, opened the
charges against the present in a comprehensive, elaborate,
and most spirited speech [Buxx.,] which lasted upwards
of three days. He was assisted in the management of this
most arduous cause by Fox, Sheridan, Grey, and others.
The sessions of 1788, 1789, and 1790 were consumed in going
through the various forms of prosecution; the Com-
mons expressed their willingness to abandon some part of
the charges, with the view of bringing this extraordinary
trial sooner to an end; and on the 2nd of June, the seventy-
fifth year of the reign of George III., Mr. Hastings was
extracted until April 17, 1795, on which (the 14th) day he
was acquitted by a large majority on every separate article charged against him.

There seems no doubt but that public opinion changed
greatly during the trial; and that Mr. Hastings came to
be regarded as an oppressed, instead of an offending man.
This feeling was probably caused in a great measure by the
impartiality of Mr. Burke, and in the skilfulness in which
Mr. Hastings and his counsel
threw all the blame on the managers of the prosecution,
in which truth has been most completely concealed from
the public. The extreme violence of their invective
was perhaps calculated to hurt their cause, and the upper
ranks, more especially the powerful interest connected
with India, were disposed to look jealously at so close a scrutiny
into the conduct and gains of an official man.

Mr. Hastings oppressed to refute the charges of extortion
by publicly asserting in the most solemn manner, that never
at any time of his life was he worth 100,000L. The law
charges of his defence amounted to 76,000L. In March, 1796,
the bankrupting the Company was incurred. He
lived eighty years and a half, and lent him 50,000L. for eighteen
years, free of interest. He retired completely from public
life, to an estate which he purchased at Deyresford, in Wor-
styreshire, for £20,000. He died August 22nd, 1818, having been raised to the dignity of
privy-counsellor not long before.

On his real character as a man and a statesman it is
somewhat hard to decide. That his talents and his ser-
vices were alike eminent, is admitted; that the means
which he used were often most culpable, appears to be
equally certain. His apology is to be found in the neces-
sities of his situation, in the general neglect of justice in
our dealings with the Asiatic princes, and in the notorious
laxity of Anglo-Indian morality, where making a fortune
was concerned, in those days. Mr. Mill, after exhibiting with-
out reserve on all subjects of his conduct, but who, as
administration, thinks it necessary to recommend him to the
favourable construction of the reader, on the ground
that he was 'placed in difficulties and acted on by tempta-
tions, such as few public men have been subjected to on this
side the water'; adds, 'It is my firm conviction that if we had
the advantage of viewing the conduct of other men, who have
been as much engaged in the conduct of public affairs, as
the Governor-General, without this regard to his view,
the few of them would be found whose character would present
a higher claim to indulgence; in some respects, I think,
even to applause. In point of ability he is beyond all
question the most eminent of the chief rulers whom the
Company have appointed: nor is there any one of whom
he would not have succumbed under the difficulties
which, if he did not overcome, he at any rate sustained.
HAT

He had no genius, any more than Clive, for schemes of policy, including large views of the past and large anticipations of the future; but he was hardly ever excelled in the skill of applying temporary expedients to temporary difficulties. He felt no such aversion to giving a disagreeable complexion to the present as he had. He did not the forward and imposing audacity of Clive; but he had a calm firmness, which usually by its constancy wore out all resistances. His virtues were among the first. He was a member of the Company who attempted to acquire any language of the natives, and who set on foot those liberal inquiries into the literature and institutions of the Hindoos, which have led to the set up of the code of Hindoo law. He thought that great art of a ruler, which consists in attaching to the government those who are governed; and most assuredly his administration was popular, both with his countrymen and the natives.

We have thought it fair to give at length the testimony of Mr. Mill, who has dissected the events of Hastings' government with an unsparring hand. At the same time, assuming Mr. Mill's interest in particular events and his strictures on them to be just, we feel bound to dissent from the mode of comparative praise conveyed in this passage, and believe that most persons, on perusing the fifth book of a "History of the East," will do the same.

HAT.

In every civilized community it has been the custom for men to wear a covering on their heads in the open air; and in Western Europe, and those countries which have imitated it, the form of hat has been the same since the fourteenth century has been that which we call a hat. The difference between a hat and a turban, the covering generally used throughout Asia and a part of Eastern Europe, and a crown, is the shape to which the brim does or does not form part of a cap; but this distinction is not sufficient, as hats such worn by naval and military officers, and those which until last years were employed in polished society in Beetoo are like to each other. In India, these hats have not any brim properly so called, but a part of ample dimensions, answering to it, and turned up so as to be parallel with the crown.

Hats are made of straw, of silk, or of wool. Straw-hats are little used by men in this country. The material chiefly used in making them is wheat-straw plaited in strips and sewed together in the required form. Silk-hats are composed of a form made of silk, or of felt, and covered with woven silk plush, or shag, fashioned to the required shape and drawn over the form. A considerable number of these hats are made for exportation to different places in the Mediterranean and to our Colonies. The greater part of the material is imported by felt-makers and is a process peculiar to that substance. There are three descriptions or qualities of hats made of wool, viz. beaver-hats, pate-hats, and felt-hats. Each of these has the body composed of felt: the first has a covering or nap of beaver; the second, a nap of the fur of the musk-rat, or the nutria, or some other fur of small value; and the third kind is without a nap. It will be sufficient to describe the mode of making beaver-hats.

According to the general belief the art of felting was brought to Western Europe by the Crusaders, who found the tents of their enemies covered with that substance. What the Crusaders did, is, with the exception of felt, felt, and it is necessary to the process that it should be well scourcd, when the fibres being brought together have a tendency to mat together. This tendency is so strong that it is not possible to spin woollen yarn without previously oiling the wool. Hats of the very finest quality are made with lamb's-s wool imported from Spain or Saxony, and the fur of English rabbits. The nap is composed of the fur of the lower part of the rabbit, and the back of down. English hare mixed together. To form the body of the hat the wool and rabbit's-fur are separately boxed in the manner employed for freeing cotton from its seeds. [Cotton.]

The next process is to cover the felt with a triangular piece of damp brown paper, and then to fold it in a damp cloth and work it well with the hand, pressing and bending, rolling and unrolling it, until the hat is compact. The felt thus prepared is next taken to the wide brim of a boiler charged with water and beer-grounds and a small quantity of sulphuric acid. In wine countries the less cased boiler is preferred. This mixture is kept near to the boiling point. The workmen having the palms of their hands protected by a covering of thick leather, lay the felt on the margin of the boiler, and then proceed to work it about with the palms of their hands; by this means it shrinks and becomes more compact; it is then dipped into the boiler and worked, first with the hands, and next by the help of a rolling-pin, which admits of more force being used, and this process is continued until the felt no longer contracts.

The next process is that of stiffening. The substance employed for this purpose is shell-lac, a solution of which is applied by means of a brush to one side, and sometimes to both sides of the felt, after which it is stoved, and by this means the whole substance becomes duly impregnated with the resin. Shell-lac is obtained from the old leaves of the oak, and is made from coal-tar is sometimes substituted for it. The use of this resin is the greatest modern improvement in hat-making; the substance is thus rendered perfectly water-proof, and this, together with the stoving, prevents the hat from taking in moisture, and thereby from rotting. The stiffening of hats was formerly composed of gum-arabic, or of glue, which are both soluble in water. To form the nap of a hat one half or three-fourths of an ounce of beaver, and some other less costly beaver, are hewn together and imperfectly felted in the manner already described, and shaped the same as the body to which it is to be applied; that body is then softened by immersing it in the boiler, when the nap is applied and worked as in felting, until the required union is effected between the two bodies. The felt thus covered is in the form of a cone, and must be brought to the cylindrical shape in which it is worn by means of the cropper. The cropper is a small circular sheath, in which the hat is placed during some hours; it is then drained and dried. After this it is softened by steam, the crown is strengthened by placing it in a disc of scale-board, and linen is pasted over this. The cap is raised and a uniform direction given to its fibres by the pressing of warm irons and hair brushes. The last processes are binding and lining, when the hat is ready to be worn.

It is not possible to form any correct estimate of the extent of the hat manufacture in this country. The quantity and value of felt hats exported in the ten years, 1827 to 1836, were as follows:—

<table>
<thead>
<tr>
<th>Year</th>
<th>Dozen</th>
<th>Value</th>
<th>Year</th>
<th>Dozen</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1827</td>
<td>75,497</td>
<td>£157,462</td>
<td>1832</td>
<td>55,458</td>
<td>£144,596</td>
</tr>
<tr>
<td>1828</td>
<td>83,114</td>
<td>197,581</td>
<td>1833</td>
<td>43,136</td>
<td>140,232</td>
</tr>
<tr>
<td>1829</td>
<td>81,182</td>
<td>189,469</td>
<td>1834</td>
<td>40,155</td>
<td>125,970</td>
</tr>
<tr>
<td>1830</td>
<td>77,061</td>
<td>209,489</td>
<td>1835</td>
<td>46,849</td>
<td>133,800</td>
</tr>
<tr>
<td>1831</td>
<td>62,854</td>
<td>170,188</td>
<td>1836</td>
<td>53,984</td>
<td>148,282</td>
</tr>
</tbody>
</table>

The great bulk of these shipments are made to our own colonies and dependencies. The exports so made in 1836 amounted to £135,800.

A duty of 10s. 6d. each is imposed on the importation of hats of foreign make, which operates as a prohibition.

HATCHETLINE. Mineral Adipocire. This substance occurs in thin flakes in the cavities of the pyrites of South Wales. It is very soft, somewhat granular in appearance; translucent; colour yellowish-white or greenish; not elastic; inodorous; combustible. It melts at 179°, and is soluble in ether.

According to Professor Johnston it consists of—

<table>
<thead>
<tr>
<th>Substance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>One atom of carbon</td>
<td>85 910</td>
</tr>
<tr>
<td>One atom of hydrogen</td>
<td>14 624</td>
</tr>
</tbody>
</table>

HATFIELD. [Essex.]

HATHERLEIGH. [Dyevshire.]

HATTERAS, CAPE. [Carolina, North.]
HAUKAL. ABUL KASEM MOHAMMED IBN, a celebrated Arab traveller and geographer. The few particulars we possess concerning his life are derived from his own work. From this we learn that he paid great attention to the study of geography from his earliest years, and collected all the books he could obtain which treated of known nations, as also others which he afterwards found in foreign parts, and particularly to avoid the tyranny of the reigning sultan, and to improve his own fortune by trade, he set out from Bagdad, A.H. 331 (A.D. 942-3), in order to visit foreign countries. He first travelled to Persia and the coast of India, but he did not proceed further; but we learn from his own account that he was in Mesopotamia A.D. 358 (A.D. 968-9); in Africa A.H. 360 (A.D. 970-1); in Sicily A.H. 362 (A.D. 972-3); and in Mecca A.H. 364 (A.D. 974-5 or 975-6).

Haukal's work on geography is entitled 'A Book of Roads and Kingdoms.' He states in the prologue that he composed the work to give a description of all the countries in which the Mohammedan religion prevailed, together with the revenues, natural productions, and commerce of each. After giving a general view of the earth, and a brief description of the nations which do not profess the Mohammedan religion, he first describes Arabia, since it contains Mecca and the Caaba, and afterwards the seas and other countries subject to Mohammedans. The description of each country is accompanied by a map; but Abulfeda, who frequently quotes Haukal in his treatise on Geography, comments on the maps and states that the latitudes and longitudes are not put down in these maps. Haukal mentions the names of other writers on Geography, from whom he derived great assistance; namely, Ibn Jubair, and Abul Fazl Kudusi of Herat; and in the prologue he adds that his aim was to establish the truth with extreme attention, request permission to remove them himself, remarking that the conformity of the superposed plates of crystalline matter with the planes of the central prism or nucleus of the crystal is a secret which he wished more fully to explore. From this moment he applied himself sedulously to the development of the truth which his genius had detected, and his efforts were rewarded by the success they merited. He was the first to show that the structure of crystalline substances was regulated by laws as inviolable as those to which organized bodies are subjected, and thus crystallography for the first time assumed the character of a regular science. His theory rests upon the supposition that all the crystalline forms belonging to any single species of mineral are derivable from some simple form which may be regarded as the type of all the others. This type of simple form is such that as the angles at which the planes of crystals can be inclined to each other are confined within certain limits, an erroneous supposition which may probably be attributed to the imperfection of Haukal's observations, has been generally adopted by all who have succeeded him. (See the article 'Crystallography' in the Encyclopaedia Metropolitana.) In compliance with the request of MM. Daubenton and Laplace, Hauy communicated the result of his researches to the Royal Academy, and was elected a member of that society in 1783. During the Revolution he was thrown into prison for refusing to take the oath of obedience required of the priest, but the exertions of Geoffroy Saint-Hilaire, one of his pupils, and the remark of a citizen, that it 'were better to spare a recusant priest, than to put to death a quiet man of letters,' obtained his release, and probably saved his life. In 1794 he was appointed conservator of the mineralogical collections of the School of Mines of Paris, and in 1802 he became professor of the Faculty of Sciences at the Academy of Paris. Hauy died at Paris, June 3, 1822. Besides numerous memoirs upon mineralogy and electricity, inserted in the Journal des Mines, he composed 'An Essay upon the Structure of Crystals,' 1 vol., 1784; 'Exposition of the Theory of Electricity and Magnetism,' 1 vol.; 'Treatise on Physics,' 2 vols., 1821; 'Treatise on Crystallography, 2 vols., 1822;' and some others.

Hauy is best known for his 'History of the Royal Society,' a work that is considered one of the most important works in the history of science. He also wrote 'An Essay upon the Structure of Crystals,' which is considered a seminal work in the field of crystallography. His contributions to the understanding of electricity and magnetism were also significant, and he is considered one of the fathers of modern physics.
diagonal planes of the cube, indistinct; fracture uneven; brittle, hardness 5.5 to 6.0; sp. gr. 2.683; colour when opaque, indigo blue, when translucent, blue or bluish-green; streak white; lustre vitreous. The mass varies in colour from amorphous to greenish, and is generally compact. When heated in an acid it becomes gelatinous and transparent. Before the blowpipe it fuses with borax into a clear glass, which becomes yellow on cooling. This mineral is found in the cavities of veins in limestone and marble and frequently in the ore of copper. Vegetus, and also embedded in pumice and lava near Ancorad on the Rhine, &c. According to Gmelin, the mineral from Marino yielded—

<table>
<thead>
<tr>
<th>Substance</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO₂</td>
<td>35.48</td>
</tr>
<tr>
<td>Al₂O₃</td>
<td>18.87</td>
</tr>
<tr>
<td>Na₂O</td>
<td>15.45</td>
</tr>
<tr>
<td>K₂O</td>
<td>12.19</td>
</tr>
<tr>
<td>CaO</td>
<td>7.67</td>
</tr>
<tr>
<td>MgO</td>
<td>0.08</td>
</tr>
<tr>
<td>Fe₂O₃</td>
<td>1.16</td>
</tr>
<tr>
<td>MgO</td>
<td>1.90</td>
</tr>
</tbody>
</table>

**Havana.**

The capital of the island of Cuba, is situated in 23° 6' N. lat. and 82° 2' W. long. on the northern shore of the island. Its harbour, which is one of the most secure and commodious in the world, communicates with the sea by a channel little more than half a mile in length, and from 900 to 1,000 yards in depth, from 8 to 10 fathoms. The harbour itself is a basin of an oblong form, measuring in length from south-south-east to north-north-west nearly two miles and a half, but its greatest width does not exceed 1,300 yards. Its depth varies from 15 to 20 fathoms, except on the small shoal De La Luz, where it is less. This basin is surrounded by heights which shelter it from every wind. The town is built on the western side of the bay, on a level with the channel, on a knoll. The channel is protected by two strong fortresses, El Morro and La Punta, and a continuous series of batteries along both shores. The town is equally strong towards the land. A well built wall surrounds six islands in the bay, promontory, on which it stands, and at a distance of respectively 1,240 and 660 fathoms from it are two fortresses erected, Del Principe and De Atures, both well fortified. The space between the walls of the town and the outer promontory is occupied by the suburbs, six in number, Horcon, Jesus Maria, Regla, Cero, S. Lazaro, and La Salud. The population of the town was estimated in 1827 at 39,980, and that of the suburbs at 54,943; the whole therefore was 94,923, of which number the whites amounted to 46,600, the free people of colour to 23,600, and the slaves to 23,800. In the same year there were also 16,000 foreigners in Havana, and the garrison consisted of 6,000 men; the whole population consequently amounted to 118,900 souls. In 1828 it was estimated at 125,000 individuals.

The streets are narrow, crooked, and generally unpaved; in the rainy season they are full of mud. A few of them exist, however, and are occupied, especially by los Mercaderes. There are several good buildings among the churches, one of which now contains the remains of Christopher Columbus, which were formerly at S. Domingo, but were removed to this place when that town was ceded to the French (1795). The other large buildings, as the palace of the government (casa del gobierno), that of the commandant of the marine, the arsenal, the post-office (correo), and the buildings used for the manufacture of tobacco, are less remarkable for their architecture than for their solidity. The town has a theatre, a circus for bull-fights, and two fine promenades, one called El Alameda, within the town, and the other Paseo Extra Muros, without the town. There is a hospital for the navy for the sick and wounded, and several other ports of Cuba have been opened to foreign vessels. More than half of the produce of the island destined for foreign markets is shipped at Havana. [Cuba.]

One of the principal products of the town under theocracy, though on several other parts of Cuba have been opened to foreign vessels. More than half of the produce of the island destined for foreign markets is shipped at Havana. [Cuba.]

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The town has a theatre, a circus for bull-fights, and two fine promenades, one called El Alameda, within the town, and the other Paseo Extra Muros, without the town. There is a hospital for the navy for the sick and wounded, and several other ports of Cuba have been opened to foreign vessels. More than half of the produce of the island destined for foreign markets is shipped at Havana. [Cuba.]

**Havercamp, Sigebert.**--He was born at Utrecht, A.D. 1683. He studied philosophy at Leyden under Gronovius, whom he succeeded as professor of Greek. He was also appointed afterwards professor of history and eloquence. He died on the 25th of April, 1742, in the 60th year of his age.

He edited many of the classical writers with numerous notes, which were principally selected from former commentators, of these the most important are 'Tertulliani Apologeticus,' 8vo., Leyd., 1718; 'Lucrètii Tractatus,' 8vo., Leyd., 1722; 'Inscriptionum Graecarum Fragmenta,' 8vo., Leyd., 1726; 'Extrav.-pius,' 8vo., Leyd., 1729; 'Orosius,' 4to., Leyd., 1738; 'Salustii,' 2 vols. 4to., Amst., 1742; 'Censorinus,' 8vo., 1743.

He was also the author of many original works, of which the most important are: 'A Universal View of the Dutch,' vol. 1727; 'Introductio in Historiam Patriam' 'a principis Hollandiae comitibus,' 8vo., Leyd., 1739; 'Sylloge scriptorium qui de linguis Graecae vera et recta pronunciatione commentarii' 'a lae' 4to., 1736; 'Notes,' 2 vols. Leyd., 1746; 'De Alexandri Magni Numismatische,' 4to., Leyd., 1722; 'The Massarum, 2 vols. fol., Leyd., 1734; 'Introductio in Antiquitates Romanae,' 8vo., Leyd., 1746. The list of Havercamp's writings shows that he was a laborious scholar; but many of his works bear traces of having been written in a hasty and careless manner.

**Haverfordwest.** [Pembroke-shire.]

**Hâvre, Le, or le Hâvre de Grace.** (The Haven of Grace), on the right bank of the Seine, at its mouth, which is several miles wide, in the department of Seine Inferieure; 108 miles from Paris in a straight line, and 30 miles by the road through Rouen, in 49° 29' N. lat., 6° 0' E. long.

Up to the time of Louis XII. the Hâvre was a mere fishing town, having a small chapel, covered with straw and dedicated to St. Gervais. Louis XII. the founder of the importance of the place: Francois I. surrounded it with walls; and Cardinal Richelieu in A.D. 1628 added to its fortifications a strong citadel, which has since been dismantled and converted into a barracks.

In the reign of Louis XVI. and in that of Napoleon, Le Havre received considerable improvement and augmentation. The site of the town and the neighbourhood are for the most part low and flat, traversed by several water-courses, one of which formed the origin of the port, which is comprehended within the circuit of the town, and has communicating with it three basins capable together of receiving upwards of 300 vessels. At the entrance of the port is an old tower built by Francois I., from which signals are made to vessels out at sea. Connected with one of the basins is a canal from Le Havre to Harfleur. There are also two roadsteads. The rise of the tide at Le Havre is from 22 to 27 feet, and the advantage of it is the largest merchants can enter the port.

The town is divided into the Old Quarter, of which the streets are tolerably regular but the houses ill built, and the New Port, which is built on the right bank of the Seine, with buildings of which are regular and handsome; the streets are neat, well watered, and well lighted. There is an arsenal and a custom-house, which is a large building: the town-hall, the office of the sub-prefect, the exchange, and the two churches are insignificant. There is a handsome square planted with trees and forming a public walk; there is also a handsome modern theatre. The populous suburb of Ingouville contains many pleasant country-seats. At Cape Le Havre, a headland about 130 yards high, at the mouth of the Seine, 24 miles west of the town, are two handsome lighthouses about 50 feet high. There is also a brilliant harbour-light on the extremity of the western jetty, at the mouth of the Seine, and having a lighthouse, and the Newfoundland cod fishery are also carried on. But the importance of the place depends upon its commerce. It is the principal port of Paris, most of the foreign and colonial trade being designed for the consumption of that city being imported into it. Besides numerous products, such as sugar, coffee, indigo, dyewoods, and spices, the imports chiefly consist of cotton (for the manufacturers of the dist
trict of which Rouen is the capital), tobacco, hides, iron, tin, dried fish, &c. The exports are silk and woolen stuffs, lace, gloves, trinkets, perfumery, wines, brandy, &c. Grain and flour are sometimes imported, sometimes exported. The usual imports are in value at from 60,000,000 to 65,000,000 francs, or above 10,000,000.: of which the value of the cotton imported was estimated at 26,000,000 francs or nearly 1,100,000.: that of the French colonial sugars 44,000,000 francs. Le Havre is a capital seaport and the most important of the French ports on the English Channel. There are also a public library of 5,000 volumes, and other literary establishments; a museum of natural history, a high school, a school of navigation, and one of geometry applied to the arts. There is a military hospital; and a yearly fair, that of St. Michael, is held in a field belonging to this institution outside the town. Le Havre was the birthplace of St. Pierre.

Le Havre is the capital of an arrondissement which comprehends an area of 344 square miles, has 9 cantons and 121 communes, and had in 1836 a population of 142,292.

It was near the site of this town that Henry V. of England landed previous to the siege of Harfleur and the battle of Agincourt. Le Havre is now a convenient harbor. Le Havre was invaded by England for an invasion of England, which drew upon the town a severe bombardment from an English squadron under Admiral Rodney.

Hawes, Stephen, author of 'The Pastime of Pleasure,' lived at the beginning of the sixteenth century, but the date of his birth and death are alike uncertain. He was a gentleman of great rank and wealth.

Hawes, Henry, author of 'The Pastime of Pleasure,' was born in Montague, Suffolk, and refers in his poems to Lydgate as his master. His accomplishments must have been equal to those of Hawes, and it is possible that he was a printer in literature, particularly French, in which Hawes's travels had given him uncommon skill, and poetry such as that of Lydgate and Chaucer, in the repetition of which Hawes was a great proficient.

The Pastime of Pleasure is an allegorical poem, 'containing the knowledge of the seven sciences and the course of Man's life in this world.' Grand Amour goes through the town of Doctrine, where he meets the Sciences, becomes enchanted with Puce, whom he marries, and with whom he spends his life.

It is by courtesy to metre and scarcely for any other cause, that we call 'The Pastime of Pleasure' a poem. We have said that Hawes 'the English-chaser of the French Prose' to the English Prose of France, the Latin Prose, and to the natural order of poetical creation; and this work seems to belong to that period when the epic element (the poetry of action) had been worn out, but having long held undisputed sway in the romances, as action itself had in real life, compelled those who lived in a more thoughtful and therefore lyrical age to clothe their reflexive poetry in an epic dress.

Another poem, 'The Temple of Glast,' is ascribed to Hawes, but there are almost equally strong reasons for believing it to be Lydgate's, as Hawes himself tells us that Lydgate composed a work under that name, and there is something about the run of the verses which reminds us rather of Lydgate than of Hawes. (Warton's Hist. of Eng. Poets, ii. 210; Southeby's Brit. Poets; Wood's Ath. Oxon.)

Hawfinch. Hae Grosebbek. Grosebak, of the modern British; Gyffsbrof of the Antient British; Le Grobbech and Le Grosbek of the French; Grosecke, Groseck, Grosecke, Groseke, Frisonne, Frisone, Friggione, of the Italians; Kernerbeis, Kirch Bernideck, Kerschhein, Nusheisn of the Germans; Apel-sink of the Netherlanders; Loxia Cocca-thrax, of the Linnaeans; Prunella Cocca-thrax of Temminck; Cocca-thraxus vulgaris of Brisson.

Description.—Rump, head, and cheeks red-brown; edging round the bill, space between that and the eye, a line between the lores, and a series of black dots on the nape; a collar just below the nape; back and greater part of the wings deep brown, but there is an olive white stripe upon the wing and beyond it a considerable space of a light white colour going off into chestnut; secondary quills as if cut off square at the ends, and, as Edwards says, with justice, like the figures of some of the antient battles, glossed with rich blue, less conspicuous in the female; Tail feathers of the head and tail, a blackish brown on the external bars; lower parts of the bird vinous red; iris pale red (according to Temminck), feet and bill greyish brown. Length seven inches.

Female. The bill is not so yellow as the male, but with the colours much less brilliant.

Young of the year before the moult.—Very different from the adults and old birds. Throat yellow; face, cheeks, and sides of head vinous red; a large capitulum below the eye; a vinous red supra-orbital, black behind, white below; sides marked with small black streaks, with which all the feathers are terminated. As the young bird advances in age some red vinous feathers appear disposed irregularly upon the belly; the upper parts are of a furnished brown, spotted with dirty yellowish; bill whitish brown, except at the point, where it is deep brown. (Temminck.)

Mr. Gould (Birds of Europe) says that in the male the beak and feet in winter are of a delicate flesh-brown, the former becoming in summer of a clear leaden hue, the ends straw-colour, and in some instances white; the top of the head, the cheeks, and rump, of a chestnut-brown. The rest of the description does not differ much from Mr. Temminck.

Varieties.—White, yellowish, or greyish. Wings and tail often white. Plumage often variegated with white feathers.

Food, Habits, Reproduction, &c.—Hard seeds and kernels form the principal food of the Grosbeak, but we have seen it feeding on the berries of the hawthorn (whence its name), and we have sometimes so observed it that it is probable the soft part of fruits is not disagreeable to it, although the bill is evidently formed for cracking the stony kernel. Willughby states that it breaks the stones of cherries, and even of small hickory nuts. The females of one which he dissected in the month of December was full of the stones of holly-berrics. The majority of ornithologists give the Hawfinch credit for forming a nest of mud, but Mr. Willughby states that the materials of the nest are usually composed of leaves, moss, weed-stalks and other soft materials, with a lining of feathers and other soft materials. But, according to Mr. Doubleday, who has thrown much light on the history of this bird, and discovered it breeding in Epping Forest in May and June, the nest, which is made in some instances in bushy trees at the height of five or six feet, and in others near the top of trees at an elevation of twenty or thirty feet, is remarkably shallow and carelessly put together, being scarcely deeper than that of the dove. In materials it resembles the nest of the buntings, but is inferior to it in neatness and compactness of construction. Eggs, from four to six in number, of a pale greenish white, varying in tint, spotted and streaked with dark brown. This greenish grey is the least prominent spot on the eggs.

The Hawfinch is not a common bird, and is known by the bird to breed near Windsor, and a few other places; but certainly nowhere so abundantly as on the estate of W. Wells, Esq., at Redleaf, near Penhurst, Kent. This gentleman informed Mr. Gould that he had, with the aid of a small telescope, counted at one time eighteen on his lawn.

Mr. Selby remarks that in the pairing season it probably utters a superior song, as Montague says that even in winter, during mild weather, he has heard it sing sweetly in low and plaintive notes.

Geographical Distribution.—Plentiful in some districts of France; permanent and not uncommon in Italy; common in Germany, Sweden, and part of Russia. Mr. Selby's Illustrations, and indeed in most other English works, the Hawfinch is noticed as an occasional visitor. Dr. Latham says that the Hawfinch visits us chiefly in winter, but only within the limits of England, and perhaps Mr. Selby, in his 'Illustrations,' was not aware that the bird he found in Kent was anything but a rare and accidental one. Mr. Selby has no authority for its ever being the case. This authority now exists in the observations of Mr. Doubleday.

'The Hawfinch,' says Mr. Doubleday, 'is not migratory, but remains in the same quarter, and is a kindness of the observer sufficiently accounts for the rarity of its appearance,—its shy and retiring habits leading it to choose the most secluded places in the thickest and more remote parts.
of woods and forests, and when disturbed it invariably perches on the tallest tree in the neighbourhood.

Cocothranthes vulgaris.

HAWICK. [ROXBURGHSHIRE.]

HAWKESWORTH, JOHN, LL.D., was a successful writer of the last century. The date of his birth (1715 or 1719) and the occupations of his early life are variously stated: in so short a notice, all that is essential to record is that he was bred to some mechanical occupation, and therefore deserves the more credit for his talent and industry in supplying the defects of a rude and illiterate education. His first appearance was as a contributor to the 'Gentleman's Magazine,' in which he succeeded Dr. Johnson as compiler of the parliamentary debates in 1744. In 1752, encouraged by the success of the 'Rambler,' he undertook, assisted by Johnson, Wattson, and one or two others, a series of essays, called the 'Adventures.' They extended to the number of 140 (70 of which are ascribed to Hawkesworth himself), were received with great approbation, and contributed much to the increase of his reputation and fortune. Herring, archbishop of Canterbury, was so much pleased with the work, that he procured a degree in civil law for the conductor. This compliment however produced a permanent alienation on the part of Johnson, who had not yet received the same distinction. He probably regarded the man so patronised as a mere imitator of himself; and in fact Hawkesworth's style appears to have been modelled upon Johnson's, though less remarkable for pomp and inflation of diction. In 1761 he published an edition of Swift, with a life prefixed, to the merits of which Dr. Johnson has borne handsome testimony in his 'Lives of the Poets.' On the return of Capt. Cook from his first voyage of discovery in the South Seas, it being thought desirable to entrust the task of translating an English account of it into a language, rather than to one of the travellers, Dr. Hawkesworth's reputation as an able writer obtained for him the commission. He completed the task in three volumes, 4to, 1773 [Cook], illustrated with maps and plates at the expense of government, including the prior voyages of discovery of Byron, and of Wallis and Carteret, and received for recom pense the liberal sum of 6000l. The work however did not give universal satisfaction; the warmth of his descriptions of manners, in some respects, was thought to verge upon immorality; and exceptions were taken to some religious speculations, which, right or wrong, were certainly out of place. The charge occasioned by these censures is said to have shortened the author's life, but as he died in November of the same year, the statement is probably incorrect; the effect of criticism on a practised author is seldom so rapid and deadly. The accounts of Cook's subsequent voyages were written by Cook himself, and gained more in simplicity and correctness than they lost in literary elegance. Dr. Hawkesworth translated 'Telemachus,' and wrote 'Almae Indi,' an eastern romance, which was much admired. He was a regular contributor to the 'Gentleman's Magazine.'

HAWKESWORTH, SIR JOHN, a distinguished seaman of the reign of Elizabeth, was born at Plymouth, about 1520. His youth was spent in trading to Spain, Portugal, and the Canaries; and the information and experience which he thus obtained made him well aware of the gain to be derived from supplying the Spanish colonies with slaves from Guinea. With the assistance of some merchants, he fitted out a small squadron in 1563, and obtained, partly by purchase, partly by force, a cargo of 300 negroes, whom he carried to Hapunia, and there sold. This, we believe, was the first adventure of Englishmen in that inhuman traffic. He made a second voyage in 1564, and a third in 1567: the latter turned out unfortunately. All trade between the Spanish settlers and foreigners being prohibited by the mother-country, though often, from interested motives, connived at by those in power, he was at last attacked by the Spanish authorities in the port of S. Juan de Ulloa, and saved but two ships of his squadron, with which, after suffering great hardships, he returned to England in January, 1568. This seems to have been his last commercial enterprise. The queen's approbation of his services and the donation of that above-mentioned which, after the lapse of more than two centuries, the tardy voice of Europe has branded as piracy, was conveyed in the expressive grant to wear as his crest 'a demi-moor in his proper colour, bound with a cord.' In 1572 Hawkins was appointed treasurer of the navy. In 1588 he served as rear-admiral against the Spanish armada (Armada); and his bravery on this occasion was rewarded by Elizabeth with the honour of knighthood. Being sent with Frobisher in 1590 to intercept the plate fleet and harass the trade of Spain, he failed in the first object, but succeeded in the second. In 1595 he was appointed, jointly with Sir Francis Drake, to the government of that section of the Spanish settlements in the West Indies. This enterprise proved fatal to both these hitherto successful commanders. They disagreed upon the conduct of operations, and soon separated. [DRAKE.] Hawkins died November 21, 1595, chief of the squadron then composed, then in his 57th year, and Sir Francis Drake expired in the following month. Sir John Hawkins sat in parliament for Plymouth, and founded an hospital at Chatham for poor and sick seamen.

HAWKESWORTH, SIR JOHN, the second of the two chief historians of music, the friend and executor of Dr. Johnson, and a descendant of the Sir John Hawkins who commanded the Victory, as rear-admiral, at the destruction of the Spanish armada. He was born in London, and was a yeoman and builder, at first brought his son up to his own profession, but eventually bound him to an attorney, 'a hard taskmaster and a penurious housekeeper.' At the expiration of the usual term, the clerk became a solicitor, and by unremitting assiduity, united the most indefatigable probity, he, unfriended, established himself in a respectable business, while by his character and acquirements he gained admission into the company of men eminent for their accomplishments and talents. He was an original member of the Madrigal Society, and at the age of thirty was selected by Mr. (afterwards Dr.) Johnson as one of the nine who formed his Thursday-evening Club in Ivy-lane, and was to be a member of the academy which Johnson had projected, and which it was his aim to form his literary habits, and powerfully influenced his future pursuits when, not many years after, he relinquished his profession. About this time he contributed much to the Gentleman's Magazine, and other periodicals of the day. He also wrote the poetry of the cantatas set to the blind composer, Stanley, from which he derived considerable profit.

In 1753 Mr. Hawkins married Sidney, the second daughter of Peter Storer, Esq., with whom he received an independent fortune, which was greatly augmented in 1759 by the death of his wife's brother. He then retired from all professional avocations, giving up his business to his clerk, Mr. Clarke, and consequently became a prominent citizen of the city of London. With this increase of wealth is connected an anecdote of far too honourable a nature to be omitted here. The brother of Mrs. Hawkins made a will, giving her the whole of his fortune, except a legacy of 50l. from whom he had become alienated, and communicated the fact to Mr. and Mrs. Hawkins, who, by representing the injustice of this act, and by adding entreaty to argument, prevailed upon him to make a more equitable distribution of his property, and an equal division with the consequence. 'We lost by this (says Miss Hawkins, her father's biographer) more than 1000l. a-year; but our gain is inestimable, and we can ride through a manor gone from us with exultation.'

Upon retiring from the law Mr. Hawkins purchased a house at Twickenham, intending to dedicate his future life to literary labour and the enjoyment of select society. But in 1761 he was inserted in the commission of the peace for
The county of Middlesex, and immediately became a most active magistrate. Among other useful acts, he wrote, "Observations on the State of the Highways, and the Laws for amending the same," which became the subject of a bill, which passed into a law. In 1764 he successfully opposed the attempt made by the corporation of London to throw on the county two-thirds of the expense of building the goal of Newgate, and in the same year was elected a member of the Middlesex quarter-sessions. Here again his independent spirit and charitable disposition were manifested. Acting as a magistrate, he at first refused the custom of sitting with under-magistrates, on the ground that proceeding further increased the litigious disposition of the people in his neighbourhood, he altered his plan, took what was his due, but kept the amount in a separate purse, and at fixed periods consigned it to the clergyman of his parish, to be distributed at his discretion. When the riots at the Brentford election took place in 1768, he was active in their suppression; and the suppression of the Spitalfields weavers in 1769, who had collected in a very threatening manner, was mainly owing to his decision and boldness. For these services he received, in 1772, the honour of knighthood.

Sir John Hawkins now set seriously about finishing his great work. He went to Oxford, and there remained some time, to examine the books in the Bodleian and other libraries, connected with his inquiry. He was accompanied by an artist, whom he engaged to make drawings of the portraits in the books. It is said that this artist was the amanuensis of his History. From the Rev. Mr. Gostling of Canterbury, who visited two years consecutively for the purpose, he also gained much valuable information, as well as from Doctors Boyce, Cooke, and others qualified to aid him in his pursuit. In 1766 appeared, in five quarto volumes, the work on which he had been 16 years engaged, under the title of "A General History of the Science and Practice of Music," which was dedicated to George III., and presented to his majesty at Buckingham House, during a long audience granted for the purpose. The king no doubt appreciated the work as it deserved; and the university of Oxford showed their estimation of it, by offering to confer on the author the degree of doctor-in-law, which he had reasons for declining; but that learned body paid him the compliment of requesting his portrait. With the public however the reception of the History was widely different. The best judges, it is true, discovered its value; its research and accuracy were obvious to those who were qualified to form an opinion on the subject; but five large volumes were alarming to the public, and, unfortunately for the science, the western extension of the book left untouched those matters in which the living many were most interested. Moreover, on the appearance of the History, Sir John was immediately attacked in the "St. James's Evening Post," and a long article was contributed to it by the Rev. Mr. Gostling, who was the most virulent and unceasing critic; and every engine was set in motion to damage the reputation of the work. Subsequently it was assailed by the ridicule of Dr. Lawrence, in the "Proscription Odes." The consequence of these persevering efforts to destroy a very learned and most useful, though not well written history, was, that it fell nearly dead from the press. Stevens and Lawrence were the friends of Dr. Burney, who may account for, though it cannot palliate, the ill-conduct; but it is to be hoped that the rival historian neither instigated nor sanctioned proceedings so unfair and so cruel. Time however has done justice to the author who his contemporaries regarded as a bore, and his history is found in every good library, and the more it is read and known, the more it will rise in public estimation and demand.

Hawkins drew his materials, Hawkins accumulated a fine musical library; and it was his singular good-fortune to become possessed, by purchase, of several of the most scarce and valuable theoretical treatises on the subjects denoted him. The collection was collected by the celebrated Dr. Pepusch, F.R.S. This collection, after the death of his works, most liberally gave to the British Museum, where it remains.

In 1769 Hawkins published his edition of Walton's notes, of which three or four editions have since appeared. On the death of Dr. Johnson, in 1784, Sir John undertook, in consequence, it is supposed, of some conversation between them, to write the life of his friend, and to become editor of a complete collection of his works. In this task, as in his History of Music, it was his fate to meet with unmerited and unmerited criticism. But he had scarcely entered on the work when his whole library—a library which no expense could replace—was destroyed by fire. The blow was severe, though the sufferer never murmured, but began again to collect. In 1787 he published a life of Dr. Johnson, and an edition of his works.

In the month of May, 1789, Sir John Hawkins suffered a paralytic attack, which from the first was considered of a fatal nature. It increased on the 21st and he died on the 24th, before he expired. His remains lie in the cloisters of Westminster Abbey, where, by his own direction, a simple tablet with his initials and the date of his death is the only monument to his memory. He left two sons and one daughter. The latter is well known in the literary world: her novels are too didactic for the multitude, but the cause of virtue and right feeling has never found a more zealous advocate.

HAWKES. [FALCONE; FALCOWRY]

HAWKESHEAD. LANCASHIRE.

HAWKSMOOR, NICHOLAS, who, although not included in Cunningham's "Lives of British Architects," executed many buildings of note in the early part of the 18th century, which is considered the period when he became the pupil of Sir Christopher Wren. Beyond this we possess very few personal details relative to him. His works, if they do not display a very refined taste, give evidence of a certain degree of boldness and grandeur. Of this he had proof in the church of St. George's in the East, Ratcliffe Highway, commenced by him in 1715, which is no less ponderous in its ensemble than hard and dry in its details, besides being most extravagantly bare and anomalous. That St. Mary Woolnoth's in Lombard Street is very much better; though a certain degree of richness and picturesque character in the north side, which, until the late alterations, was the only one exposed to view. This facade is remarkable for having no windows, but in lieu of them three large niches, decorated with columns and external rustics, and in themselves not ill-imitated, although too much cut up by the smaller niches inserted between the pedestals of the columns; had the rustics been continued uniformly below them, and the smaller blank windows or panels been entirely omitted, the effect of the whole would have been decidedly improved. The interior, which is lighted chiefly by a square dome or closed cylinder, and by one circular window at each end of the columns at each angle, and having a large semicircular window on each of its sides, is one of the best specimens of church architecture of that day, though the effect is greatly increased by the spire covered with lead, which is not the architect of St. George's, Bloomsbury, that Hawksworth is entitled to notice, that being a work which itself ought to confer a lasting reputation. It is true, Walpole has stigmatized the steeple as "a masterstroke of absurdity," and adopting that 昕arily expressed opinion others have continued to repeat his censure. Malton was one of the first who ventured to express a contrary judgment, and it has more recently had a plainer justice done to it by a writer in the "Quarterly Review," who very deservedly gives it the preference over every other steeple in London. It is certainly the happiest as well as the most original in its idea; picturesque and graceful in outline; well combined and varied; constructed with great solidity, remote from heaviness on the one hand, and on the other from that species of lightness which, though a merit in Gothic, becomes a fault in Roman architecture. One leading fault is the low close position of this steeple, which is expressed by a statue of George II., which gave rise to a paltry epitaph that had perhaps quite as much influence in exciting a prejudice against the structure as Walpole's dictum. Yet if there be any inconsistency or extravagance in its being the structure of a steeple by a statue, it is perfectly equalled if not surpassed by that of erecting a column, for no other purpose than to elevate a statue upon it: because in the latter case the figure, though put almost out of sight, is presumed to be the principal object, whilst in the former it is considered an ornamental accessory and termination to the structure. The portico of this church, which is like that of St. Martin's,
Haydn, Joseph, the father of modern orchestral music, was born at Rohrau, about fifteen leagues from Vienna, on the 31st of April, 1732. His parents were both of the smallest condition, and his father was a small wheelwright, and his mother, previous to her marriage, was cook to the lord of the village; but both, true Austrians, were musical: the former had a fine tenor voice and could play on the harp, the latter sang, and with the aid of a relation they got up little concerts on Sunday afternoons, in which the young Haydn, when five years of age, pretended to join them with two pieces of wood cut in imitation of violin and bow. The amusement with which his motions kept time with the domestic music attracted the notice of a cousin, a schoolmaster at Hainburg, and a good musician, who made an offer, which was readily accepted, to take the child into his house as a scholar. Under the guidance of this kind, intelligent, and musical man, he soon became capable of using a real violin, and acquired some knowledge of Latin. He was also taught to sing in the parish church, where he was heard by Herr Reuter, Kapellmeister of the cathedral of St. Stephen, who was travelling in search of boys for the use of his choir,—and immediately engaged as a chorister in the metropolitan church of the empire.

Under Reuter, Haydn continued till he arrived at the age of thirteen, practicing almost incessantly, but receiving only such instructions from his master as qualified him for the duties of the choir. At that period failing, for want of sufficient knowledge, in an attempt at composition, and being utterly destitute of the means of obtaining the assistance of a master, he contrived to procure the well-known treatise on counterpoint by Fuxha, with one or two other works on the theories of which he had a certain idea. Notwithstanding this, he steadily surmounted the first difficulties encountered by a youthful composer. He now made himself known to the famous Vonpor, who was living in the hotel called by the street from Venetian, and signed, it may be of duty to the old musician gained much knowledge from him, particularly in singing, in which he made such progress that the ambassador, having heard him, took him into his service, and bestowed on him a trifling salary. But at the end of a short time, Haydn considered this engagement as little suited to his future plans, and his father, finding that he had fulfilled the present means of living. His father could render him no assistance, and, sorely distressed, he was offered an asylum in the house of Keller, a wig-maker, who had often been engaged in experiments on voices, and who, by his skill and patience, had rendered himself so acceptable, and Haydn was, in obscurity, enabled to pursue his studies. But his residence with the friendly tradesman powerfully influenced his future domestic life. Keller had

a daughter, who was offered to the young musician in marriage. He gave his promise to her, which after a time he honourably fulfilled; but the union however did not contribute to the happiness of either party, and ended in a separation not very long after it had taken place.

By giving a few lessons in music, and occasionally performing in the orchestra for what he could get, Haydn supported himself, and lived entirely by his ow. He being one of the German virtues, he maintained to preserve a tolerably decent appearance; till fortune first began to smile on him, by leading him into the house of the Abate Motastasio, where he gave instructions to the poet's niece, who gained not only an acquaintance with the Italian language, but a general knowledge of literature, and the most useful advice on the subject of setting words to music, from the imperial laureate. This connection also introduced him to the Count Martin, a noble patriot of his age, whose service he entered in 1759: and hence, in 1761, he passed into that of the rich Prince Esterhazy, to whom he remained attached, as Mastro di Capella, to the end of his life.

Comfortably settled in the palace of Eisenstadt, in Hungary, enjoying in moderation his favourite diversions of hunting and fishing, and relieved from care for the future, Haydn devoted himself to all the works which he produced prior to the year 1791, and under advantages which few, if any, have possessed:—he had a full, choice band, living under the same roof with him, at his command every hour in the day; he had only to order, and they were instantly ready to execute his will. In the city of Vienna, occupying a part of an apartment, that, quietly seated in his study, he might commit to paper. Thus at leisure he heard, corrected, and refined whatever he conceived, and never sent forth his compositions till they were in a state to bear the unceasingly challenging of the world.

We now arrive at that period in the life of Haydn in which were produced most of those works that have raised his fame to the high point it has attained. In 1790 Solomon, the celebrated violonist, having determined to give a series of subscription concerts in London, went to Vienna to engage either Haydn or Mozart, not only to produce certain compositions in aid of his design, but to superintend in person the performance of those by the three parties that Haydn should be the first to visit London, and that Mozart should follow the year after; but it was destined that the latter should not live to fulfil his part in the agreement. In 1791 Haydn arrived, and produced during that and the following year, at Solomon's Concerts in the Hanover-square Rooms, six of his Twelve Grand Symphonies, which immediately made an extraordinary sensation in the musical world, and have never since lost their music as an instrument. Here also he composed, by agreement with Corri and Dussek, music publishers, his two sets of English concertos, which for originality, for musical expression of every feeling of the noblest kind, and for skill in the art of accompaniment, have no rivals. Besides these his prolific imagination gave birth to many quartets, sonatas, &c.

In 1794 Haydn accepted a second engagement from Solomon for the same purpose. He reached London in January, and in the course of that and the succeeding season brought forth the remaining six of his grand symphonies, with the same brilliant result. For these twelve symphonies and for several others having determined to give a series—amongst them two benefit concerts, the profits guaranteed by Solomon—amounting to 1550l. To this is to be added, as the fruits of his visits to England, what he has received in private distributions of works and other compositions; it was therefore with reason he declared that in London he discovered the real value of the reputation he enjoyed in Germany. His reception here was of the most flattering kind. The university of Oxford conferred on him the degree of Doctor of Music; at the tables of the king, and the duke of York he was a frequent guest; and nearly all classes vied in showing him attention. The satisfaction which he felt he gratefully acknowledged and evinced in a diary he kept during his stay, and which formed part of a part of which (a curious document), with notes, appears in the fifth volume of the Harmonicon.

In 1798 Haydn gave to the world his oratorio The Creation, the most important work of his sixty-fifth year. It is enough to say of this fine production of his advanced years, that it is the only oratorio, of many that have been produced, that can bear comparison with
those of Handel. The design was suggested, his biographer, M. Boyle, tells us, by an English gentleman named Lidley (Liddell, we suspect, is the true name). The German text however, and the barbarous English translation (which to our shame is still in use), were furnished by the Baron Von Swieten, who may be said to have been the he who in a work of such originality as the Creation, but not exhibiting, nor intended to exhibit, the same depth of thought. The subject is not of so grave a nature, and is treated with a circumspection that two faithful copies were two sets of quartets, which betray no abatement of his vigour: on the contrary, the second of his Op. 89 is perhaps the most original and exquisitely finished of all the works of his maturity.

When Haydn's Creation reached Paris the Institut National elected him a member, an honour contested with him by some of the greatest men of the time in Europe: but the decision was just; for through the candidates had contributed so much to the happiness of civilized nations? His few remaining years were spent in the enjoyment of a great and well-earned reputation, and a small independence created by his talents; and the last hours of his mortal life were crowned with honours. (Supplement to Musical Library, i. 27.) His death is supposed to have been accelerated by the bombardment of Vienna, which powerfully agitated his sensitive frame. Though it must be admitted to the honours of his native country, his strict orders that the abode of Haydn should be respected; and when the soldiers entered the city a French guard was placed at his door to protect him from every kind of injury. His body was sent to England, also was interred in St. Paul's, and then buried at Gumpendorf, his country then suffering all the horrors of war, and the capital of the empire being in possession of the enemy. He left no children. His property, except about £2,500 in cash, contained only his library, comprising his 

Seven Last Words, a grand Te Deum, a Stabat Mater, 14 Italian and German operas, 42 duets and cantatas, upwards of 200 concertos and divertissements for particular instruments, &c, &c., &c., &c., &c. The possession of these valuable, were irretrievably lost in the fire which consumed the palace of his patron at Eisenstadt: the best are out of the reach of danger; they have been printed and reprinted in hundreds of editions.

HAYLEY, William, best remembered as the friend and biographer of Cowper, during the end of the past and the beginning of the present century enjoyed a considerable reputation, less perhaps from his sterling merit as a poet, than from his character; but he did not possess the talent, and devotion to art, with an easy fortune, and a fortunate position in society. Of epistles and occasional verses he was a frequent, willing, and eleemosynary collector; but he was a master of the branch of composition as fleeting as it is commonly ex- cessive. Mr. Hayley was born at Chichester, in 1745, and studied in Trinity Hall, Cambridge, intending to practise as a barrister. Finding the law not to his taste, he settled on his patrimonial estate of Earlham, in Sussex, in 1774, a name memorable by its frequent occurrence in the history of Cowper, with whom the proprietor became acquainted in 1792. Hayley died November 29, 1820. Among his numerous poetic works, the 'Triumph of Temper,' 1781, was the most popular, probably in consequence of the domestic interest of the subject. The 'Essay on Painting,' 1778, and 'Essay on History,' 1781, addressed respectively to his friends, Romney the painter, and Gibbon, rank among his best productions. We may add, as the most important of his other numerous works, the 'Essay on Epic Poetry,' 1792; 'Life and Poetical Works of Milton,' 1794-5; 'Essay on Sculpture,' 1800, addressed to his friend Flaxman; 'Life of Cowper,' 1802. (Life of Hayley, by himself, 1823.)

MAYTY, [HISPANTOL.] HAZEBROUCK, a town in France in the department of Nord, on the road from Paris to Dunkerque: distant from Paris 128 miles in a straight line almost due north, or 140 miles by the road; in 50° 43' N. lat., 2° 32' E long. for oil, and fruit. The streets of the town are well laid out, the houses handsome, and the place has the air of being inhabited by a wealthy and thriving population. There is a large and handsome market-place, in which is the town-hall, with a Doric colonnade, built of freestone. There are four subordinate churches. The town is the seat of a high school, and two theatres. The population in 1836 was 7674.

Hazeau is the capital of an arrondissement having an area of 287 square miles, and comprising the entire part of 53 communes: the arrondissement had in 1836 a population of 105,879.

Hazel-nut, the fruit of the wild bush of Corylus Avellana, unconnected and unimproved by cultivation. It differs from the domesticated varieties only in being smaller and rather more hardy. [FILBERT.]

HAZLITT, WILLIAM, the son of a Unitarian minister of the same name, was born in London, on the 10th of April, 1778. When he was five years old his father transferred the scene of his ministerial exertions to America, and remained with his family in the United States for two years. On his return to England the father became pastor of the Presbyterian congregation at Wem in Shropshire; and it is here that the work of Hazlitt's education was commenced. At the age of nine he was put to a day-school at Wem. Some letters written by him, between the ages of eleven and twelve years, have been published, and show forward mental development; and in addition to these specimens of private correspondence, there is a letter, which he published at the age of thirteen, in a newspaper, in defence of the loyalty of Dr. Priestley, and another, written at fourteen, concerning the English language, as well as literary skill. In 1793 Hazlitt was entered as a student of the Unitarian college at Hackney, in order to be educated for his father's profession. But for this profession he had no great taste; and, having failed at the college, he determined to change his course. He went to London, where, at the college, principally to moral and political philosophy, and having comparatively neglected theological pursuits, he returned home in 1795, having determined to pursue his father's wishes, to change his course. Hazlitt had from a very early age shown a love of pictures and a taste for drawing, and it was now determined that he should follow the profession of a painter. He commenced with great activity, and assiduously continued to cultivate metaphysics in his intervals of leisure. We are told by his son that the first rough sketch of the essay on the 'Principles of Human Action' was thus begun at the age of eighteen. In 1802 he visited Paris for the purpose of studying the paintings in the Louvre; and on his return to England in the next year he made a professional tour through some of the midland counties and the manufacturing towns, and painted a considerable number of portraits; and his first collection of articles on politics and theology was issued in 1803. This was followed by another, and his literary pursuits. In 1811 he returned to London, and we find his residence in a house in York-street, Westminster, which had been once inhabited by Milton, and which then belonged to Bentham. The adornment for genius led him to erect, in the garden of this house, a tablet 'inscribed to the Prince of Poets,' and he was afterwards much scandalized by a plan of Mr. Bentham's to cut down two beautiful cotton-trees which ornamented this tablet, and to expose the garden and the tablet to the continual intrud of the members of a Chartistological school. The passage however in the 'Spirit of the Age,' in which Hazlitt speaks of this contemplated operation of forming the plan which is, perhaps, not altogether free from an affected sentimentality, of which, it must be allowed, he is not often guilty.
In 1813 Hazlitt delivered a course of lectures at the Russell Institution, on the history of English philosophy; and subsequently he lectured on the English poets generally, the comic poets, and the poets of the age of Elizabeth, in separate courses, at the Surrey Institution. The three last series of lectures have been published, but not those on the history of philosophy. He acted for a short time also as reporter to the 'Morning Chronicle,' and after giving it up he devoted himself entirely to his literary pursuits. His 'Edinburgh Review,' and some smaller magazines. His life was indeed one intermitting experience of the pleasures of a popular writer, or of a man who has the fortune of being paid for his genius, and driven into his work by the necessity of serving a living. His income brought him a considerable income, which however his imprudence always quickly dissipated.

In 1822 he was divorced from his wife, and two years afterwards he married a second time. He died on the 13th of September, 1836, at Chelsea, and was buried in the churchyard of St. Anne's, Sloho, where a friend has raised a monument to his memory. A long and eloquent inscription concludes thus: 'This stone is raised by one whose love with him in his grave.'

Hazlitt's principal works, besides those which have been already mentioned, are the 'Round Table,' in which he was assisted by Mr. Leigh Hunt, the 'Table-talk,' the 'Plain Speeches,' the 'Characters of Shakespeare's Plays,' the 'Spirit of the Age,' which is a series of interesting sketches of his most distinguished contemporaries; his 'Political Essays,' projected by himself from newspapers, and published in volumes, each of which was received with unqualified applause; and his 'Life of Napoleon,' which Hazlitt himself looked upon as his great work, and which was his last. The articles which he contributed to the 'Encyclopaedia Britannica,' was also written by Hazlitt.

The principal merits of Hazlitt as a writer are force and ingenuity of illustration, strength, terseness, and vivacity. Another characteristic, which, by excess, often becomes a fault, is the affection of the language. To enable us to understand, said one good quality frequently exhibited in his writings is terseness, it often happens that he is chargeable with the opposite faults of verbosity and diffusion. There is also a want of repose in his style, which, for a long time, and which, despite the splendour of particular passages, tends to leave an unsatisfactory general impression. But in a number of fine passages which one would read, not only once, but again and again, one is stung by nervous sentences, which, without an effort, would impress themselves on the memory, there are few writers who can match Hazlitt. We hardly know, in the whole circle of English literature, even in this age, an equal exception, a finer specimen of accumulative eloquence than the account of the intellectual life of Coleridge in the 'Spirit of the Age.'

His personal qualities were doubtless not of that kind which gains the good-will or affection of men. Yet there was something in his moral constitution, and that not little, to be admired. If amiability was wanting, strength was there; and the regret with which one contemplates his irritable temper and its constantly distressing consequences is in some degree at least compensated by admiration for the moral courage with which he was ever ready to enter into conventions of the world and despise the frowns of the great.

Since Hazlitt's death, two volumes of his 'Literary Remains' have been published by his son, with a short life, some additions, at the Surrey Institution, and some additional remarks, and I feel inclined to think that he will be regarded as a man of good and great feelings, and to which we are principally indebted for the above account.

HEAD. [BRAIN; SKULL.]

HEAD, INJURIES OF THE. From the many peculiar and important features which they present, injuries of the head have properly received a separate consideration in all systems of surgery. For not only is the brain so essential to life that even its least injury must be regarded as serious, but the parts around and guarding it have peculiar properties. The skull is composed of two distinct and perfectly separated portions of bone, hard, compact, and impervious to external injuries; and it is only by slight cuts, is extremely liable to fracture, and it is covered by a very dense and tightly applied membrane, the pericranium, of which the injuries and diseases exhibit all the peculiarities of those of other fibrous membranes. By the free communications of its vessels with those of the similar membrane (the dura mater) lining the interior of the skull, and less directly with those of the brain, disease is very liable to spread from the pericranium to those more important parts; and it is itself covered by the hair, and the scalp, which is always prone to extend widely. The injuries of the head are best considered as they affect the parts enclosing the brain or the brain itself.

In most instances, the size and shape of the skull are such as to render the two circumstances are worthy of notice. A vessel of some size may be burst without the skin over it being wounded, in which case a most copious effusion of blood takes place, raising up the scalp from the skull, and the rapid swelling of the head may come together at the top of the head. It is therefore in particular treatable; no incision should be made into it, for if cold wet cloths are diligently applied, the blood will be again rapidly absorbed. If the effusion of blood from the brain take place between the pericranium and the skull, the former is raised into a tumour, with sharp defined edges, and yielding to pressure in a manner so similar to that of fracture with depression of the skull, that the most experienced surgeon might be readily deceived. The operating surgeon is in the best situation, had he known that it should never be employed except in cases in which the brain itself is implicated.

A common superficial wound of the scalp needs no particular treatment. It is the nature of the case, after the hair around it has been shaved off, and it should be kept cool; but to guard against mischief to the adjacent parts, the patient should avoid all stimulants, and all inflammation of either the body or mind. Not unfrequently a violent oblique blow will strip off a large flap of the scalp so as even to denude the bone. In cases of this kind, the part, after being carefully cleaned, should be accurately replaced: if absolutely necessary, a dressing should be applied to the wound, and the rest should be closed by adhesive-plaster; the head, after being shaved, must be kept perfectly cool; the patient must be placed on a low diet, take sampilent medicine, and remain quiet; on the first appearance of general excitement blood must be taken from the arm, and by leeches applied round the wound; under this treatment many cases get well with almost singular rapidity; but if irregularities be permitted, some consequences may ensue even from the slightest injuries.

One of the most common of these sequelae of injuries of the scalp is erysipelas of the head and face. It generally begins at the nose, and spreads up the cheeks and forehead, and in the full and potherbite. It commences about the third or fourth day after the injury; the patient begins to complain of headache and a feeling of general illness; he has a shivering fit, followed by nausea, thirst, and restlessness; the eyes are quick and red, the tongue is dry, and a thirst that cannot be quenched, and is perhaps slightly delirious. Soon after these symptoms have commenced the head and face feel very hot, and become red and swollen, appearances which increase, and after a day or two are accompanied with an erupcion of small blisters, full of yellow fluid. There is no pain on touching the parts; but by the great swelling the eyes are often closed, and the features almost obliterated. Active reducing measures should, as a general rule, be early employed, and continued, if the disease does not yield, as far as the patient's strength will permit; and percutive, with small doses of mercury, should be given, but the liver is very delicate, and a person from five to eight days the inflammation in most cases subsides, the cuticle scales off, and the wound, which had assumed an indolent unhealthy appearance, acquires a vigorous aspect, and rapidly heals. But in some cases a fistula may result, and if this is the case the parts, and the scalp is separated, and there is profuse discharge from the wound. One or two incisions should in such case be made into the sloughing part, to admit of the free separation of the sloughs; and even with this the disease will sometimes spread and prove fatal.

Another affection which sometimes follows injuries (and especially punctured wounds) of the external coverings of the head is the separation of the muscles attached to the brain. A separation of the muscle covering the top of the head with the pericranium.
The general symptoms of fever are in these cases less severe than in erysipelas; the scalp is less hot and swollen, but more painful and very tender; the face is never affected. After a few days of general ill ease, a feeling indicating a collection of fluid may be perceived over some part of the brain, and the general appearance of the body is altered; and as appeared, a quantity of matter may be pressed out of it from beneath a large portion of the scalp. When this affection is suspected to be coming on, leeches should be let out, and the parts be kept cold diligently applied; but if matter should form, one or more free incisions should be made through the scalp to let it out, and the part afterwards treated like a common abscess.

In cases in which the bone has been exposed, the same general and local treatment should be employed. The scalp when replaced may at once unite to the bone; or if it do not, granulations may spring up from the surface of the bone and close the wound: in worse cases, the outermost layer of the skull may die, and require a tedious process for its exfoliation and healing; in the worst, the whole thickness of the skull may perish, and the dura mater be exposed. In all those cases the mildest treatment is requisite, but as the disease is extremely liable to spread to the interior of the skull, the general health should be carefully watched, and all signs of mischief arise, general or local bleeding should be once employed.

When the bone itself is injured, no active treatment should ever be adopted, unless there are evident signs that the brain is suffering from compression or other pædiac injury. The blood vessels of the scalp rupture the most rapid those of other bones; and in some cases, especially in children, the skull may be forced to some extent, but when it does not produce any derangement of the functions of the brain the injury will be repaired, and health perfectly restored. Cases of fracture of the skull in which the brain is not at first injured may be amongst the most simple or the most dangerous in surgical practice— for those which reach the point of coming to the surface after their reception may produce irreparable inflammation of the skin or its membranes.

Injuries of the dura mater (the membrane lining the interior of the skull) are of great importance, because they more immediately affect the brain. The dura mater is connected with the skull by a tissue in which numerous vessels ramify, and these may be ruptured by the jar from a blow which does not even break the skin. The blood that flows from them, accumulating between the dura mater and the skull, produces compression of the brain. The chief indication of this very dangerous accident having occurred is the disproportion of the parts. The skin may seem only stunned, or had been even quite sensible, gradually becomes dull, sleepy, comatoso, and at last totally insensible, just like one suffering from apoplexy. These symptoms supervene with a rapidity corresponding to the size and mass of the object which has struck the patient, and are those in which, by a blow on the side of the head, the main artery, supplying the dura mater and upper part of the skull which ascends just before the ear, is wounded. The only hope in these cases is to bleed the patient largely, to check the flow of blood in the head, and if that be not evidently beneficial, to apply the trephine wherever it is most probable that the blood may be found and removed. It must be confessed however, there is little prospect of doing good by trepanning in these cases; it is seldom possible to decide at what part of the skull the blood is effused, or whether it may not be between the dura mater and the brain, and the trephine is of no use. In every case are the same, but the mechanical removal of the blood is possible only when the blood is immediately beneath the upper part of the skull.

Instead of blood, purulent matter may collect between the dura mater and skull, and produce equally fatal results. This is indicated by the patient (usually some considerable time after the accident) complaining of headache, respiration, and lassitude, or excitement in a more or less degree, changes in the color of the conjunctiva, his pulse is quick and hard, and he cannot sleep: if unrelied by treatment, all these symptoms increase, and are shortly followed by delirium, convulsions, insensibility, and death. If trepanning is practised in such cases, the verdict is quick and permanent, the patient often expires in a few hours. Early after their first appearance, a puffy, soft, but very hot or painful tumour, forms over the part struck. If this be opened, the pericranium will be found detached for some extent from the skull, when exposed to be dead, of a dull yellow colour, and covered by purulent fluid. In this case it may be expected that the dura mater is separated from the interior of the skull to the same extent that the pericranium is from its exterior, and that the trephine may be applied to perforate the dead portion of bone with the trephine, and let out the matter collected between it and the dura mater, and which compressed the brain.

The brain itself is of course injured by any blow, and, if it be either from blood effused in it by rupture of its vessels, from compression by fractured portions of bone being forced down upon it, from wounds, from concussion, or from inflammation, and its various effects, the treatment of all or any of these cases need not here be particularly treated of; it does not differ in its symptoms from the cases of common apoplexy with effusion of blood [Apoplexy] and admits of no mechanical treatment. The second class comprehends the most important injuries of the head; those of 'fracture with depression,' as they are called, and those which occasionally happen in children, in which the skull is indented without being broken. The symptoms of such an injury are insensibility, generally in direct proportion to the degree of pressure; the breathing is slow, laboured, and snoring, and at every expiration the cheeks are puffed out and elevated; the pulse is slow and irregular; the pupils are dilated and insensible to light; the patient neither feels nor responds to the outside world and lies as if in a fatal state of apoplexy. The part struck may of course present most varied characteristics: it may be swelling from the entrance of the blow, so as to have a shallow conical depression; it may be bluish, deep blue, or black, and pass under the other; or it and the scalp may be broken up and confused, and the brain be protruding through the openings in them. It is worth remembering that the interior part of the skull may, in consequence of its bony nature, be much more widely fractured than the external, so that the degree of pressure on the brain is not always indicated by the depth of the indentation felt in the scalp. If unrelied by treatment, the hasty growth of the eye and the skin, which grows more and more insensible; his pulse becomes more irregular, and he rapidly dies. The evident and indeed the only mode of affording relief is to remove the pressure from the fractured part of the skull by enlarging the wound in the scalp, or making a fresh one, and taking away or elevating all the portions of bone that are depressed. The mode of doing this will be determined in each case by the form of the fracture and other circumstances; in some it may be sufficient to remove the loose pieces with forceps; in others, to saw off portions with a Hey's saw, or to apply the trephine and raise the other parts. The upper limit of the operation is the skull; the proceedings however must of course be limited to the cases in which the fracture is in a part within view; when it extends across the base of the skull no mechanical means are applicable, and it is left to the surgeons. Such cases, and all others in which compression cannot be mechanically relieved, can only be treated like common apoplexy, by bleeding the patient, by cold sedulously applied, and by rigorous reducing measures. The after-treatment of cases in which the trephine or analogous means have been used is nearly the same as in wounds of the skull and soft parts; the edges should be brought gently together, and slight pressure employed to support the dura mater where it is exposed by the aperture in the skull; and the usual precautionary and curative measures, as cold, local bleeding, &c., resorted to.

The immediate consequences of wounds of the brain vary greatly, and in no one instance distinctly; in some cases a very slight injury is rapidly fatal, as in those (of which many are now recorded) in which a pointed instrument has passed through in the orbit, and produced almost instant death; whilst in others severe and immediate effects are followed by perfect recovery. Gun-shots, have been followed by serious symptoms at only a late period from their reception. In most of the cases where the dura mater is perforated, whether by wound or gun-shot, the head is slightly enfeebled, and there is a peculiar ulceration, and the surface in a darker degree, through the aperture in the form of a darkish dirty-looking fungous mass, called 'Hernia Cerberi.' Its surface discharges purulent matter abundantly, and often bleeds slightly; pressure on it, as on any other ulcer, produces inflammation and pain; but the whole mass may be cut off without producing any pain or ill consequence. This is indeed the best treatment of it. If after having protruded to some
distance it shows no disposition to decrease or to slough, it should be cut down to the level of the skull, and gentle pressure should be applied. If the wounds are covered with the mildest ointment, so as to compensate, if possible, for the deficiency in the dura mater. Should the mass again sprout forth, the same treatment may be repeated. In a few cases the growth is checked, and the brain protrudes from the healthy granulations of the surrounding parts and skin over; in others the fungous mass sloughs and the remaining parts heal; but in the large majority the exposure of the brain and its irritation by surrounding parts produce such continued inflammation and destruction of the minute parts of the brain. In its slightest degree it is merely a stunning, from which perfect recovery takes place in a few minutes; in its most severe, it is rapidly fatal; but even in these, a post-mortem examination discovers no alteration whatever in the structure of the brain. One of the most interesting points in surgery is the diagnosis of concussion from compression of the brain. As the latter seldom occurs without the former (for of course a blow which would fracture or indent the skull would violently shake the brain), compression has the symptoms of concussion, with the addition of some of the most severe which we have already mentioned. In concussion the patient is stuporose, insensible to all impressions; for if he be loudly called to, he will wake up, answer a word or two, perhaps even rationally, and then relapse into the same state. If he be severely pinched or otherwise irritated, it may be necessary to make the part swing with a stick; he moves his limbs; he appears, in short, as if in a sound heavy sleep like that of a drunken man. The breathing is not stertorous, but generally quite natural; the pupil is contracted, but not unequal; the pulse is rapid, but not very strong, and in severe cases small and weak: there is nausea or vomiting, and the extremities feel cold. If the case is about to terminate fatally, the whole body grows rapidly colder, and the other symptoms of sinking seem increasing; stimulants are first called for, and should be given till he is completely roused to his former state; but if, instead of the above effects, he becomes insensible and incapable of any kind of employment. Cases are not rare in which, after remaining in a nearly insensible state, as if in a sound sleep, for four, six, or eight weeks, with only very slight temporary alterations, the patient wakes, complaining of but little inconvenience, and rapidly recovers. If instead of waking nearly well, he is observed to grow restless, to seem suffering from headache, or should he be delirious or convulsed—if his pulse becomes quick and hard, and his eyes are hurt by strong light—he has, in all probability, inflammation of the brain, which is a most frequent consequence of concussion, and must be at once met by the active depleting and reducing measures necessary for its cure. In some cases the symptoms of concussion gradually change into those of compression, which may then be suspected to arise from effusion of blood into or on the brain, as in the cases above mentioned.

The account here given is only a sketch of the most prominent and constant symptoms, progress, and treatment of the effects of injuries of the head. There are other symptoms which may occur accidentally, which is necessary briefly to advert to. Furious delirium, lasting for some days and requiring active depilation, sometimes immediately follows concussion; violent convulsions also occur, either on the spot or on concussion; paralysis or hemiplegia is not unfrequently produced directly by compression, and they still more commonly occur as its sequel. Loss of memory, sometimes most singularly limited to particular classes of events or things; impairment of individual sensations, and various forms of insanity, are all the occasional consequences of the inflammation and destruction of the brain which follow them, and to the prevention or cure of which the chief attention is, in the majority of cases, to be directed.

HEARNE, THOMAS, an eminent English antiquary and editor of books and manuscripts, was born at White Waltham, in Berkshire, in 1678, where his father was the parish clerk. In 1692, under the patronage of Francis Hildreth, he became a fellow of Christ Church, Oxford, where Dr. White was his tutor, and Dr. White's housekeeper, or guardian; for he had been as a menial servant, he was placed at the free-school of Bray; and subsequently, in 1695, at that gentleman's expense, was entered of Edmund Hall, Oxford, where Dr. White had been his tutor. Dr. John Mill, who was principal of the hall, and Dr. Gabe, gave Hearne much employ in his younger days in the collation of MSS. He became B.A. in 1699. In 1701 he received his first employ in the Bodleian Library, of which Dr. Hudson had just been chosen keeper. He was afterwards made janitor of the library, and in 1712 succeeded to the place of second librarian. In January, 1715, he was elected archiptygraphus and require beadle of civil law in the university; and was still librarian till the month of November following, when, finding the two places untenable together, he resigned the beadle's place, and soon afterwards his post in the Bodleian Library. He afterwards devoted himself to the government, with which he could not conscientiously comply. He continued a non-juror to the last, much at the expense of his worldly interest. In the latter part of his life he resided in state, but principally at his lodgings in the West Country, where he died June 10th, 1735, in consequence of a cold, succeeded by a fever which was improperly treated.

Hearne's publications, above all, are remarkable for the elegant beauty of their shape and binding. Amongst the most valuable were an edition of Livy, 6 vols. 8vo, 1708; the 'Life of Alfred the Great,' from Sir John Spelman's MS. in the Bodleian Library, 8vo, 1710; Leland's 'Itinerary,' 9 vols. 4to, 1728; Warington's 'A Guide to Antiquaries,' 1726; the 'Acts of the Apostles,' in Greek uncials, from a very ancient MS. in Archbishop Laud's Collection, 8vo, 1715; Livius Foro-Juliansis's 'Life of Henry V.,' 8vo, 1715; Alured and Beverley's 'History of the Rebellion,' 8vo, 1720; Thomas More's, 8vo, 1716; Camden's 'Annales,' in Latin, 3 vols. 8vo, 1717; William of Newbridge's, 8vo, 1719; the 'Textus Roffensis,' 8vo, 1720; Fordun's 'Scotchchronicon,' 8vo, 1720; 'History and Antiquities of Gloucester,' 1722; Hearne's 'Chantilly,' 8vo, 1722; 'Robert of Gloucester's Chronicle,' 2 vols. 8vo, 1724; 'Peter Langtoft's Chronicle,' 2 vols. 8vo, 1725; 'Adam of Donemara,' 2 vols. 8vo, 1727; the 'Liber Niger Saccararius,' 2 vols. 8vo, 1728; 'Hengfords History,' 2 vols. 8vo, 1731; Otterburnie and Whathamstaed's 'Chronicles,' 2 vols. 8vo, 1733; the 'Annales of Dunstable,' 8vo, 1737; and, 'Benetific, Abbot of Peterborough,' 2 vols. 8vo, 1735.

Hearne's pieces on some ancient collections, by will, to Dr. William Bedford, of whom they were purchased by Dr. Richard Rawlinson for a hundred guineas, and by him bequeathed, together with his own manuscripts, to the Bodleian Library. Hearne's MS. Diary, in a hundred and fifty small paper books, is amongst them.

Several of Hearne's pieces were reprinted at different times, and in 1810 the project was entertained of reprinting his 'Short History of the English Nation,' and publishing an edition of four volumes, containing Robert of Gloucester and Peter Langtoft's Chronicle, the scheme was abandoned.

The 'Lives of Leland, Hearne, and Wood,' 8vo, Oxford, 1773; Nicholls's 'Life of Anselm, the Eleventh Century; Chalmers's 'Biography,' vol. xvi., 1724; and, 'Heart the central organ of the circulation, and by its alternate contractions and dilations exercises the principal power by which the blood is moved through the body.'
of the higher animals. Its anatomy and physiology will be made most easily intelligible by considering first the principal varieties of the circulation or other motion of nutritive fluid which occur in the animal kingdom; bearing in mind that the main objects for which such a motion is required are a constant supply of fluid adapted for their nutrition to all parts of the body, and its regular exposure to the influence of atmospheric air, that by the process of respiration it may be fitted for maintaining the life of the animal.

The simplest mode by which a distribution of nutritive fluid is effected is by means of ramifications proceeding from the stomach or intestinal canal to various parts of the body, which occurs in the polyps, infusoria, intestinal worms, echini, medusae, and other zoophytes. In all these the digestive canal and the circulating system form but one apparatus: the food, which in the higher animals requires a complicated process of assimilation before it is fitted to move with the blood, is in them already adapted for nutrition. In most of them currents can be seen passing in opposite directions along the canals opening into the digestive cavity, exactly like those well known to exist in the stems of charms, and probably produced by the motion of cilia which line the tubes, but are too minute to be discerned even with the microscope.

In the planaria and some of the trematoda a separate vascular system has been discovered in addition to the gas-digestive tube-lace. In the former, the main trunk has the shape of an oval loop (a, b, c, d), from which capillary networks arise and communicate freely together, and with a dorsal median vessel (c).

These vessels have been seen contracting and dilating, but no regular course or order has yet been discerned.

A more perfect form of circulation of this kind is found in the annelida, and it has been closely observed by Müller in the leech, as shown in the annexed drawing. There are two main lateral vessels (d, b, c, e), communicating at their extremities and by transverse branches with each other, and with a third central vessel (a, a, a), which contains within it, bathed in its blood, the nervous cord, and presents knot-like swellings at the same situations as that cord does. Alternate motions of the blood may be seen in these vessels: at one moment the lateral vessel (a, b), and the central (a, a, a), with the communicating branches between them, are seen filled with blood; while the other lateral vessel (c, e) and its branches are empty. In the next moment, c, e and its branches are filled, while a and b are empty; so that one lateral vessel, and the central one, are always opposed in action to the other lateral one. The central continues acting with one of the lateral for twenty or twenty-five pulsations, and then its relation changes, and it acts in unison with the other. During the contraction of a lateral vessel the blood evidently flows from it through the middle transverse vessels over to the other side, and in the next moment returns. The contraction proceeds gradually from behind forwards, so that a wave (as it were) of blood is seen passing from one end of the lateral and of the central vessel to the other, and then returning in the contrary direction through the other lateral vessel. In this manner it is probable that a constant circulation is maintained along the sides of the animal, and its direction seems to be changed after every eight or thirteen pulsations. The same general type of circulating system is found in earthworms and all the other annelida.

Hitherto nothing has been seen which could fairly be called a heart, nor have the vessels presented any characters by which they could be separated into systems of arteries and veins, for all alike seem to perform at different times the functions of both. A more distinct division of the parts of the circulating system is found in insects. They have a large vessel (a, a) running along the back, divided by numerous constrictions into a series of communicating cavities, between which there are lateral openings through which the blood is received, and which are guarded by valves to prevent the blood from flowing out. Through this, which is commonly called the dorsal artery, but which may rather be regarded as a series of venticles, the blood passes from behind forwards, diverging into small streams, one of which flows to each of the antennae, feet, &c. No distinct vessels can be detected in which these minor currents may run; they seem simply to pass through the various tissues, and having arrived at their destinations, to form there into arches, and return and empty themselves into abdominal vessels, b, c, which may be regarded as veins, and through which the blood flowing from before backwards is returned into the dorsal artery through the communications which exist between them at the posterior part. This is also the plan.
of the circulating system which with various modifications prevails in the arachnida and the lower crustacea.

In the orders already mentioned no special arrangement of vessels has been found for the purpose of exposing the blood to the influence of the air. Either the whole or part of the blood undergoes respiration on the whole surface of the body, or at the tracheae, or the vessels arranged in special systems for that purpose. In those which follow, however, we shall observe a separate and complicated respiratory apparatus; and that the form of the heart and its large vessels are adapted in accurate correspondence with that of the gills or lungs, and according as the whole or part of the blood is required to be exposed at each round of the circulation to the influence of the air.

The simplest kind of a heart, forming a defined cavity, is found in the larger decapods, and some other crustacea. The annexed sketch represents the heart and large arteries of the lobster. There is a single cavity or ventricle (a), into which the arterial blood flows from the gills by vessels which unite into two trunks, whose orifices (b, b) are protected by valves. Six main arteries proceed from the heart; the three anterior (c, c, e) go to the head; two from its inferior part to the liver; and the largest of all (d) from its posterior part. This last gives off a superficial and a deep artery to the tail, and then curving forwards under the sternum, gives branches to the foot and deep arteries to the head. From these the blood returns by veins into a number of venous sinuses which lie at the sides by the articulations of the legs with the chest, and all communicate together. From them branchial arteries proceed, which run on the outer edge of the gills, and pass through capillary vessels in them, terminating in branchial veins which unite into the two trunks that open into the heart.

In most of the molluscs the blood flowing through the branchial veins, instead of being poured directly into the ventricle, is received first into an auricle, presenting the first instance of a heart with more than one cavity. In most of the gasteropods and pteropods the auricle is single; in the bivalves the auricle is double. In the latter division, the blood, collected from the systemic veins into one venous reservoir, is formed, before going to the gills passes by numerous branches into a spongy tissue which Bojanus calls a lung, and others a kidney, but whose real nature is as yet unknown. From this a few branches pass at once into the auricles, but the greater number go as branchial arteries to the gills. In the brachiopods the systemic veins is also double, each cavity giving rise to an auricle. But the most singular form of heart in this class, and one of much interest as presenting all the cavities separated, which in higher classes are united into one, is that of the cuttle-fish. The blood passes in it from a systemic or central ventricle (a), through the auricles superior (b), and inferior (c), and is thence distributed throughout the body, whence it is collected into six veins cavae (d, d, d, d, d, d), which open into two branchial cavities (f, f), by which it is forced through branchial arteries (g, f, e). From the extremities of these it is received into branchial veins, of which that of the left side (b) is here shown, which open into the two systemic arteries (i, i), conducting again into the systemic ventricle (a). Hence we have the first appearance of a separate heart for the respiratory circulation, and the elements of all the compound forms which we have now to notice.

Among vertebrate animals the simplest form of heart is found in fish. They have a single auricle (a, a), which receives the blood from the trunks of the veins of the whole body (h, b), and communicates with a single ventricle (c), which forces the blood into an arterial trunk with a contractile bulb (d). From this trunk all the branchial arteries (e, e) arise, and passing on each side in arches to the gills, divide there into capillary branches. The blood thus aerated passes on, and the arches again unite into a common trunk (f), the true aorta, which runs along the under surface of the spine, and sends the blood to all parts of the body. From these it collects again into the systemic veins (b, b), by which it is carried back to the auricle. The same type of formation is found in the reptiles which have gills, as in the proteids in their adult state, and in the larvæ of many which at that period also breathe by gills.

In fish all the blood is subjected to the respiratory process before it passes to the body: in the reptiles, which breathe in air, and have therefore a much more complete exposure of the blood to it than fish, who breathe only the air that is dissolved in the water, only a part is exposed before entering the general circulation, but the modes in which this is effected very greatly. The annexed sketch represents the circulatory system of the frog in its perfect state. It has
through the single aorta, into all parts of the system, and
again into the veins and right auricle.

We may now consider the anatomy of the heart, and the
chief phenomena of the circulation, in man. The heart is
of a somewhat conical form, having its base directed back-
wards towards the spine, and its point forwards, downwards,
and to the left side, so that at each contraction it may be
felt striking between the 5th and 6th ribs, about four inches
from the middle line. It rests upon the diaphragm (a, a) the
muscular partition between the chest and abdomen, and
the surface upon which it lies is much flattened. It is
firmly attached to the diaphragm at its right side, and be-
hind by the inferior cava, which passes through that
muscle at the aperture b, and above and behind it is fixed,
though more loosely, to the upper and back part of the
chest by the rest of its great vessels, which there pass out of
the pericardium, and are united to the surrounding cellular
tissue and organs. Everywhere else it is quite free and
moveable, though the range of its motions is limited by the
pericardium, or membranous bag in which it is contained,
and which closely surrounds it at all times. When the heart
is exposed by cutting open the front of the pericardium, it is
seen to be divided along its front and most convex surface by a
line running from the middle of its base downwards to the
right side of its apex. This line and a similar one on the under
and flatter surface, both of which are traced out by two vessels,
the principal trunks of the coronary arteries and veins by
which the walls of the heart itself are supplied with blood,
indicate the position of the septum, or partition by which
the ventricles are divided from each other. At the base, above
and on each side two other divisions will be seen, each having
a little fleshy pendulous appendage at its corner; these are
the auricles. Thus may be seen at once a right auricle (d) and
ventricle (e) on the right side and front of the heart, and a
left auricle (f) and ventricle (g) on its left side and behind.
From the greater thickness of the walls of the latter, they
form the larger portion of the whole heart, but the cavities
will be found to be nearly of the same size. The right
anterior or pulmonary side of the double heart is exclu-
sively for the circulation through the lungs (h, A); the left
posterior, or systemic, for that through the body.

To examine the interior of the heart it should be removed
from the pericardium, and an incision should be made
into the front of the right or front auricle, so that an angular
flap may be cut out of its walls, and the whole view of the
back part and sides of its interior may be exposed. There will
then be seen, behind and to the right side, two large ap-

ture; the upper leading to the vena cava superior (a), through
which all the blood is returned from the head and upper extremities, and the lower leading to the vena cava inferior
(b, b), by which all the blood is conveyed from the abdomen
and lower extremities. These apertures will be seen to be
surrounded by a few muscular fibres continuous with those
of the auricle itself, and that of the inferior cava is par-
tially guarded by a thin semilunar membranous fold, called
the Eustachian valve, varying much in size, and often much
torn. The left side of the cavity, on the partition which

* The heart and large vessels of any of the larger of our domestic quadrupeds may be used for popular dissection: their structure differs so little from that found in man, that the present description will almost exactly apply to them.
separates it from that of the right auricle, presents an oral depression (the fossa ovalis) surrounded by an elevated border, indicating the situation of the foramen oval, through which, during the fetal state, the blood, which was prevented by the Eustachian valve from passing into the ventricle, was conveyed directly from the right into the left auricle, and thence into the left ventricle. Lastly, at the anterior and left angle of the cavity another and the largest aperture is seen, which leads into the right ventricle, and has attached to its sides a membranous curtain of, by which it is occasionally closed, and which is called the tricuspid valve. The general form of the cavity of the right auricle is that of a quadrangular sac, from the right and anterior part of which a small flattened triangular process stands out from the remote similarity of which to the ear (auris) of a dog, the cavity has received its name. Its interior is tolerably smooth behind, by the orifice of the superior cava, on the partition, and about the opening into the ventricle; but to the right and front side, about the auricular appendage and the inferior cava, it is rendered uneven by prominent bands of muscular fibres (the musculi pectinati) which seem to radiate from the auricles.

Proceeding in the course of the circulation, a cut should be made from the right auricle through the aperture leading from it into the right ventricle, and along the front of the heart nearly to its apex, and then another from the end of the first upwards into the pulmonary artery, as it arises from the front and upper part of the ventricle. By raising the portion thus cut out, a complete view of the cavity of the right or pulmonary ventricle, and of its communication, will be seen. The cavity of the right ventricle has a somewhat conical form, with its base uppermost; that part of its walls which is formed by the septum projecting somewhat into it. Its walls are rendered extremely irregular by prominent bands of muscular fibres crossing each other in every direction, and enclosing spaces of various size and form, which after death are generally filled with coagulated blood entangled in and adhering to them. Here and there stand out short columns of muscle projecting into the interior, and pointing towards the right auricle; these are called columnae carneae, and they have attached to their summit fine tendinous cords (chorda tendinosa), which pass thence to be attached to the edges of the curtain-like membrane (the tricuspid valve), which guards the orifice between the auricle and ventricle. This orifice is of a broadly oval form, surrounded by a ring of firm dense tissue, to the whole interior circumference of which is attached the fold of membrane, strengthened by tendinous fibres, forming the valve. The edges of this valve are very irregular, but it may be roughly divided into three principal portions (whence its name), the largest of which lies so as to divide the orifice from that leading into the pulmonary artery. If this valve be pushed inwards towards the cavity of the ventricle, as in the larger of these figures of the mitral valve, of which the construction though similar is more simple, it will lie nearly flat against the walls, and would in this position present no obstacle to the passage of a fluid from the auricle into the ventricle; but if, on the contrary, it be pushed from the ventricle towards the auricle, its edges will be found to meet so as to close the orifice as in the smaller figure: a, a, a, a, the columnae carneae; b, b, b, b, chordae tendineae; c, c, c, c, valves. This we shall see is the mode in which it acts during life.

From the front and upper part of the ventricle a smooth short passage leads to the origin of the pulmonary artery e, which is attached firmly to the dense ring to which many of the muscular fibres of the ventricle are affixed. At their union, and at the very orifice of the pulmonary artery, three little valves, a, a, a, fig. 1 (the semilunar, sigmoid or pulmonary valves), are seen, of a nature similar to the orifice by the whole length of their convex edges to the walls of the artery, and hanging loosely in it with their free festooned edges directed upwards, enclosing behind them three small spaces, where the artery bulges somewhat outwards. If one looks from the cavity of the ventricle along the interior of the artery, and blows gently into it, the valves will be seen to lie nearly flat against its walls, as in fig. 1, and will offer the obstacle whatever to the passage of any fluid in that direction; but if one looks and blows in the opposite direction, from the artery down into the ventricle, the valves will fall inwards, so that their edges will meet, and they will completely close the tube of the artery, as at fig. 2, so that unless driven with force sufficient to rupture them, no fluid could pass into the ventricle. It is evident that if the artery be circular, the edges of these semilunar membranes could not exactly meet to close it, but would leave a little space, of a triangular form, between them. This is filled by three little bodies, b, b, b. Corpora Arantii, one of which is attached to the middle of the edge of each valve, and which, at the same time that they effect this, afford a strong point of attachment for the tendinous fibres by which the valve is strengthened. The pulmonary artery proceeds upwards, and to the left, in front of the other vessels, and, after a course of about an inch, divides into two branches, of which one proceeds to the right lung, while the other goes straight onwards to the left. In these organs each artery divides into numerous branches, which become smaller as they become more numerous, and terminate in a most delicate network of vessels, ramifying on the walls of the air-cells, from which, after the blood which they contain has been exposed to the air, it is received into equally delicate pulmonary veins, and through them conveyed in gradually increasing branches to the four main trunks of the pulmonary veins, which open into the left auricle.

It would be useless repetition to describe in detail the left posterior or saccular ventricle and auricle, which differ in no important particular from the right. The walls of both cavities on the left side and all the parts contained in them are thicker and stronger than those on the right; the orifice between them is guarded by a valve which has only two principal parts, and is therefore called the mitral, and the saccular semilunar valves have larger and more prominent bodies (Corpora Arantii) on their edges. The saccus, f, proceeds upwards, and to the right side, then arches backwards and to the left, and, turning over the main air-tube of the left lung, passes down along the spine, at the lower part of which it divides into two large arteries (the common iliacs) which supply the pelvis and lower extremities. From the upper part of each it gives off the main trunks of the head and upper extremities in three large trunks—that most to the right, called artery innominata, g, is the common trunk which divides into the right carotid for the right side of the head, and the right subclavian for the right arm and side of the neck and chest. Next to it is the left carotid, h, and next the left subclavian, i, of which the distribution is similar to that of those on the right side.

During life the blood, returning from the whole body by the veins which unite to form two vena cavae, enters the right auricle and gradually distends it, at the same time that the blood returning from the lungs by the pulmonary veins enters the left auricle and distends it; when completely filled a kind of vermiform motion is seen commencing at the point of each auricle, which is rapidly propagated along their walls, and simultaneously empties the contents of the one into the right, and of the other into the left ventricle. The ventricles are no sooner completely filled then they contract suddenly and with much greater force than the
auricles, and propel the blood into the pulmonary artery and aorta. They drive it indeed in all directions, but in each ventricle there is but one orifice into which it can find a passage, for that by which it entered is closed by the valves surrounding it. The same contraction of the walls of the heart which propels the blood serves to raise and fix the valves by its regurgitation into the auricle is prevented; for as soon as any blood is forced under their edges they are lifted up and pressed towards the auricles; and they would be forced into them, but that when they have arrived at such an elevation as to fill nearly the whole of the cavity, and to create further, by the cordis tendineae, which are attached at one end to the edges of the valves, and at the other to the summits of the columnae cærnes—those muscular pillars, which we have described as standing out and supporting the extremities of the columns of the ventricles—these tendons are exactly measured to the distance to which the valves may be allowed to flap back, and as the columnae contract so as to narrow the cavity of the heart, and force the blood out of it, they tighten and fix the edges of the valves against which some of the blood is forced, and thus keep them steady, till the ventricles being emptied their walls relax and permit the valves to be forced down again by the next current coming from the auricles. The blood forced into the artery pushes on that which was already there (for the whole circulating system is throughout life completely filled) and distends the lower part of the vessel, which is now open; and the blood would force its way to the more distant parts of the body if the arteries did not close; the distended part would fill and force the blood as well back into the ventricle as forward into the branches. It would accomplish both, and half the power of the ventricles would be thus wasted, but that the semilunar valves, which are placed at the outlets of the walls of the ventricle, by their form as by the little projecting bodies on their edges, as soon as any blood gets behind them, are pushed down and close the passage into the ventricle. The whole of the blood is therefore driven on along the arteries, replacing the current which had just before been thrown in by the ventricles, and itself in turn displaced by the next succeeding wave.

Through the arteries it is distributed to all the body, and returns, by the veins, to the heart. Most of the large veins and the organs connected with it unite into a large trunk, the vena portae, which, instead of at once entering the heart with the others, passes into the liver, and there again divides in minute capillary vessels, from which the bile is secreted, and which pass into the ultimate divisions of a series of hepatic veins, which collect into three or four large trunks which open into the vena cava inferior just before it passes through the diaphragm to enter the right auricle.

A point of much interest is the consideration of the changes which the circulating system of man and the higher animals undergoes in the various periods of their life in their different states of the generative and the non-generative periods. It has been clearly proved that in the embryos of both man and the higher animals the first appearance of the motion of any nutritive fluid is in the form of a circular canal running round the edge of the area in which the future development of the animal is to be effected, an arrangement in some measure analogous to that of the planarians, and those of the lowest animals, in which a circulating system is first added to the digestive. The first appearance of a heart is in the form of a long tubular pouch, lying beneath the spinal cord, analogous to the dorsal vessel of the insects. The first trace of a separate respiratory current, not of a nutritive nature but of a very early kind, is seen in the form of a series of respiratory currents, possibly the thin nature of the animal, which are found to be jelly-like, are present at their opposite extremities into a single auricular trunk; an arrangement most closely analogous to that of fish. After this, and to the end of the egg stage, the arrangement is respiration by simple diffusion, as in the embryo of the British Museum, and the remains of the embryo of the aquatic man, as in 1836 and 1837, viz.:—that the first sound is produced by the vibrations of the muscular fibres of the ventricles during their contraction, assisted in a very slight degree by the movements of the blood which the ventricles force out; its point is tilted up, and strikes at each ventricular contraction, or systole, as it is called, against the wall of the chest, producing that impulse which may be felt by the finger or hand placed just beneath the left breast, and which is almost exactly coincident with the pulse felt at the wrist. At the relaxation or diastole of the ventricles they regain suddenly and forcibly their previous position towards the heart, and remain in this position for some time with certain sounds. If the ear be placed directly, or on a stethoscope, on or near the part where the heart is felt beating, a sound like that of a gentle breathing is heard coincident with each contraction of the heart. This sound is immediately followed by a second sound, which is shorter, sharper, more defined, like the falling back of a light valve, coincidently with which the heart seems to fall back from the wall of the chest. A short pause of perfect silence succeeds, and then the first long sound is again heard. They take place in regular rhythm. Dividing the whole period occupied between each two impulses of the heart into four parts, the first sound would occupy two, the second one, and the pause one.

It is unnecessary to allude to various explanations given of these sounds; the most probably correct is that founded on an extensive series of experiments made by a committee of the Royal Society of Physicians of the British Empire in the year 1838, viz.:—that the first sound is produced by the vibrations of the muscular fibres of the ventricles during their contraction, assisted in a very slight degree by the movements of the blood which the ventricles force out; its point is tilted up, and strikes at each ventricular contraction, or systole, as it is called, against the wall of the chest, producing that impulse which may be felt by the finger or hand placed just beneath the left breast, and which is almost exactly coincident with the pulse felt at the wrist. At the relaxation or diastole of the ventricles they regain suddenly and forcibly their previous position towards the heart, and remain in this position for some time with certain sounds. If the ear be placed directly, or on a stethoscope, on or near the part where the heart is felt beating, a sound like that of a gentle breathing is heard coincident with each contraction of the heart. This sound is immediately followed by a second sound, which is shorter, sharper, more defined, like the falling back of a light valve, coincidently with which the heart seems to fall back from the wall of the chest. A short pause of perfect silence succeeds, and then the first long sound is again heard. They take place in regular rhythm. Dividing the whole period occupied between each two impulses of the heart into four parts, the first sound would occupy two, the second one, and the pause one.
lowed after a scarcely appreciable period by the pulse at the wrist and other parts distant from the heart. Lastly, the sound is coincident with the relaxation of the ventricles, the falling down of the valves to permit the blood to pass from the auri-ucles into the ventricles, and to prevent its passage from the arteries back into the ventricles; and the rush of blood from the arteries into the ventricles which continues through the whole time of the second sound and the pause.

At each contraction of the ventricles a very large proportion of the blood is forced out of the heart; and this is the reason why the heart is so large, although the blood vessels, especially the aorta, are very small. It is probable that some blood flows back into the veins from the pulmonary veins, for they are seen distended rather more suddenly at this time that can be explained by the mere arrest and conse-
quent accumulation of blood in them. However, so large a portion of the heart's power is exerted in propelling the blood into the arteries that these slight influences in the contrary direction need scarcely be taken into account in calculating its amount. At each contraction of the ventricles about one ounce and a half of blood is forced into each artery, with such force, that Hales found that the blood as it rushed from the open main artery in the thigh of a horse of 16 cwt, or 8 feet high, was the same in temperature as the vessel, while in the animal the temperature of a sheep it rose 64 feet, and in those of dogs from 4 to 6 feet. Pois-
seille (Magen de's Physiologie) also calculated, by deductions from accurate experiments on animals, the force of the heart, as it streams in the human aorta, as sufficient to support a weight of 41b. 3 dr. and 43 grains. Now if the quantity of blood in the whole body be assumed to be 20 (tr. wt.) pounds, which is probably somewhat an average, and if 100. be forced from the ventricle at each pulsation, of which, on an average, there are 70 per minute, a portion of blood will go the complete round of the circulation in about 5 minutes, which is however a somewhat slower rate than we might deduce from the experiments of Hering (Tiedemann's Zeitschrift, t. 3), who found that substances injected into the veins of horses could be detected in the arteries in half a minute.

Harvey considered the heart to be the sole agent by which the circulation is effected, but it is certain that several other agents exercise auxiliary powers. That the heart has however an influence on all parts of the circula-
tion is quite evident. In the larger arteries its effect is seen in the increase of the current which it had set in motion, in exact coincidence with the contraction of the ventricles; in the smaller ones, by the same increase at a scarcely appreciable interval; in the capillaries, by the occa-
sional pulsatile motion which may be seen in them, when, after an animal has been largely bled, its transparent parts are examined with the microscope, and this thought the heart is acting very weakly. Lastly in the veins we see its influence still exerted; for if the main artery and vein in a limb be exposed and isolated, and the latter be wounded, the flow of blood from the orifice may be exactly regulated by compressing the artery, that is, by preventing, to a greater or less extent, the blood from flowing to the vein with the impulse given to it by the heart. There are cases again in which the veins have distinctly pulsated, and the pulsa-
tions have been proved to have been communicated from the heart through the capillaries; and in this case we may add that the rapidity of the current in the arteries, veins, and capillaries, is always in direct proportion to the strength and frequency of the ventricular contraction, and always more rapid in the parts near than in those remote from the heart; that it ceases in all the instant the heart is removed, or its influence on a part cut off by dividing the main artery; that in old persons, in whom the whole arterial system of the lower extremities is sometimes ossified and rendered incapable of contraction, the heart alone is sufficient to maintain the circulation through the affected parts; while on the other hand, while the heart's power is by any cause weakened or interfered with, partial stagnation and an extremely languid motion of the blood is found in all the organs. In cases of suspended animation no motion of the blood current induced till the heart begins to act; but when this is the case, it has once the sufficient power to set all the blood of the body in a current.

Those are so many proofs that the contraction of the ventricles has a share in propelling the blood throughout the whole course of the circulation; but the heart also assists, by the enlargement of its cavities after their contraction, which, whether it be the effect of mere elasticity, or of an active power of dilatation, certainly takes place with great force. The heart, in short, acts at once as a forcing and as a sucking-pump. The proofs of this are, that the auri-
ucles, and still more the ventricles, dilate, not gradually, but suddenly, and with more force than they could be distended by the blood being impelled into them; that the currents observed in living animals are often seen to be increased coincidently with the dilatation of the auricles; by the vel-
ocity of the flow of blood from the auricles into the ventricles being disproportionate to the degree of contraction of the former. This part of the heart's action will be further illustrated in speaking of the influence of atmo-

From the heart the blood is poured into the arteries, a series of ramifying tubes through which the current is dis-
tributed, divided into a gradually increasing number of streams, which progressively diminish in size, till it arrives at a net work of the most minute canals, the capillaries. As a general rule, when an arterial trunk divides, the sum of the diameters of the branches is greater than the dia-

meters of the trunk—thus in the annexed diagram (in which the arrows indicate the course of the blood), the sum of the branches is greater than that of the aorta, and the sum of those of 3 and 3 greater than that of 2, from which they arise. Hence the arterial system has been

1. Trunk of the artery; 2. large branches, successively becoming smaller and smaller until they termi-
nate in 4, the capillary branches.

compared in form to a cone, of which the heart is at the apex—and the stream of blood will be like a current gradu-
ally growing wider, so that if no additional impulse be given to it, it will proceed at a greater or less distance from the heart, to effect which the friction of the blood against the walls of the vessels will also contribute. The effect of both these causes however is so slight that M. Pois-
seille has found that the form of the current of blood in all arteries sufficiently large to be experimentable is the same; that in the aorta, for example, bears the same relation to its diameter as that in the artery at the wrist does to its diameter. Thus the diameter of an artery may be taken as a measure of the force of the current in it. It does not appear moreover that the direction in which a branch is given off from the trunk has any appro-


able influence on the velocity of the current in it.—most frequently the branches of arteries are given off so as to form an acute angle with the continued trunk as 2, from 1, but often they separate at right angles, and less frequently so as to form obtuse angles. Neither can the effect of the tone of the vessels be ignored; for it is known that there can be little doubt that, _coerteria paribus_, the current in it will be slower. An important point in the arrangement of arteries is the frequent union, or anastomosis, of branches, or the presence of anastomoses, which is beneficial in preventing any part being cut off from its supply of blood, by the compression or obliteration of one of its arteries. Hence it is that even when the main artery of a limb has been ligated, the blood can still be maintained in the current of blood being diverted into the collateral channels, which subsequently become enlarged. [ANEURYSM.]

The chief property of the arteries by which they affect the circulation is their extreme elasticity. It is by this we forced them on the blood that had been forced into, and propel it in every direction—and that when elongated they again shorten, and that when empty they remain open and tubular. The chief effect of the arterial tone of the arteries is that the current of blood is propagated with incalculable rapidity through all the arteries, and causes each part of them a slight diastasis as it passes through them. This produces a series of such impulses, waves, and dilatations, and when a finger slightly compresses an artery, it feels the tendency to dilatations, in what is called the pulse. The degree of dilation is so slight that its existence was much disputed; but M. Poiseuille has proved that in the larger arteries it is equal to about 1/11th of their average diameter. In feeling the pulse however we perceive a greater impulse than so slight a dilatation could produce, because the finger flattens the artery, and therefore we feel the force of the wave over a large part of its circumference, and we increase its velocity by diminishing the size of the channel. From this description it will be evident that the characters of the pulse by which the conditions of health or disease of the heart can be diagnosed will depend on two circumstances—the state of the heart, and that of the artery itself. The frequency of the pulse will depend entirely on the number of contractions of the heart, and the slow or irregular, and interrupting pulses are entirely referrible to the heart. The size and degree of contraction of the artery will produce the fullness or smallness, the regularity or irregularity, and the frequency of the pulse. These are determined by the touch rather than by mere counting.

But the arteries have another power besides that of their elasticity, by which they influence the circulation, though of the mode and nature of these powers are less clear. One is the power of contraction which they possess during life, and which is sometimes, but erroneously, called muscular. The vital contractions of the arteries differs from the muscular contractions, the latter being a pulso-pulse and is produced by the ejection of blood at all times excitable by any of the stimuli that excite the muscles to contract, as mechanical irritation, electricity, &c., but following generally some peculiar influence, as of cold, or some particular local excitement, as inflamma-

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tion, &c. From these contractions it is distinguished by being exercised only during life, and then tending to reduce the artery often to a smaller caliber than its elasticity would, so that on the complete cessation of life the artery is compressed, and forces the blood into the veins, and the vascular system. The vascular system is so great that it predominates over that of the elastic contraction; and the current, though continuous, is irregular, presenting a succession of jets—but as we recede from the heart, and as the resistance to the current becomes less, the succession of jets becomes less distinguishable, and in the veins we find a perfectly equable stream. An artificial contrivance for effecting the same object, viz. the conversion of a series of motions of a fluid into a continuous one, may be seen in an organ. The air is forced into the wind-chest by a series of strokes of the bellows, and if the walls of that chest were fixed it would issue from it into the organ-pipes in the same intermitting manner, but the chest is movable, and is loaded with weights (proportioned to the size of the instrument), so that it maintains a constant and steady pressure on the air below it, which therefore, though driven out by the extrinsic pressure, is drawn back into the organ-pipes under the influence of the single force from the top of the chest in a continuous steady current. A similar arrangement is employed in fire-engines, where the elastic power of the bellows partly occupies the chest into which the water is forced. [FIRE-ENGINE.]

We have said that the arteries are dilated slightly by each column of blood poured out by the veins; from this arises their pulse, which may be said to be owing to the dilata-
tion of the arteries produced by the wave which is propagated along the column of blood contained in them. One may form an idea of what is here called the pulse by observing a ripple in a running stream. There are in that case two waves going in the same direction and which move together, with an absolute change of place, and this constitutes the stream; but again, they move sep-
The influence of the minutest arteries and veins, and of the capillaries, on the circulation, is best seen in the phenomena of local action, as inflammation, blushing, turgescence, &c. If the web of a frog's foot placed in a microscope be irrigated, the capillaries are seen slowly contracting, so as sometimes to prevent the flow of blood through them, and if the stimulus be so great as to produce inflammation, then they dilate, and a larger number of globules is seen passing along the part. The result may be seen in the human eye, the vessels in the front of which recede so minute that they give no colour to it; but if they be irritated by a particle of dust, at once they dilate, and more blood-globules entering them, they are seen as tortuous canals filled with globules; when affected by wound or other injury, the parts around grow redder, and swell from the influx of blood to its capillaries, and if the inflammation arise in a part which can be compared with another similar one, as in the hand, one feels that the pulse is fuller and stronger on the injured than on the sound side, indicating that a larger quantity of blood is passing through it. A still more evident accumulation of blood is shown in blushing, in which, from a mental impression, in an instant all the minute vessels of the face, neck, head, &c., become distended with blood. The pallor of fear is produced by the opposite condition, and we have other cases in which the blood of the quantity and nature that is seen in the deficient nutrition and shrinking of parts which have become useless, as in the gills of tadpoles, the horns of deer, &c. All these circumstances are clearly sufficient to prove that, independent of any influence extending from the brain, the amount of blood passing through capillaries of all parts a power by which the supply of blood passing through them may be either increased or diminished, whether it be effected by an alteration in the propelling power of the heart, or by increased or decreased attraction or repulsion between the tissues and the blood. In any case, we have only proofs of its occasional influence, and that in many it is intimately connected with the passions; for it comes from secondary mental excitement; but we have no evidence that it exercises any constant influence on the course of the blood.

Following the course of the circulation we come now to the veins, which may be regarded as the most passive of the parts engaged in it, though they are constructed so as to permit many important external agencies to act upon the motion of the blood. While the arteries form a series of branching canals in which the main current is diverted into streams whose number increases as their individual size decreases, the veins are made up of a series in which a vast number of capillaries gradually unite into others whose number decreases as their size increases (as shown in the following table), and which consist of two great trunks, the vein caverns. In addition to other peculiarities of structure the veins have valves, 5, 5, 5, very similar to those at the origins of the arteries, which are arranged in series along the main current, so that of nearly all those veins in which the blood has to rise against the power of gravitation. Their simple use is evident; the blood, returning slowly through the capillaries, and much of the force of the heart being expended in propelling it so far, would be apt to retrograde, or remain stationary, if the weight of the whole column in the veins bore down upon the arteries, and through them on the heart. As soon however as a portion is raised into a vein, when it tends to return to the arteries it is impeded by one or two rich meshes, &c., which close the canal of the vein and support the blood above them, till another portion rising sends it onwards. Thus while they permit the blood to pass without obstacle from the capillaries entirely prevent it from retrograding; and if it were stationary, the column of blood would be like a stream branching out, and divided by a number of closed locks in which the portion of fluid between any two is thrown into a current by exercising any influence on the portions adjacent to it.

The veins, like the arteries, are elastic, and this power is occasionally exerted in recovering them from too great dilatation; for their elasticity permits a certain water pressure to be transmitted by simple transudation; nor can any open terminations be seen, for all appear to arise from arteries and terminate in veins.
accelerating the circulation; but from the arrangement of the valves equal pressure on the veins has a very different effect, for it will be prevented by them from producing any retrograde current towards the extremities of the arteries, and thus the greater part of the power exerted will be gained in favour of the flow towards the heart. Such pressure is exercised by the muscles surrounding the veins; as they contract they compress the veins, and thus force the fluid to flow in the only possible direction, viz. towards the heart. Their influence in this way is shown in the greater tendency to disease and permanent dilatation of the veins immediately under the skin and other parts remote from the muscles, than in the deep-seated branches in which this varicoso state (as it is called) very rarely occurs, although the number of valves in the former is always much greater; in the benefit derived by supplying the place of muscles by artificial pressure on the veins by bandages, &c.; by the increased fullness of the veins, and velocity of the current commonly seen in bleeding when the bleeding-stuff is compressed and moved about in the hand; by the general acceleration of the circulation by muscular exertion; and, on the contrary, by the tendency to stagnation and swelling of the veins in the indolent, or those whose muscular systems are greatly debilitated.

But a still more important influence which is permitted by the presence of the valves is that of atmospheric pressure. It acts principally in respiration. When the chest is expanded for the purpose of inspiration, it is evident that the atmosphere will press with equal weight on all parts to fill up the vacuum thus produced. From without it will pass at once into the most open course through the trachea into the lungs, which it distends; but at the same time the blood will be forced towards the heart and the great vessels contained in the chest, and will assist in filling up the vacuum to a degree directly proportionate to their volume as compared with that of the lungs. An experimental proof of this influence in the veins (for in the arteries its effect is prevented by the valves at their origins) is afforded by introducing a tube into the jugular vein of an animal, and placing its opposite extremity in a vessel full of fluid. At every inspiration the fluid will be seen to rise, and at every expiration to descend a little, indicating first a suction towards the heart, and next a slighter expulsion of fluid from it. It is seen also in cases in which the brain is exposed by removing a portion of the skull; and in cases of Hernia Cerebri [Head, Injuries of the], in which, in addition to its slight elevation by the pulsation of the arteries at its base, the brain is seen to enlarge and rise at every expiration, and to become flattened at every inspiration. All these phenomena are still more evident when a strong inspiratory effect is made, as in sighing.

As inspiration draws the blood into the chest, so expiration acts by compressing all the large vessels to force it out of that cavity away from the heart. Its principal influence must be exerted on the arteries, for the blood would be prevented from flowing along the veins by the valves. As the arteries (and to a less extent in the veins) it is seen to act in the increased velocity of the current that issues from a wound; in the fullness of the vessels of the face and other parts during a strong expiration, or when holding the breath, coughing, or sneezing, actions which are sometimes the causes of rupture of the smaller vessels, and produce an evident alteration in the pulse.

Atmospheric pressure on the veins must also act to some extent in filling up the vacuum which the sudden contraction of the venous vessels must produce in the pericardium. Of course the lungs will expand, and in part effect this by pressing the pericardium towards the heart; but at the same time the fluid vessels tend to rush towards the aorta and dilate it, so that they may fill up the vacant space.

Dr. Barry proved this further, by showing that if a tube be introduced into the sac of the pericardium, without allowing any air to enter with it, a fluid placed in it will be seen to be drawn towards and driven from the sac, at each contraction and dilatation of the veins.

Such are the powers concerned in the circulation, and the principal effects which they produce. The influence of each is certain, but what is its extent, and what are the circumstances under which it is chiefly exercised, cannot be accurately determined. In order of importance, the contraction of the veins, the elasticity of the arteries, the contraction of the aorta, and the dilatation of the veins contract. All these assist at all times in moving the blood; the elasticity of the arteries tends also to equalize the velocity of the current, while their vital contraction and that of the veins, the action of the capillaries, and the muscular pressure on the veins, influence it only at particular periods. It is by the heart that one of these (or sometimes another whose influence is prevented, as in the lungs on which muscular and atmospheric pressure can have no influence, but in which many circumstances prove how intimately is connected the motion of the veins and capillaries; and in the liver, in which the ventricular contraction can have little power, but in which the constantly patulous state of the hepatic veins would make them peculiarly fitted for the influence of pressure).

HEART, DISEASES OF THE. When we consider the compound, or rather the mechanically complicated nature of the heart; its constant action, from the hour of birth to the hour of death; the extent to which every organ depends upon it for power to perform its functions in the animal economy; and the frequent derangement of some one of these organs, which tends to impede or render more laborious the heart’s unceasing action; we cannot be surprised at finding this central organ of life so subject to so many diseases, and that there is great difficulty in assigning to each unhealthy state its peculiar cause.

In giving some account of the disorders to which the heart is liable, it would perhaps be best to state them according to their causes; but as it is much easier to obtain a knowledge of the structure of this organ than of the remote causes of its several diseases, we shall here enumerate and describe first those lesions which occur in its investing membrane; secondly, those which affect it as a whole; and thirdly, those met with in its various parts. Those who desire to be further acquainted with this subject are referred to the works of M. de la Hire, Parthenais, Cruveilhier, Bouillaud, Bertin, and Dr. Elliott, Hope, &c.

Diseases of the investing Membranes of the Heart, the Pericardium; Absence.—The pericardium has been reported
as about in a case published by Mr. Robinson in the "American Journal of the Medical Sciences," February, 1833; and the evident exaggerations of his account render it unsafe to give credit to any portion of it.

Pericarditis, Inflammation of the Pericardium, resembles much, in its pathologic conditions, inflammation of other serous membranes, and is induced by similar causes, as exposure to damp and cold. It of course presents peculiar symptoms, arising from the situation and nature of the individual organ; thus there is a feeling of tension over the portion of the heart, amounting, when pressure is made, to acute lancinating pain, which prevents him from lying on the left side, and is much increased by drawing deep inspirations or coughing, this latter symptom frequently combining, and being interpreted by the patient, as an inflammatory attack. This pain however is not always so severe; frequently only a sense of oppression is felt. The pulsations of the heart are frequent, sometimes regular, but at other times intermittent, so strong, as to constitute palpitations; but still, if much effusion has taken place into the pericardium, the hand applied to the chest will have difficulty in perceiving them. The precordial portion of the thorax is considerably impaired by the forcible action of the heart and the quantity of fluid effused into the cavity of the pericardium. This effusion varies much in quantity and consistence at different periods of the disease. In many cases, a bloody secretion will be found; in others, pus in large quantities, coagulated lymph, bands of fibrinous matter uniting the two layers of the serous membrane, and even cartilaginous or bony fragments will be found discovered by percussion in the precordial region. The temperature of the body is always, in this disease, increased in proportion to the quantity of fluid in the pericardium, and in proportion as this fluid becomes organized sounds will be heard by the application of the stethoscope, and often of the unassisted ear, varying in their nature according to the state of the organizing process, and resembling at one time the creaking of new leather, at another the rubbing together of paper or parchment, and at times it is made by a fluid also are frequently heard, which depend upon the disease being accompanied by lesions within the heart itself. Although at the commencement of the disease the patient may complain of attacks of acute inflammation, accompa-
nied by nausea having a type sufficiently tonic, this state does not endure long; the effusions into the pericardium hinder the heart's action; the free passage of the blood through its cavities becomes obstructed by various intubated parts of the organ sharing in the inflammation; and, the circulation being no longer vigorously and equally carried on, a crowd of distressing symptoms, such as inability to sleep, rattling in the chest, amounting to suffocation, dropsies, &c., render life almost insupportable, and if not speedily relieved, soon put an end to existence. It is worthy of remark that this disease frequently presents rheumatic passion of the joints; and also that patients, when apparently recovered from acute rheumatism, are sometimes suddenly attacked and carried off by inflammation of the pericardium. So many of these cases have occurred that many distinguished physicians have considered that the pericarditis takes the place of the rheumatism, constituting what is termed a 'met-
tasis.'

The serious nature of this disease and the rapidity of its progress demand very prompt antiphlogistic treatment; but on the contrary some physicians exhibit tonic medicines. A distinction ought to be drawn however between recent acute cases and those in which, from previous attacks, the condition is in advance, and the heart little by little impeded by old adhesions and deposits between the two layers of the pericardium, and perhaps within the organ itself.

Hydro-pericardium; Dropy of the Pericardium.—In addition to the effusions just noticed in the pericardium, as the result of inflammation of that membrane, it is found in some few instances distended, and sometimes to an enormous degree, by an increase of its internal fluid, and the fluid itself is sometimes impeded by old adhesions and deposits between the two layers of the pericardium. The fluid may vary in quantity from a few ounces to several pounds; it differs from the effusion of pericarditis in being merely a morbid increase of the natu-
ral serous liquid accumulating into a fibrous clot, or forming false membranes, like the pericarditis effusion which is the result of inflammation.

The sounds of the heart will in this disease appear to be removed from the surface, and dull in proportion to the quantity of the effusion, but no abnormal sound is produced, unless, by the amount of pressure, some obstruction to the circulation arises in the interior of the heart. The action of the lungs becomes much impeded when the pericardium is greatly distended with fluid, and when this obstruction to the breathing is conjoined to pressure on other neighbouring organs many very distressing symptoms are produced.

The treatment of this affection consists in the application of cold compresses, and it has been a question whether or not the operation of puncturing the membrane might be practised.

Diseases of the Heart itself; Absence.—Though the circum-
stances may seem rather to belong to a treatise on non-
organic, than organic diseases, it is not inappropriate that the physician should feel a dread of wanting in some aphasical beings who have shown, for a short time, evident signs of life.

Displacement.—The heart is not always found in its usual situation at the time of birth, there being on record whereas it occupied the right instead of the left side of the chest, the other organs of the body presenting at the same time a relative change of position without any dis-
turbance of their functions. It has also been found pushed out of the left into the right side of the chest by tumours, or, what is more common, by extensive effusion of fluid into the pleura of the left side of the chest. The whole heart has been drawn into the upper part of the abdomen, and forming a portion of a tumour projected beyond the abdominal parietes, constituting what are termed hernias of the heart. For a more elaborate account of these last-mentioned abnormal conditions the reader should consult a memoir on the subject written by M. Hersveld.

Carditis; Inflammation of the Heart.—The proper mus-
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mences in this structure, or in the membranes, is difficult to determine. This however is certain, that when inflam-
mation of the muscular structure exists, there will also be found traces of it in the pericardium, or in the lining mem-
branes of the heart and a large quantity of the blood is often observed in the pericardium. The symptoms of the one distinct from those of the other dis-
 ease: the treatment consequently will be similar in both. The progress of this inflammation may be traced at its different stages. Two cases will find at one period on record whereas it occupied the right instead of the left side of the chest, the other organs of the body presenting at the same time a relative change of position without any dis-
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hand of the observer when applied to the chest forcibly repulsed, yet the pulsations are for the most part regular, unless palpitations be induced by over exertion. The sounds perceived by auscultation will be found very loud, but not otherwise unnatural, if the disease be not combined with some obstruction to the passage of the blood; and unless some obstruction exists, the sounds of other organs will not be much deranged, provided that the hypertrophy be not of great extent; but it seldom does exist to considerable extent without the simultaneous occurrence of some impediment to the passage of the blood, already circulating with an extraordinary impetus. The accidents referrible to hypertrophy of the left ventricle of the heart are apoplexy and hemorrhages; it will also contribute to the production of aeurism of the aorta. It is also possible that the enlargement of the right ventricle of the brain by the too forcible expulsion of blood from an hypertrophied left ventricle is materially facilitated by an earthy or ossaceous state of the coats of those vessels. When the right ventricle is hypertrophied, sends its blood too forcibly through the lungs, there will be a disposition to congestion of those organs. These effects will be combined when the whole heart is hypertrophied.

This is a disease in which great perseverance is required on the part of the patient and the practitioner, but with proper care it frequently admits of much alleviation. Rest, abstinence, sedative medicines, and more or less depletion, supplied to counteract the consequences of the case, are the most efficacious plan of treatment.

Atriofthe Heart—is a wasting of the heart’s structure, dependent on deficiency of the nutritive process. This disease is the reverse of hypotrophy, and, like it, may affect the whole of the heart or its parts; it is often such that the heart does not exhibit more than half its ordinary weight. Like hypotrophy, it has been divided into simple atriof, when the walls of one or more cavities are thinned without the production of a heart unusual sensation; and specific or aneurismatic atriof, when the enlargement of the cavity keeps pace with the thinness of the walls; and concentric atriof, where the cavity is diminished, but the walls are normal, so that the state of the heart is usually accompanied by general emaciation, and the pulsations and sounds of the organ will be found feeble in proportion to the extent of the atriof. In concentric atriof the pulse will be small and resistant, though small, whilst in the excentric form of the disease it will be proportionally soft, feeble, and large.

In atriof the powers of the patient are all below par, and the proper treatment will be to support the system by what will exhibit systole and diastole of the heart unaltered, and preserve the countenance, restless tossings of the body, dizzinesss of the sight, and faintings; if the obstructions in the right side of the heart are extensive, as they often are from fibrous constrictions, thickening about aorta, and other obstructions, the venous circulation will be affected, as indicated by the livid bloated state of the countenance, and serious effusions into the extremities; various apoplectic symptoms seem to be sometimes induced by the same cause. The breathing is not affected generally beyond a sense of oppression, unless a considerable impediment is experienced by the circulation, but then the distress and restlessness of the sufferer is often extreme, accompanied by an inability to lie down, and a state of alarm and wandering amounting almost to delirium.

The causes of this serious malady are similar to the causes of pericarditis, and the treatment, which shall be actively antiphlogistic, must not be deferred if the practitioner be desirous of saving his patient.

In giving this slight sketch of endocarditis, allusions have been made to effects produced by obstructions to the circulation; the nature of these obstructions, and how the effect comes to be produced, may be explained. Upon examination after death there will often be found, particularly in the right cavities of the heart, and entangled in the muscular fibres, clots or concretions of a fibrous matter, and of a dark brown colour, which was only caused by stagnation of the blood at the time of death, but also by inflammation of the internal lining membrane. This membrane is also often thickened, especially at the orifices of the valves; and after a time, or long after the form of endocarditis, the valves will not merely be thickened, but will become the seat of a variety of watry excrescences, or even cartilaginous and osseous formations of considerable size, extending into the cavities of the heart.
is most frequently met with in old persons, and especially those who have been addicted to a too generous mode of living. The morbid sounds produced by these obstructions are in the chest, will resemble a low rumbling sound, or a rustling, according to the degree of the obstruction; and sometimes a triplet or even a quadruplet sound will be perceived instead of the two normal sounds. The effects of these violent exertion will be sanguinolent haemorrhages, tiger constrictions, oppressions of the breath, apoplectic seizures, and other symptoms of embarrasement circulation.

Ruptures of the Heart.—Ruptures are sometimes found to be at the valves and the linings of the heart, and the fibres within the heart, but also in its parietes. The effect of such injuries will depend upon their extent and situation. A valve or one of the bundles of muscular fibres caught up through the surrounding muscles will give rise to the free circulation of the blood; but it seldom happens that the parietes of either cavity of the heart are sufficiently injured to allow the free passage of blood into the pericardium without instant death being the consequence.

Pressure from without and pressure from within will both give rise to these accidents. Under the first head may be included all wounds, whether produced by cutting or puncture; and the pressure of the left or right side of the body upon the heart, etc. The second consists of the contusions of the chest. Pressure from within will operate whenever an orifice of the heart is so narrowed or blocked up by thickenings or adhesions of its valves, or dilataions of the passage passing through it; there will then be a tendency in the cavity to dilate in proportion to the extent of the obstruction, and this dilatation may end in rupture. Under such circumstances or a previous one of great or less degree the parietes by absorption will greatly promote the rupture.

Persistence of the Foramen Ovale.—It is by no means very uncommon to meet with cases in which the opening between the two auricles is not obliterated, though it has not been properly closed up at the time of birth. According to the extent of the communication thus remaining, a greater or lesser proportion of venous blood will pass into the lungs, and be carried by the right side of the heart through the arteries. The arterial blood being adapted to produce in the animal economy certain effects and changes necessary to life, and the blood of the veins being unable to produce these effects until it has in its turn been submitted to the action of air in the lungs, the health of every individual in whom the mixture of arterial and effete blood occurs will suffer in proportion to the extent of that mixture.

The symptoms of this disease are blueness of the skin, lips, and nails; a temperature of the body below that which is natural and healthy; shortness of breath, palpitations, faintings, a sense of suffocation induced by slight exertion, and a feeling of indigestion or a change of the bowels from small losses of blood. This disease has from the colour of the skin been named 'blue disease,' 'morbis caerulescens,' or 'cyanosis.' The persistence of this opening between the two auricles is not the only though the most frequent cause of this disease; sometimes the partition between the two sides of the heart is ruptured or ulcerated through, and at others the duct communicating between the auricles and pulmonary artery has remained unclosed; indeed any anormal state of the cavities of the heart, or of the great vessels proceeding from it, which gives rise to an extensive admission of venous and arterial blood, will produce the effect of the communication of the blood, with or without dilatation, and contraction or obstruction of the orifice of the pulmonary artery, and of the right auriculo-ventricular opening, frequently occur at the same time with persistence of the foramen ovale, and increase all the painful symptoms produced by it. Little in the way of treatment can be done in these cases, but every cause of excitement should be carefully avoided, and during the attack all nourishment and faintness small doses of digestive stimulants, as ether and ammonia, may be advantageously employed.

Nervous Diseases of the Heart.—The last class of diseases and which remains to be noticed differs from all the preceding in not presenting any organic changes. They are met with chiefly in women suffering from anemia, chlorosis, hysteria, and other nervous symptoms; and in men in whom a naturally nervous temperament has been rendered more irritable by the too free use of stimulants or by depressions of passions. In these cases strong pulsations of the heart are experienced, increased by exertion to such an extent as to produce palpitations, a sense of faintness, and shortness of breath amounting to suffocation. Sometimes a slight bellows sound is heard at the heart, and in patients labouring under anemia and chlorosis this is frequently accompanied by a noise like roaring, heard chiefly in the carotid and jugular arteries. In certain sorts of persons no attention is paid to the general health; in the cases of anemia and hysteria, iron medicines and the shower-bath will be of the greatest service; and, as far as possible, sources of anxiety should be removed. Sometimes, however, these cases are increased in bulk like other muscles; consequently these nervous states which give rise to so much action of the heart be not removed, they may in process of time lay the foundation for more permanent and serious disease.

HEARTSEASE, or PANSY, is the cultivated state of the plant called Viola tricolor by botanists, improved by crosses with V. altaica and other allied species.

Several hundreds of beautiful varieties are now common in gardens. Although they will all grow in almost any kind of soil, yet in order to bring out the best in perfection, a loam, mixed with sand, and highly manured, is absolutely necessary. By proper treatment they may be had in full flower at two different seasons—from April to June, and from August to October. The ground chosen for the first planting should not be fully exposed to the mid-day sun, as the plants are liable to be scorched by it, but should be open to the east or west; the second planting must be planted as fully exposed, as the influence of the sun is not so powerful as to injure them at the later season of the year.

The original species from which all these varieties spring are easily grown from seeds, and can be raised from the finer sorts, which, as in animals and in other plants, the higher they are bred, and the finer the kinds, are in proportion difficult to keep in health. The principal causes which affect them are excessive heat in summer, and wet and cold in winter. They are lovely plants, and only require to be looked over frequently, when, if any of them are found damping or decaying at the bottom of the stem, the top must be taken off, and struck. When there is danger of losing any of the sorts, the best way is to strike a quantity in autumn, and to place half-glasses over them until spring; at that time those which are alive may be soon multiplied in abundance.

Where fine large flowers are wanted, the plants should always be struck from cuttings the same season, and grown rapidly. In striking them, artificial heat is altogether unnecessary; all that is required for the purpose is a small hand-glass to place over the cuttings, and a mat to shade them during bright sunshine. After they are well rooted, they must be taken carefully off and planted in a bed previously prepared for them. They will then flower in great profusion from April to June.

At this period other plants must be propagated for the autumn flowering; they must again be kept in a shaded situation, until the intense heat of summer is over, when advantage must be taken of all rainy weather for planting them out in beds, where, if the soil and situation be good, they will soon flower, until destroyed by frost.

Varieties of the plant confined from seed are always found to have them fine, considerable care is requisite in selecting the seed.

It must always be gathered at those seasons when the plants flower in the greatest perfection, and from the best formed and large blooms. They will all bear in this state in the early part of the season, from April to June, or in autumn, after the heat of summer is past; at other seasons the flowers are smaller, and it is found that this in winter.

In the spring, in light soil, with the protection of a cold frame. When the plants are very young, they must be removed from the frame, and planted thinly under hand-glasses, where they will remain until some strong sun is to be planted out in the flower-garden. At every shifting they must have plenty of water, and be carefully soaded during bright sunshine.

Like all other florists' flowers there are certain characters...
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which are deemed indispensable to the formation of a good bloom. Mr. Gorrie (Gard. Magazine, vol. viii., p. 573) thus defines it—"Large and round petal, the flower forming nearly a circle, not much undulate—(4 in. across in the large, but some are broader); colours brilliant, distinct, and permanent; eye rather small, and not deeply pencilled; flower stalk strong and upright; and the stigma filling the open part of the eye.

But it is difficult to conceive how, without a direct connexion, that the temperature from heat emitted, it can have any temperature peculiar to its locality; in fact, that vacuum can possibly have any proper heat.

But though the temperature of the free emanation of heat and light are similar, those of their transmission through substances are very different. When a metallic body is but a little heated in a fire, we have heat unaccompanied by sensible light; and the least transparency of glass, though originally transmitted from the sun, arrives at our planet without any sensible heat, even when collected in the focus of a burning glass. Again, a plate of glass placed before a common fire will intercept the heat until it becomes itself sufficiently heated to radiate. When however the source of heat is more intense, a small portion will be directly transmitted; while for the solar rays we find the heat is transmitted as well as the light. It is still more remarkable that when the rays of a liquid are decomposed by transmission through a glass prism, the differently coloured rays of the spectrum have each a different intensity of heat, the least refrangible possessing the greatest portion; the greatest heat is found at that which is occupied by the extreme red rays, or even a little beyond them.

Not only may radiant heat be collected in a focus by reflection through a lens, but also by reflection from a polished metal mirror. If we employ a pair of convex mirrors, the heated body will be placed in the focus of one, and a thermometer in the other, the reflected heat falling on the bulb of the instrument will cause the mercury to rise; and conversely, a colder body will make the mercury descend, for the excess of radiation proceeds in this case from the thermometer. Recent experiments on heat show that the analogy of the laws of heat and light extends even to their polarization.

The experiment of Leslie have shown how greatly the quantity of radiant heat may be affected by the state of the surfaces from which they finally emanate. The method adopted by Leslie for examining the powers of radiation possessed by different substances was extremely simple and ingenious. Having employed the system of two specula above mentioned, he placed a tin canister filled with hot water in the focus of one, and a differential thermometer in the focus of the other [THERMOMETER]. The sides and bottom of the tin canister were covered with the substances of which he proposed to seek the radiating powers; when three of the sides were respectively covered with lamp-black, paper, and brown glass, and the fourth turned so as only to present the speculum, the heat reflected by the other raised the thermometer accordingly to 100°, 98°, and 90°; but when the fourth side, which was uncovered, was similarly directed, the thermometer fell 12°. Thus it appears that polished metallic substances are bad radiators, which may be attributed to the internal reflection of the heat from their surfaces, for the sources of radiation must evidently be at some small depth below the geometrical surfaces. A similar apparatus served to measure the absorptive power of different substances, by covering the bulb of the thermometer as uniformly as possible with an envelope of the substance to be examined; this power is thus found to be nearly in proportion to that of radiating power. In fact, the reflected heat was not however in the strict geometric focus, but, in consequence of aberration, it was found to be a little beyond it.

The power of radiating heat is certainly the most universal mode of its propagation between different particles of matter as well as through considerable spaces. However, it is usual, for greater simplicity, to designate this propagation through solid bodies as conduction, and that through the vacuum as contact. Poisson has shewn that the different forms of contact, or heat in solids may be derived from the internal radiation of the particles which compose them. Whichever of these theories may be the true one, they are both important, and present some of the most interesting distinctions between different homogenous substances, viz., their conducting powers internally and externally. If we
take two substances, as a piece of metal and of wood, at the same temperature as indicated by the thermometer, when held in the warm hand the metal will feel colder than the wood, the heat of the hand being more rapidly absorbed by the metal, as being the better conductor of heat. Or if we place the two substances in a rod of copper and of glass in a fire, and hold with the hands the other extremities, the heat will be found to ascend rapidly through the metal and very slowly through the glass. These circumstances are sufficient to give a general idea that bodies conduct heat differently, yet, to obtain exact measurements of conducting powers, it will be necessary to have a more precise idea, since such power is a constant coefficient belonging in every case to the nature of bodies peculiar, and with the knowledge which it would be impossible to compare the result of theory with observation.

Newton remarked that, when two substances of unequal temperature are in contact, the colder received from the other in a given small time a quantity of heat proportional to the difference of their temperatures. This simple law has recently been found not strictly correct, but is sufficiently so when the difference of temperatures is inconsiderable. If \( t' \) represent the temperatures of two bodies of the same physical nature placed in contact, and if we leave out of consideration the heat escaping by radiation from their surfaces, the quantity of heat communicated in a given time by Newton's law, be represented by \( h (t-t') \); where the coefficient \( h \) is a constant peculiar to the given substance, and is proportional to the interior conductivity.

If we imagine the surface of the earth to be of a uniform temperature, and subject to a current of air also of a uniform but inferior temperature, the loss of heat by a unit of surface in a unit of time indefinitely small will, by the law represented by \( H \), be proportional to the surface of the earth, and the coefficient \( H \) is proportional to the exterior conductivity under such circumstances.

The exterior conductivity may be very different in the same body by slight alterations in the smoothness or or colour of the surface; it is by this antagonist principle that heat acquires a permanent state corresponding to the different positions of the parts of bodies relative to the surfaces of heat and the dispersing surfaces.

The theory of the distribution of heat is founded on the principle that when a body has arrived at a permanent state of temperature the quantity of heat given out by any particle to the adjacent colder region must be equal to that received from the warmer particles near it, and conversely. For example, suppose a solid body to be contained by two parallel planes of indefinite extent, the lower plane being preserved by any means at a uniform temperature by \( a \) and the upper at the same by \( b \). Suppose a thin cylindrical rod to be placed in a medium of which the temperature is constantly zero, while its extremities are maintained at constant but different temperatures, if the heat escapes at the dierent equal distances along the rod, a geometrical progression increasing from the colder extremity to the hotter, for on this supposition the heat which would be retained by any section in the proportion of the unequal differences of its temperature with those of sections similarly placed above and below it, if there were no radiation, will be exactly lost by the external means of conduction, for it is a property of the terms of an arithmetical progression that the sum of the terms proportional to the terms themselves; the heat which would be retained is proportional to this second difference, and the heat externally emitted is proportional to the temperature itself. Thus this law, which renders the internal gain of heat equal to its loss externally, represents the law of its permanent distribution. Those who are acquainted with the calculus of partial differences may find these principles applied, not only to the permanent distribution of heat, but to the laws of cooling in bodies warmed by any sources, and bounded by any surfaces, in the excellent work of Fourier (Théorie de Chaleur), and in the memoirs of Poisson, Littrow, and others.

The propagation of heat in liquids depends very little on any communication by contact. If we place a heated plate on the surface of water in a vessel, but so as not to touch the edges of the plate, we shall observe little or no alteration of temperature; liquids are therefore heated by the transposition of their parts. Thus, if with a blowpipe we apply heat to the bottom of a vessel containing water, in which are floating some small particles of dust, a current will be perceived of the warmer rise to the point to which heat has been applied, and another descending current of the colder parts, which being heated in turn rise also; in this manner the heat is distributed through the whole liquid, for as the heat expands the particles of liquid which it first meets, they become specifically lighter than the adjacent fluid, and they must therefore ascend by the laws of hydrostatics, while the heavier take their places. Little indeed can be said about the direct propagation of heat in a liquid, as it is probably much less, if any; but there would be great difficulty in establishing this experimentally. The effect of heat on gases is to increase proportionally their elasticity, and this increase can be measured by the number of the collisions of the particles of the gas with the walls of the vessel, so that the whole shortly acquires a uniform temperature, when other forces, such as gravity, are not taken into consideration, and when the bounding surfaces are not essential. This increase of temperature is where the cooling occurs.

These three modes of the propagation of heat exist in our globe, and are the cause of important phenomena in the distribution of climate.

First, the great mass of the earth, considered in reference to the sun, has an external source of heat by radiation principally from the sun. The maximum quantity of this heat is bestowed on the region between the tropics, while the poles are at a temperature which, for the action of the sea and straits, would, were it not for the internal heat of the earth, would in a homogeneous sphere be distributed symmetrically relative to its centre, diminishing towards the surface, which would lose heat by external radiation; but the external heat is included to, by producing a flux from the equator to the poles, forms a permanent compensation for this radiation.

If we suppose the mass of the earth to have been at any remote period, when in an almost round form, its general form, there are many striking geological proofs, the effect of the radiation of this mass of heat into the colder surrounding space would be to cool first the superficial part, and successively, the more interior strata, until the temperature on the whole reached a certain depth; but the internal heat of the earth would in a homogeneous sphere be distributed symmetrically relative to its centre, diminishing towards the surface, which would lose heat by external radiation. Hence, on descending below that comparatively shallow envelop affected with diurnal or annual changes of temperature, we ought to find a continually increasing temperature towards the centre, a result which has been verified in the mines in several countries in Europe. Poisson deems these experiments inconclusive, in consideration of the small depth which we are able to penetrate; for without assuming any increase of heat towards the centre, the same superficial phenomenon would occur on the supposition that the whole solar system had been transferred into a region of space possessing a different temperature from that in which it formerly moved; but this view, which is purely speculative, cannot be verified by facts.

The propagation of heat by motion in fluids has an immense effect upon our climate. The winds, that will blow the equal distances along the rod, a geometrical progression increasing from the colder extremity to the hotter, for on this supposition the heat which would be retained by any section of the fluid in proportion of the unequal differences of its temperature with those of sections similarly placed above and below it, if there were no radiation, will be exactly lost by the external means of conduction, for it is a property of the terms of an arithmetical progression that the sum of the terms proportional to the terms themselves; the heat which would be retained is proportional to this second difference, and the heat externally emitted is proportional to the temperature of the fluid itself. Thus this law, which renders the internal gain of heat equal to its loss externally, represents the law of its permanent distribution. Those who are acquainted with the calculus of partial differences may find these principles applied, not only to the permanent distribution of heat, but to the laws of cooling in bodies warmed by any sources, and bounded by any surfaces, in the excellent work of Fourier (Théorie de Chaleur), and in the memoirs of Poisson, Littrow, and others.

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add any salt to water at common temperatures they will combine and coagulate; and as long as their mutual affinity exists at the degree of heat in the surrounding surface and the earth's surface, but the greater cold would necessarily convert the vapour in the upper regions into water, which, descending in rain, would be again vaporized, and this reciprocal action going on during the whole process of cooling would be capable of producing immense alterations on the earth's surface. It has been suggested by Mr. Babbage that a cause of a similar nature may have led to the rings and belts of the supercontinent.

Most of the instruments constructed to measure heat are founded on its general tendency to produce expansion, but a few of them on other properties of heat. Besides the various thermometer and barometer differences described by Laplace, in which an internal chamber of a box is preserved at the temperature of melting ice, being constantly surrounded with that substance, guarded against the contact of the air in a division of this chamber, a cell furnished with a stop-cock, a body is plunged at any temperature, and remains until it ceases to melt the ice, when the quantity of melted water conducted through the stop-cock is taken as a measure of the quantity of heat given out by the body. This instrument is of use in determining the specific heats of substances, and the calculation of latent heat; but this subject more properly belongs to heat regarded relatively to its chemical effects. For the measurement of high temperatures, see Pyrometers.

The dilatation of substances by heat is nearly proportional to the increase of temperature, except when they are about to change their physical or chemical states; thus water near the boiling-point is a little more than half as expansive as lead. The term is diminished, which is probably owing to the different arrangement assumed by its constituent particles preparatory to crystallization. From the experiments of Dubourg and Petit, the pure gases appear to afford the most strictly proportionate expansions, and to correspond to mercury between the freezing and boiling points. Water and alcohol, when near boiling, have very irregular expansions; and crystals in bodies expand unequally in the directions of their different axes. The slow propagation of heat in glass causes very unequal expansions, and consequently fractures. In gases the law of Gay-Lussac is very simple; their expansion (even water containing air) is 0.072 of their volume at the freezing-point, when their temperature is raised to the boiling-point; and is equal during the interval. [Gas, p. 84.]

Experiments by Fresnel, Trevalyan, Powell, Forbes, and others, have greatly tended to prove that a regular sensible diminution of heat exists between particles at small distances. If a heated poker be laid slantingly on a block of lead at the ordinary temperature, it will commence to vibrate, first slowly and then with increasing rapidity, and will produce a musical note, which continues for some time, at the termination sometimes changing to an octave. Though a different hypothesis may partly explain this circumstance, yet the number of phenomena of a similar nature adduced of late years render the hypothesis of repulsion extremely probable.

The following table gives the dilatation of a unit length of different solids from the freezing to the boiling point, and is a mean taken from several observers:—

<table>
<thead>
<tr>
<th>Substance</th>
<th>Expansion at Ordinary Temperatures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass tube</td>
<td>0.0083</td>
</tr>
<tr>
<td>Copper</td>
<td>0.017</td>
</tr>
<tr>
<td>Brass</td>
<td>0.009</td>
</tr>
<tr>
<td>Silver</td>
<td>0.023</td>
</tr>
<tr>
<td>Palladium</td>
<td>0.010</td>
</tr>
<tr>
<td>Tin</td>
<td>0.002</td>
</tr>
<tr>
<td>Cast iron</td>
<td>0.001</td>
</tr>
<tr>
<td>Pewter</td>
<td>0.002</td>
</tr>
<tr>
<td>Steel</td>
<td>0.003</td>
</tr>
<tr>
<td>Grain tin</td>
<td>0.003</td>
</tr>
<tr>
<td>Lead</td>
<td>0.003</td>
</tr>
<tr>
<td>Zinc</td>
<td>0.004</td>
</tr>
<tr>
<td>Glass</td>
<td>0.0009</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reflecting Power (Lease).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brass</td>
</tr>
<tr>
<td>Silver</td>
</tr>
<tr>
<td>Tin</td>
</tr>
<tr>
<td>Glass</td>
</tr>
</tbody>
</table>

Chemical Agency of Heat.—The agency of heat in promoting chemical action is important and extensive; in some cases no combination can take place without it, and in others it greatly facilitates chemical combination, while in some instances it decomposes compound bodies and resolves them either into simpler or elementary forms of matter. If we

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rounds it is known by the obvious fact that the fat melts at the foot of a tree at a great distance from it; the temperature is lower in summer is equally well proved by the coldness of the fluid which is discharged from many vines and vine-like plants when cut across. These phenomena have been examined with care by several observers: it is said that the temperature of the trunk plunged 11 inches deep in the trunk of a walnut tree generally indicates in the autumn a higher temperature than that of the external air by 2° or 3°; Schöpf at New York; and Birkerland in Sweden, and Maurus and various other observers, have obtained similar results; they have found even tubers and bulbs with a temperature higher in winter than that of the external air by 6° or 7°. In summer, while on the other hand from the spring to the autumn it is lower.

The former fact accounts in some measure for the power possessed by some plants of resisting cold in winter, and for the protection given to the upper parts of trees by keeping straw up against their trunks in winter. During every season of the year trees are absorbing water from the earth; water when absorbed with its heat very slowly through the carbondized matter of a trunk; in winter the temperature of the earth, which determines the temperature of the water it contains, is uniformly higher than that of the atmosphere, and consequently the temperature of the interior of a tree is also higher, in proportion to the difference between the heat of the soil at the base of the trunk and the atmosphere of the spring and summer, on the contrary, the earth is cooler than the air, and the temperature of trees is cooler also.

These considerations throw some light upon the effects of freezing. Severe freezing is a disastrous, affecting every more than an old one of the same species; either because its roots derive their food from a smaller distance under the soil, or because the heat obtained from the soil is sooner parted with on account of the shininess of the bark and the thinness of the wood mass. Unhealthy trees, which also suffer in like manner, may be supposed to do so in consequence of the weakness of their power of pumping warmer fluid up from the soil in winter.

When a sufficient source of heat in vegetables, there is another that deserts attention. Whenever oxygen combines with carbon to form carbonic acid, an extraction of heat takes place, however minute the amount; such a combination occurs much more extensively during the germination of seeds and the imregnation of flowers than at any other time. At the first of these periods extraction of heat takes place to a considerable amount, as is remarked in the germination of barley heaps in roots, previously by being manufactured into malt: in the latter it also occurs, but in consequence of flowers not being confined in close cases, the heat is lost as soon as it is disengaged, and never a rum, except in a few cases. The temperature at which the temperature is the angle of the common gourd, at between seven and eight o'clock in the morning, half a centigrade degree higher than that of the air; and those of the temperate zone between 2° and 3° higher. This is how it is, only when large quantities of flowers expand within close cases that this phenomenon is particularly remarkable. Accordingly, in the spathe of araceous plants it has been noticed at its greatest intensity. Lamarch, Senebier, and De Candolle, found the flowers of Arum maculatum, between three and seven o'clock in the afternoon, as much as 7° Réam, warmer than the external air. Schultz found a difference of 4° to 5° between the heat of the spathes of Cacalia in the morning and that of the external air, by being warmer in winter and cooler in summer, but that under particular circumstances the heat of certain parts is elevated in a very remarkable degree. We know this very well since the surrounding air at six to seven, and eight to nine o'clock p.m. Hubert and Bory de St. Vincent assert that at sunset the spathe of Arum cordifolium acquires in the Isle of France an elevation of 30° R. above the atmosphere. For the temperature of the Calcutta and Vienna, and Adolph Brongniart at Paris, have confirmed the fact by new observations in the hothouses of those cities.

Hence it appears that plants not only have, under all circumstances, a temperature different from that of the external air, being warmer in winter and cooler in summer, but that under particular circumstances the heat of certain parts is elevated in a very remarkable degree. We know this very well since the surrounding air at six to seven, and eight to nine o'clock p.m. Hubert and Bory de St. Vincent assert that at sunset the spathe of Arum cordifolium acquires in the Isle of France an elevation of 30° R. above the atmosphere. For the temperature of the Calcutta and Vienna, and Adolph Brongniart at Paris, have confirmed the fact by new observations in the hothouses of those cities. It is very likely to be the temperature of the external air, being warmer in winter and cooler in summer, but that under particular circumstances the heat of certain parts is elevated in a very remarkable degree. We know this very well since the surrounding air at six to seven, and eight to nine o'clock p.m. Hubert and Bory de St. Vincent assert that at sunset the spathe of Arum cordifolium acquires in the Isle of France an elevation of 30° R. above the atmosphere. For the temperature of the Calcutta and Vienna, and Adolph Brongniart at Paris, have confirmed the fact by new observations in the hothouses of those cities.
care in preparing the article for market; though it is yet doubtful whether the Ceylon gamboge of commerce is all yielded by this tree; but Mrs. Walker on one occasion, in passing through a forest of these trees, saw all of them with the bark cut off in various places. Dr. Christison has shown that there is all but an identity of composition with that of Siam; and its medicinal effects are precisely the same as proved in Ceylon by Dr. Pictorin, and by Dr. Graham and Christison in Edinburgh.

This plant, though new named, is far from being new. Dr. Graham considers it to be identical with the Careapulli of Herman, the Cambogia gutta of Linnaeus, the Garvania Morrel of late authors, and the Stalagmitis cambogioidei of Moon's 'Catalogue of Ceylon Plants.' The last name might have been retained, as it was originally intended for it, had it not been discovered by Mr. Brown that the specimens in the 'Bankian Herbarium' collected by Kenné, and from which Murray's character of the genus and species was established, consist not of one, but of two distinct plants, the flowers of Xanthochymus ovalifolius being stuck by sealing-wax upon a branch of what appears to be this Ceylon plant. The genera Stalagmitis and Xanthochymus are therefore one genus, as was previously inferred by Cambeessen, who has retained for it the former, as the prior name.

The genus Hebradendron has diocious flowers; the male having the calyx membranaceous, four-septaled, persistent, coroll four-petalled; stamens monadephous; column four-sided; anthers terminal, opening by the circumcision of a flat and umbilicate terminal lid. The inflorescence of the female tree is similar to that of the male, the flower white and a little larger, with a germin precisely in miniature of the fruit, and surrounded (like it) with several (ten?) abortive stamens. The berry is many (four) seeded; cells one-seeded, surrounded at the base with some free abortive stamens, crowned by a lobed and muricate sessile stigma; cotyledons fleshy, united; radicle central, filiform; trees with entire leaves.

HEBREW LANGUAGE forms a branch of that extensive family of languages which are known by the name of Semitic; a name which is derived from the real or supposed descent of the people who speak these languages from Shem the son of Noah. The Semitic languages may be divided into three branches: the Arabic, to which the Ethiopic is closely allied; the Aramaean, consisting of two dialects—the Babylonian or East Aramaean (sometimes but erroneously called Chaldee), and the Syriac or West Aramaean; and the Hebrew, to which the Phoenican and Punic are closely related. Of these languages the Arabic is the most copious, and the Aramaean the least; the Hebrew holds an intermediate rank between those, being more perfect than the Aramaean, and inferior to the Arabic.

The Hebrew language derived its name from the Hebrews, who date their origin from Abraham, who is called 'the Hebrew' (אָבִּית in Gen. xiv. 13). The etymology of this word is doubtful. According to the Jews it is derived from Eber (אֶבֶּר), an ancestor of Abraham (Gen. x. 24, 25; xi. 15); but Gesenius and many other critics maintain that Eber cannot be regarded as a historical person, and that his name has been invented in the same manner as the names of Ion, Dorus, Alois, &c., by the Greeks, to account for the origin of the people. It has been supposed with some probability that the name of 'Hebrew' was originally applied to designate all the Semitic nations west of the Euphrates, which appear to have emigrated from Mesopotamia. According to this etymology, the word 'Hebrew' is derived from the root אָבִּית, 'to pass over.' This appears to have been the opinion of the translators of the Septuagint, who render Gen. xiv. 13, 'Abram the Hebrew,' by Αβρααμ τον ισραήλ, that is, 'Abram, the passer-over.' All the descendants of Abraham were, according to this view, originally called Hebrews; and the name was only restricted afterwards to the inhabitants of Palestine. (See Ewald's Hebrae Grammar, § 3; and Gesenius, Hebrew Lexicon, under אָבִּית.) This name is never applied to the language of the Hebrews in the Old Testament; in Isaiah, xix. 18, it is called the language of Canaan (גָּם כָּנָעַן); and in Is. xxxiii. 11, 2 Kings, xviii. 26, 2 Chron. xxxiii. 18, and Neh. xiii. 24, the Judaic Jewish language (יוֹדּוּש). The language spoken in Palestine in the time of Christ is frequently called Hebrew (יוֹדּוְתֵר) in the New Testament (John vii. 14; Acts xxi. 13; Acts xxvi. 2; xxii. 14); by which the Aramaean is probably intended. In the writings of the Rabbinical Jews the Hebrew is generally called the 'holy language' (יוֹדּוְתֵר הָנְטוֹל).
The Hebrew language appears to have been formed in the time of the ancient Aramaean, which was brought by the Abrahmites from Mesopotamia, with the Phoenician or Canaanitish, the language of the original inhabitants of the country. That the Phoenician and Hebrew languages were very closely allied is evident from the Phoenician names and surnames, and from the species of the Phoenician language which we possess in coins and inscriptions. (Bohniary, Geographia Sacra, b. ii. cc. 1—7; Belifemar, Handbuch der Bibl. Lit., vol. i. sect. 56; Beliemen, Erklärung der Hebräischen Sprache, 1847.)

The long settlement of the Hebrew land, as the forty years' wandering in the wilderness, must have had an important influence upon their language; but the number of Egyptian words received into it appears to have been small.

Many critics have divided the history of the language into four periods:—I. From Abraham to Moses; II. From Moses to Solomon; III. From Solomon to the Babylonian captivity; IV. From the Babylonian captivity to its final extinction. The most ancient language remains, however, are in two only two periods in which any difference can be traced in the language; the first extending from the time of Moses to the reign of Hezekiah, and the second from the reign of Hezekiah to the fall of Jerusalem, or the spoken language of the Targums.

The language in which the Pentateuch is written differs so little from that of David, Solomon, and Isaiah, who lived many centuries after the time of Moses, that many critics, who suppose that the language of the Psalms should have languished, or that the books of the Old Testament were written only in the time of the exile, are of opinion that, as the language has maintained its position for so many centuries, we must suppose it to have been written in a new style; but in general, the subject is a matter of dispute.

He observes in his "Hebrew Grammar," §7 (Eng. trans.), that "the Hebrew language in the first four books of the Pentateuch, which are the most ancient, contain records of unquestionable antiquity, partly by Moses or by his time, appears already, a few minutes excepted, fully developed.

'From Moses until about the year 707 it underwent two changes: for as the structure of the Semitic language is in general more demotic than that of languages of greater development, as Sanskrit; to which is to be added, that in that period the Hebrews did not experience those influences which materially affect a language. In the last period, however, there was a change in the language more severe than the former. It was the time of the Babylonian captivity, when the language was less subject to nations of foreign tongue, and lived almost entirely separated from all nations, especially from nations of foreign language. Their language therefore advanced little in development, but it also suffered little from corruption. There are however in those books of the Pentateuch some certainly important differences which afterwards disappear, and many differences of that kind have become so less distinguishable by us, because the more modern punctuation has treated all words according to one standard, and that the standard of the language at a late period. The study of the Hebrew language appears to have been greatly promoted by the schools of the prophets, which were founded, and it is of these schools that we are probably indebted for the lyric poems of David and the didactic and amatory poetry of Solomon.

The conquests of the Assyrians and Chaldeans from about a.c. 720 tended to introduce the Aramaean language into Palestine. It appears from Isaiah (xxxvi. 12) that the principal people in Judaea, even in the reign of Hezekiah, four hundred years earlier, spoke it. In the time of the destruction of the kingdom of the north, when the land of Galilee and the northern parts of Palestine appears at all times to have inclined to the Aramaean; in the time of Christ, the Galilean dialect differed from the language spoken in Judaea. (Mischenthal, Geschichte der Sprache, 1841.)

The Jews, according to the edict of Cyrus, it appears from a letter of the year 536 (Hagăr, 2 Esdr., 12, 1), did not understand the Scriptures when read to them in the Hebrew language. But Hebrew continued to be spoken by the upper classes for a considerable time after the Babylonian captivity. The prophecies of Hagăr, Zechariah, and Haggai, and the books of Malachi and Song of Songs, are written in tolerably pure Hebrew. The inscriptions of the coins of the Maccabees are in Hebrew; and the Hebrew language does not appear to have been discontinued in the writing of chronicles and commentaries till the fourth century preceding the birth of Christ.

But the Hebrew, from the period of its extinction as a spoken language, has been always more or less cultivated by the Jews. By the time of the Talmud, the Jews and Romans, numerous schools were established by the Jews, in which their language and literature were taught. Of these schools the most celebrated were those of Tiberias and Babylon. The Mishnah, which contains the traditions of the Jews and interpretations of the Scriptures, is supposed to have been compiled in the latter part of the second or the beginning of the third century, by Rabbi Jehuda. The Mishnah was considered from this period one of the principal works of Hebrew literature, and the Rabbis of Tiberias and Babylon wrote numerous commentaries upon it. These commentaries were at length collected into two separate works, and entitled the Jerusalem and Babylonian Talmuds. The Babylonian Talmud was compiled in the third or fifth century, by Rabbi Jochohan; and the Babylonian Talmud in the sixth century, by Rabbi Acis. Each Talmud is divided into two parts, the Mishnah, which contains the traditions of the Jews, and the Sifra, which has been edited by Surenhusius, 6 vols. fol., Amsterdam, 1698; the Babylonian Talmud was published at Berlin and Frankfort, 12 vols. fol., 1715; and the Jerusalem Talmud by the Jews of Amsterdam, 1677; 1700. In the same school we are also indebted for the system of punctuation and accents which we have in the Hebrew Bible. This system, which no doubt represents faithfully the traditional interpretation of the language, is called the "Masora." The Jews, entitled Masora (ירה), that is, 'tradition.'

It is uncertain how long the school of the Tiberians lasted; but the Babylonian school was broken up by the Arabs, a.d. 1400, after a long period of prosperity, and most of the scholars took refuge in Spain, where they founded schools in most of the principal cities. These schools produced a succession of writers; of whom the most celebrated was Hai Athir, who lived at the latter end of the sixth century. After remaining in Spain for nearly four centuries they were banished by the Christians in 1492.

The Christians paid very little attention to the Hebrew language till the time of the Franciscans, who were the first to travel in the east and bring back the knowledge of the language. But the Buxtorfs in the seventeenth century tended to diffuse the language among Christians, but their works contained no philosophical views of the language, since they implicitly followed the decisions of the Masoretes. The language of the Spanish Jews, which appeared in 1731, and which may still be consulted with great advantage by Hebrew scholars, contained a much clearer development of the principles of the language than the Buxtorfs had given. His knowledge of Arabic enabled him to compare the forms of that language with the Hebrew, and thus to draw the attention of scholars to the important fact that the study of the cognate languages is necessary to obtain an accurate knowledge of Hebrew.

But the publications of Oxenham and Ewald in the present century, which are enumerated at the end of this article, have done more to facilitate the acquirement of the language than the works of all preceding writers.

It appears probable that the language of the country, which was divided both physically and politically into several parts, must have contained various dialects; but this cannot easily be proved, since almost all the Hebrew writers who lived in the latter end of the first century, the people of Galilee and the northern parts of Palestine appears at all times to have inclined to the Aramaean; in the time of Christ, the Galilean dialect differed from the language spoken in Judaea. (Mischenthal, Geschichte der Sprache, 1841.)

The pronunciation of the Epitomizes is distinguished; and many critics think that they can discover traces of the northern dialect in the song of Deborah (Judges, v.)

Few literary subjects have occasioned greater discussion.
than the letters, vowels, points, and accents of the Hebrew
language. But with regard to the letters, square points are
possible, that the square characters which Hebrew is
written were not employed previous to the Babylonian cap-
tivity, but that the Phoenician letters were used, which
are still preserved with a slight alteration in the Samaritan
and other languages. The present square characters, which belong to the East Arabian
language, were first introduced by Ezra when he revised the
canon of Scripture; but they could not have been univer-
sal till after the exile. The vowels, on the other hand, were
introduced by Ezra, and the pronunciation of the
Tatnach, which was not introduced into Samaria till after
the Babylonian captivity, was written in the antient char-
acter, and the coins of the Asmonaeans in the second
century. In general, therefore, the Hebrew language is
difficult to say when the change was introduced. It has
been conjectured that the square characters were in use
in the time of Christ, from his referring to the letter yod as
the smallest letter in the alphabet; a fact which is true of
the present Hebrew alphabet, but would not apply to the
antient Hebrew or Phoenician alphabet.

It is a characteristic of the Hebrew language, according
to the system of most modern Hebrew grammars, that the alphabet consists only of consonants, and that the vowels are
expressed by means of small points placed above and
below the letters. The antiquity of these points has occasioned
considerable controversy among the learned. Some have maintained
that both the points and the letters were taught Moses by God hims-elf; others, that the points were first introduced by Ezra when he transcribed the Scriptures in the present square
system. On this point, as on many others, the ancient Greeks had
three vowel points, a, i, and o, answering to the three letters נ, THREAD, and that the present system of punctuation was not introduced till the time of the Masorites; but it is
not very certain that this is the case. Gesenius, Winer, Ewald, &c., that the whole system of punctuation was first introduced by the Masorites, of whom some account has been given above, perhaps as early as the sixteenth century. Therefore that which has been used in the tenth or eleventh century. It appears certain from many circum-
stances that the Hebrew letters were originally written
without points. They are not found in antient Jewish
coins and inscriptions; they were first mentioned or alluded to in the Talmud; they appear to have been
unconnected from Origen and Jerome; the antient versions, such as the Chaldee paraphrases of Jonathan and Onkelos, and the Greek translations of Aquila, Symmachus, Theodotion, and many others, express their meaning in
Hebrew words, without points, since they frequently give a different interpretation to the words from which they must mean according to the present system of punctuation; and it is not very certain that the present system of punctuation has
any points. The best arguments on both sides of the question are given in Buxtorf’s ‘Tiberias, sive Commentarii Masorobutich,’ 4to, 1626, in which the antiquity of the points is maintained, and in Capellini’s ‘Aracnem
Punctationis revelatum,’ 4to, 1624, in which their antici-
pation is denied. Further information on the subject will be
found in most of the grammars which are mentioned at
the end of this article. The system of accented on
dependence on that of points, and was in all probability
introduced at the same time. The accents mark the relation of one word to another in a sentence, and thus serve an
important purpose in the syntax of the language. Many
scholars have considered the accents almost useless; but one of the most eminent Hebrews of the present day remarks (Ewald, ‘Hebrew Grammar,’ § 642, Engl. trans.), ‘We everywhere find a beautiful harmony between the
accentuation and the syntax, so that they mutually support
and explain each other. Whether we set out from the syntax,
and learn to comprehend it without knowing any
thing of the accentuation, or whether we proceed from the
accentuation to the syntax, the latter becomes throughout more easy at home in the
former. This is however at the same time the best
comprehension of the accentuation.’ We must distinguish however the accentuation of the historical and poetical books. The remarks of Ewald apply only to the accentua-
tion of the historical books. Many of the accents in the
poetical books serve the same purpose as those in the his-
torical; but with regard to the poetical, their intention
was to indicate the tone according to which the Scripture
was to be pronounced in the synagogue. The accents are given with great
clearness in Stuart’s ‘Hebrew Grammar.’

Further information respecting the Hebrew language and
literature may be found in the following books: ‘De Sacri
Litterae,’ in the ‘Geschichte der hebräischen
Sprache und Litteratur,’ 8vo, Halle, 1766; Koppen’s ‘Bilder
und Schriften der Vorzeit,’ 1829; Gesenius’s ‘Geschichte der
Hebräischen Sprache und Schrift,’ 8vo, Leip., 1815; Lowth’s
‘A Grammar of the Hebrew Tongue,’ 2 vols. 8vo, Lond., 1796;
Gött, ‘1768-9; this work has been translated into
English by Gregory; Herder, ‘Geist der hebräischen
Fösig,’ best edition by Justi, 2 vols. 8vo, Leip., 1823; this
work has been translated into English by von der Groeben,
V.O., U.S., 1833; Bellermann, ‘Versuch über die Metrik der
Hebräer,’ 1813; Saatlach, ‘Von der Form der Hebräischen
Fösig,’ 8vo, 1823; the introductions to the Old Testament
by Eichhorn, Jahn, De Wette, and Augusti; Harzvit,
‘Hebrew Tales, selected and translated from the Writings of
Antient Hebrew Sages; to which is prefixed an Essay
on the Uninspired Literature of the Hebrews,’ 12mo,
Lond., 1826; the article ‘Tales, in this work.

Grammara.—The following list is only intended to
direct the attention of the student to the principal
grammara.

Buxtorf, ‘Thesaurus Grammaticus Linguae Sanctae
Hebrae,’ 8vo, Basle, 1615; this work is taken from the He-
brew grammars of the Rabbinical school, and is
grammara according to the Rabbinical System; Schultens,
‘Institutiones ad Fundamenta Linguae Hebraeae,’ 4to,
Leiden, 1731; Robertson, ‘Grammatica Linguæ Hebraeæ,
’ 8vo, Edinburgh, 1788; ‘Grammatica Linguae Hebraeæ,’
Leip., 1788; Gesenius, ‘Ausführliches Grammatisch-
kritisches Lehrgebäude der Hebräischen Sprache,’ 8vo,
Leip., 1817; but his smaller grammara, forming the first
volume of his ‘Hebräische Grammatik’ and only
appearance is printed in 1826. The work of Dr. Gotz,
‘Grammatik der hebräischen Sprache,’ by Collerier, 8vo,
Genèvre, 1826, is also formed upon the Hebrew grammar of
Gesenius. The grammara of Ewald contain the most philosophical
exhibition of the language, which has yet appeared. This
grammara, entitled ‘Kritische Grammatik der Hebräischen
Sprache,’ was published at Leip., 1827, 8vo. The
writer of a review of this work in the 13th No. of the ‘Journal of
Education’ remarks that the reader will not expect to find
exhibitions of the language. The grammara are of two
kinds entirely different from those which were stated by
the Buxtorfs, and by Gesenius and his followers in Eu-
ropae and America. The characteristics of Ewald’s gram-
mar consist in the following points: he uses antient
rules, and in his attempts to refer the rules and their ap-
parent exceptions to more general principles. But this
laudable aim leads Ewald into a number of new conclu-
sions, which in his Critical Grammar he pronounces
authoritatively against his predecessors. The conjectures
of Ewald were however generally supported by independent
investigations. A smaller Hebrew grammara was published
by Ewald in 1828, which has been translated into English
by Nicholson, 8vo, Lond., 1836. Lee’s ‘Grammar of
the Hebrew Language,’ 2nd ed., 8vo, 1831, contains
many excellent observations, but it is deficient in cleerness
of arrangement, and cannot be recommended to beginners. Harzvit,
‘Grammar of the Hebrew Language,’ 8vo,
Lond., 1831, is well calculated for beginners, but it
does not give a philosophical development of the
language. Those who wish to use a small grammara will find the fol-
lowing works useful: Yehes, ‘The Hebrew Grammar,’ which
has been frequently printed, and Hincks, ‘Grammar of the
Hebrew Language,’ Belfast, 1832. In the schools and uni-
versities of Holland the two following works are principally
employed: Schoone’s ‘Graecae et Hebreaeae Linguae
Hebraeae,’ reprinted at Glasgow, 1824, 8vo; and Roorda,
‘Grammatica Hebraeæ,’ 2 vols. 8vo, Leyd., 1831. Stier’s
‘Neugrundriss Lehrgebäude der Holer Sprache,’ 2 vols.
8vo, Leip., 1833, is said by the Bishop of Osnabrug to be the best
13 of the ‘Journal of Education’ to be the best work now
extant in any language on the elements and what is usually
called the etymology of the Hebrew language.

Grammara without vowel points.—Mazal, ‘Grammatica
Hebraeæ,’ 2 vols 8vo, Paris, 1751; Parkhurst’s ‘Methodical


Lexicon.—Buxtorf, 'Lexicon Hebraicum et Chaldaicum,' 8vo., Basle, 1634; reprinted at Glasgow in 1824; Stock, 'Clavis Linguæ Sanctæ Veteris Testamenti,' 8vo., Jena, 1753 (best ed.); Winer's edition of 'Simonius Lexicon Manuale Hebraicum et Chaldaicum,' 8vo., Leip., 1826; this was written about the year 1110; 'Journal of Education' to belong to 'the most useful works of its kind, especially for students who have overcome the first difficulties of the language.' Leopold's 'Hebraicum et Chaldaicum,' 12mo., Leip., 1832, a useful lexicon for beginners; Gesenius, 'Thesaurus Philologicopoliticus Linguæ Hebraeæ et Chaldaeæ,' 4to., 1829-32, of which two parts have as yet only appeared. Gesenius's first work on Hebrew lexicography was entitled 'Hebraicum, Deutschem und Wörterbuch über die Schriften des Alten Testamentes,' 2 vols. 8vo., 1810-12, which was translated into English by Leo, 2 vols. 4to., Lon., 1825. In 1815 Gesenius published a smaller Hebrew and German lexicon, which has gone through several editions, and formed the basis of a Manual Hebrew and English Lexicon, 'by Gibbs, Andover, U.S., 1824; reprinted in London, 1827 and 1833. The most recent Lexicon by Gesenius, entitled 'Lexicon Mesopotamianum Biblicum,' was published in Leip., 1833, and has been translated into English by Robinson, Boston, U.S., 1836. Parkhurst's 'Hebrew and English Lexicon,' which was published originally in 1762 in 4to., and 1822, and again in 1846, is recommended for the use of those who are unacquainted with the vowel-points. A review of the most important Hebrew grammars and lexicons is given in Nos 9, 11, and 13, of the 'Journal of Education.'

Those who are commencing their Hebrew studies without the assistance of a master will find the following works useful:—Leusden's 'Clavis Hebræicae Veteris Testamenti,' 4to., Utrecht, 1683; Robertson's 'Clavis Pentaæchi,' 8vo., Edinburgh, 1812, reprinted at Glasgow in 1825; the same at Leip. 1826, and at Lon., 1833; by the director of Lyra Propheticæ, sive Analysis Critica Præciosa Psalmarum, reprinted at Glasgow in 1823; Meisner's 'Nova Veteris Testamenti Clavis,' 8vo., Leip., 1809; Reay's 'Narratio de Josepho,' 2vo., 1822; Olivati's 'Analysis of the Text of the History of Joseph, upon the principle of Professor Lee's Hebrew Grammar,' 8vo., 2nd ed., Lon., 1833; Greenfield's 'Book of Genesis in English Hebrew; accompanied by anInterceptor, or Translator of Critical Notes, and a Grammatical Introduction,' 8vo., Lon.

HEBREWS. (Jews.)

HEBREWS, EPISTLE TO, a book of the New Testament, containing the longest and most important of all the epistles, has led some to doubt whether this book is an epistle or a dissertation. But it contains allusions to particular circumstances, which prove it to be an epistle (v. 11, 12; v. 8, 10; x. 22-24; xii. 19, 23, 24). The general opinion respecting the persons to whom the Epistle was addressed is that they were the Jewish converts in Jerusalem or Palestine generally. This opinion, as Michaelis has shown, is supported by the contents of the book itself. (Marshall's 'Michaelis,' vol. iv., pp. 192-7.) Others suppose it to have been addressed to the Jews of Asia Minor, and Dr. Neesselt contends for its having been written to the Thessalonians. Concerning the language in which this epistle was written, there are many critics who differ more or less in respect to this subject, some supposing that it was written in Greek, and others that it was written in Hebrew and translated into Greek. The latter opinion was held by Clement of Alexandria, who states that it was written by Luke in the Hebrew language for the use of the Hebrews, and that Luke translated it for the benefit of the Greeks; by Eusebius, and by other fathers; and is strongly advocated by Michaelis. This opinion is supported by Macknight, Rosenmüller, Professor Stuart, and most modern commentators. But the arguments on either side are far from being conclusive.

It is the author of this Epistle is equally uncertain. The general voice of tradition assigns it to the apostle Paul, but it has also been ascribed to Barnabas, to Luke, to Silas, and to Apollos.

In the first ages of the Church it appears to have been generally considered as a production of the apostle Paul, though great doubts were very easily entertained on the subject. In the Alexandrian church we have the testimony of Paulinus (A.D. 180) to its Pauline origin, as well as that of Clement, in the passage quoted above, and in other parts of his writings. These testimonies are preserved by Eusebius (Hist. Eccl., book vi., c. 14). Eusebius also quotes a passage from Josephus (Antiq., c. 29), which has been variously understood, but which seems to imply that an objection had been raised against the Pauline origin of the epistle from the superiority of its style to that of the acknowledged Epistles of Paul, and that it was objected by some that the antients had handed it down as Paul's. In Origin's own writings it is frequently quoted as being written by Paul; and after his time the Alexandrian fathers unanimously ascribe it to the same apostle. Turning to the Eastern church we find passages in the writings of the fathers, which are thought by some to be indirect quotations from this epistle. The earliest direct testimony is that of Eusebius, who mentions fourteen epistles as being clearly and certainly Paul's, but adds that some have rejected that which is written to the Hebrews, alleging, with the church at Rome, that it is spoken against as not being Paul's. He frequently cites it as written by Paul. The modern advocates of the theme of the Western church, however, have taken the subject from about the close of the second to the middle of the fourth century, when Jerome states that the Epistle was received as Paul's by all the Greek and some of the Latin church. It was condemned for some time for being ascribed to Barnabas or Clement of Rome, but held in high esteem, and read in its churches. Jerome himself, and Augustine, constantly refer to it, sometimes as an apostolic production, and sometimes as 46 such a production, and sometimes as an apostolic production, and sometimes as 46 46 ascribed to Paul. Their authority appears finally to have established the belief in its Pauline origin among the Western churches. The modern advocates of the same opinion have attributed the doubts which prevailed in the Western church at the end of the fourth century to the influence of the persons who relied on this Epistle in support of some of their opinions. On the other hand, those who believe that Paul did not write the Epistle ascribe the strong testimony of the Alexandrian fathers in its favour to their great fondness for the allegorical interpretation of Scripture, which the style of this Epistle is thought to sanction. The passage in 2 Peter, iii. 15, is thought by some to refer to the Epistle to the Hebrews.

The internal evidence in favour of Paul being the author is drawn from the reference (c. xiii., v. 23) to Timothy, who is known to have been Paul's intimate friend and frequent companion, and who was added to the Epistles (c. xv. 19-24, 34; xvi. 18, 19, 24). In the arrangement of the Epistle, the former part being doctrinal and the latter part hortatory, in the mode of using quotations from the Old Testament and the style of argument adopted, in the doctrines not most prominent, the Epistle and Epistles of Paul and there are great resemblances between this book and St. Paul's acknowledged epistles. (For examples see Prof. M. Stuart's Commentary on the Hebrews, Introd., sects. 20-24, and Horne's Introduction, iv., p. 415, ed., 1834.) The chief objections against the Pauline origin of the epistle are drawn from the absence of the usual address at the beginning, the superiority of the style to that of other epistles of Paul, and the resemblance between its style and that of the Alexandrian school. The points above stated are discussed with great ability and éclat by Prof. Moses Stuart in favour of the Pauline origin of the epistle. The opinions which assign the authorship to Barnabas, to Apollos, Luke, and Silas, rest on very slight grounds. The second of them was first started by Luther, a conjecture founded on the resemblance which the epistle bears to what was known as the epistle of Barnabas and to that of the subject by a man of the character given to Apollos in Acts, xvi. 24-28.

The date depends upon the settlement of the former question. The internal evidence of the Epistle argues that it was written while the temple at Jerusalem was standing (see viii. 4-5; ix. 9), and probably not long before its destruction in a.p. 70. If Paul was the author, it was probably written during his first imprisonment at Rome, immediately before he was released (see xvi. 18, 19, 22).
Accordingly most critics refer it to A.D. 61 or 62; some
say A.D. 59 or 60.

The canonical authority of this Epistle depends partly on its
authorship; but may be argued on other grounds. It is
repeatedly quoted by Clement of Alexandria, and apparently
by Barnabas, Hermas, Polycarp, Ignatius, and Justin Mar-
tinus. It is included in the Septuagint Syriac version, the date
of which is not later than the second century, and in the old
Latin versions made about the same period. From that time
the questions of the canonical authority and the authorship
of the Epistle have been pressed together.

The design of the writer of this Epistle appears to have been
to sustain the faith of those to whom he wrote, while they
were suffering under persecution and inclined to spon-
taneous and rashly to be delivered to the authority of the
Christian Church; the present temper, and the grace of God,
superior to angels (c. i., ii.), to Moses (c. iii.), and to the
race of Jewish priests (iv. 14—16; v. viii.); the superiority of
the Christian to the Jewish religion, as much as the latter
was only typical of the blessings conferred by the former, and
was intended only to last for a while, while Christianity is
to be permanent (c. ix.; x. 1—18). He proceeds to apply
these arguments to encourage the Hebrews to constancy
in their faith, and to enforce his exhortations by the example
of eminent men (x. 19—xii.). After urging them to the
practice of various Christian duties, he concludes with the
usual salutations. In warmth of feeling, elegance of lan-
guage, and force of argument, this epistle yields no book to
that of the Hebrews, of the New Testament.

(Lardner's Credibility; Marsh's Michaelis, vol. iv.; Prof.
Moses Stuart's Commentary on the Hebrews; of Prof. Bleek's
Brief on the Hebræans, perhaps the best commentary on this
epistle; also a north-north-westerly; Dr. Beza, 1592) containing
Discourses, &c., and the 2nd the Commentary
as far as c. iv., v. 13, Berlin, 1836; Hug and
Horne's Introductions; for a list of commentators see
Voigt's Bibliotheca Britannicae, and Seiler's Biblical
Hermeneutics)

HEBRIDES, THE (or Western Islands of Scotland), are
scattered in the Atlantic Sea, along the western coast of
Ireland, and probably does not exceed 5° to 6° N., and
6° to 8° W. long. They amount to the number of nearly 300,
but more than one-half of them are so small or so sterile
as not to be inhabited. In 1609 only 79 were regularly
peopled all the year round, but in eight more houses were
found, which were tenanted during the summer, and aban-
donated at the approach of winter.

These islands are commonly divided into the Northern
and Southern Hebrides, the most western point of the main
land, the promontory of Lat. 56° 20' and long. of 8° 20',
being considered as the point from which the line of division
between them runs westward into the Atlantic. But geo-
graphically they should be divided into the Eastern and
Western Hebrides: the former extends in a line of 700 miles
greatest distance from the coast of Britain, and one extensive
group is much farther to the west in the ocean. The wide
and open strait which divides the last-mentioned group,
which is comprehended under the general name of Large
Island, from the former islands and the mainland of Scot-
lnd, is called the Minch; and in its narrowest part (about
20 miles), between Skye and North Uist, it is called the
Little Minch.

The surface of the Hebrides is stated to exceed 3184
square miles, which is nearly one-twelfth part of Scotland
and one-thirtieth of Great Britain. They are larger than
Cornice, or the two provinces of Holland, and than any
county of Great Britain, excepting Yorkshire and Inver-
ness.

The surface of these islands varies considerably. Some
of the larger islands, especially those which approach the
mainland, and particularly those of Arran, Jura, Mull, and
Skye, in which the elevated masses rise to the
height of 2000 or 3000 feet and more above the sea.
The rest are in general only hilly, the most elevated parts not
exceeding in height (outside of Arran) the level of
500 feet, and the average seems to rise to more than 300
or 500 feet, as in Tiree and in the

The coasts are everywhere rocky, and in many parts
high, and particularly so on the west of the islands.
The heath are characterized by the Atlantic, with the exception of the innermost
angles of the bays and inlets, where they are frequently
low. The southern islands of the Long Island have a series of
sand-hills on their western coast, and the shores are gene-

number of harbours of every description, some of which, in
security and convenience, are equal to any in the world.
It is stated that there is no place, even in the larger islands,
which is more than seven miles from the sea-shore. The
rivers are small, but numerous, and all of them abound
in salmon, trout, and eels; many of them contain also several
other kinds of fish. Some of the islands abound in

Those of Long Island alone cover 25,000 acres, and in
the small island of Tiree they are stated to occupy about
700 acres. The soil is in general as good as in other parts
of Scotland, and is most improved by cattle. The climate is

The islands of Bute and Islay are considered

more fertile, and also several districts in the island of
Skye. But a comparatively small portion of the surface of the whole
is inhabited by the whole number of people about
8000, which is only 1/8 of the area of the islands. The
hundreds 1,592,000 Scotch acres, of which only 310,000 are
arable or meadow land; 600,000 acres mountains, morasses,
and lakes; 70,000 acres pasture ground, commonly on
hills, and of little value; 25,000 acres are barren sands
soaked by the winds; 220,000 are occupied by peat-
mosses; and 30,000 acres are dry at ebb-tide, and serve as
kelp-shores. There are no natural woods on the islands,
but about 3000 acres have been planted.

The backward state of these islands is chiefly to be
attributed to the want of timber, their great distance from towns
and markets, and the difficulty of intercourse on account of
the hilly and mountainous country which surrounds them, and the storms
which frequently prevail for a month or more at a time from the
south-west. This wind brings torrents of rain almost
annually from August to the beginning of March. Early in
March, and often also in October and November, a north-east
wind is not at all uncommon; and some of these
storms are so violent that blows here, it is generally dry and pleasant.
The climate is upon the whole mild. Frost and snow are almost unknown
in the smaller islands, and they seldom prevail in the larger
islands to any considerable degree. On the sea-shores the

is susceptible to the sea-lands, the height above the
level of the ocean, except in the islands of Bute
and Islay. From their language and customs it is evident
that they are of the same stock with the inhabitants
of the Western Islands of Ireland, and it is possible
they gain as much by catching herrings, cod, and

some of the surrounding sea abounds, or by burning
kelp, as by their agricultural industry.

The Hebrides are divided into four Scotch counties.
Those of them which lie in the Frith of Clyde, between
the peninsula of Cantyre and the coast of Ayrshire, constitute a
county by themselves. [BUTE & ARRAN] All the other
Southern Hebrides, together with the islands of Mull,
Rum, and Canna, which are included in the Northern
Hebrides, are annexed to the county of Argyll. [ARGYLL.] The Long Island, except Lewis, constitutes a part of
Inverness-shire. Lewis is a part of Rossshire; and Skye
belongs to Inverness.

The Hebrides are mentioned by Ptolemy under the name
of Eubea, and by Piny (iv. 16) under that of Hebeides.

Piny makes the Hebeides thirty in number. In most of the
islands they are called as by catching herrings, cod, and

(M'Culloch's Highlands and Western Islands; Mac-
donald's General View of the Agriculture of the Hebrides.)

HEBRUS. [MARTIZA.]

HECATE. In mythology, Hecate is the goddess of magic
and witchcraft, and is often represented as a three-headed
deliberation of the ionians (A.D. 501), and attempted to

He is also mentioned by Herodotus (v. 14) as being alive at the time of the flight of Aristogoras,
A.D. 497.

His works, which consisted of histories, genealogies,
and geographical pieces, were held in considerable esteem by
the ancients. Herodotus (vi. 137) speaks of his
historical works. Strabo (i. p. 12, Casabon) complains that
his geographical works only contained the descriptions of
the poets written in prose; but he is mentioned by
Anianus Marcellus (xii. 8) in conjunction with Eustathius
and Ptolemy. Hecateus appears, like Herodotus,
to have visited distant countries for the purpose of acquiring information respecting the history, customs, and physical peculiarities of foreign lands. Herodotus (i. 143) gives an account of a conversation of Hecateus with the priests at Thebes in Egypt, which was apparently derived from his work.

The fragments which remain of the writings of Hecateus have been published by Creuzer in his 'Historiorum Graecorum Antiquissimorum Fragmenta,' v. 3, Heidel., 1896, by Klausen, 'Hecateus Miscell. Fragmenta,' Berl., 1821, and in the 'Museum Criticum,' vol. 1, p. 88-101, Camb., 1814.

Hecate, one of the ancient Greek divinities, the daughter of the Titan Perseus and Asteria, according to Herodotus (i. 143), gave an account of a conversation of Hecateus with the priests at Thebes in Egypt, which was apparently derived from his work.

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Heclia. [Iceland.]

Hedera, a genus of Araliaceae, consisting of nearly forty species, inhabiting chiefly the warmer parts of Europe, is interesting to Europeans for containing among others the common ivy with its numerous varieties. This plant, the Hedera Helix of botanists, does not exactly resemble its name, being of more variety, and including the exotic species, instead of being creepers, adhering to other plants, or to rocks and walls by their sucker-like roots, are trees of considerable size.

Common ivy is dispersed through many distant parts of the Old World, lying between the Canaries and Europe on the west, and the northern parts of China on the east. In the Canaries it acquires its largest size, being what is called in English gardens the Irish or giant ivy, which grows so much faster than the European form. In the north of India, and indeed occasionally in Italy, the berries, instead of being black as with us, are bright yellow, and it is supposed that this is more particularly the Hedera of the Roman poets. The leaves of Hedera Helix are of two kinds, in form and color, and never runners or creeps upon other plants, but merely forms a compact bush.

Hedge, one of the most lasting and effectual of our fences, when hedges have been well made, and are kept in good order, nothing can surpass them, except well-built stone or brick walls, and even these are far less effectual in keeping out trespassers of every description.

Hedges are made of various kinds of shrubs and trees, trained so as to throw out numerous branches along the stem from the surface of the earth upwards; this is done by judicious pruning when they are young. The head being formed on the side branches, when these are the thickest and most numerous, smaller branches spring out, which are shortened in their turn, and form a very compact mass, consisting of the ends of stumps and branches pointing in every direction. These shoots being a thorny outgrowth of the hedges, Holly, which bears prickles on the edges of the leaves, is on this account by far the best shrub to form a hedge. But it has a great inconvenience in its very slow growth, and, except in very old gardens, which have been successfully trained, it is very seldom that a hedge of this kind would be prepared for trenching and abundant manuring; the plants should be more carefully planted after midsummer, or immediately before the usual rains which come at that season. There should also be a portion of virgin soil for the roots to spread in; and in planting they should be well divided, to give them the greatest possible extent from which to draw their nourishment. The earth should be well pressed to them by treading it down; and, in case of a continued want of rain, they may be occasionally watered, late in the evening, or early in the morning. By a little attention to them in the first year, they will form a good fence several years sooner than those which are comparatively neglected.

The plants which are usually put in are three years old; but if they could be transplanted at once from the seed-bed, they would be speedily covered with a new and strong growth down and pruned earlier, would lay the foundation of a better and harder hedge. Next to holly, as forming a close and durable hedge, is the yew: it bears very close clipping, and forms a thick hedge and good fence all through the year. Its branches extending in many directions, where occasional pruning is required, the yew hedge is preferred; but in all places where cattle are put to pasture, they should never be permitted to grow. Many valuable hedges which have been destroyed by grazing in places where young trees grew; and notwithstanding the instinct which leads animals to reject food which is hurtful, they greedily eat the yew leaves in spring. The same may be said of box.

The various kinds of box are peculiarly adapted to form hedges, and they are consequently by far the most common plants of which a live hedge is formed.

For high hedges and strong fences the hornbeam and a variety of elder, and of the yew, which are extensively used in old gardens, where geometrical figures and numerous angles are admired.

Where it is desirable that the hedge should arrive very rapidly, it is usual to plant it as a screen against cattle, elder may be planted. Elder grows very rapidly, and throws out many long hollow branches, which soon become hard, and are admirably calculated for a fence, and cattle will not eat the leaves; but it is never very close or ornamental; and as it is a kind which never runners or creeps upon other plants, but merely forms a compact bush.

Sweetbriar is ornamental, and forms a good fence against cattle. It may be planted in a hedge, and will bear cutting and training as well as any of them. Hitherto no edges have been made of this shrub, except a few in the gardens of nurserymen, but there is no doubt that if any hedges were planted for hedges, they would soon be produced at a reasonable price. The privet is a very common and quick-growing shrub, which is frequently planted as a hedge where cattle are not admitted; but of all shrubs, the most common and most useful for the purpose of hedges is the yew, which is one of the most extensively used in the construction of hedges by which our fields are separated and enclosed.

In order to have a good hedge, the shrubs should be planted in a soil which is naturally strong, but well pulverised, and in which no shrub or tree has lately grown. The best soil is that which is produced by the decomposition of sods taken from commons or old pastures; and it is observed that in new enclosures, where the quick has been inserted between two sods, it always grows luxuriantly, and only requires to be protected, when young, against the cropping of cattle and sheep, which are fond of the young green shoots of this shrub. The young shoots are so tender that it requires to be protected from cattle or sheep by some fence. Sometimes the quick is planted in two or three parallel rows on the top of the bank, which in this case is made much wider, with a ditch on each side. A double fence in this case is not much needed, and the present generation was born, it is very seldom that such a hedge is met with. The high price which the nurserymen charge for this plant is another reason why it is more seldom planted.

In forming a holly hedge the ground should be put in such a way that the plants should be thoroughly planted, and the common ivy which is naturally strong, but well pulverised, and in which no shrub or tree has lately grown. The best soil is that which is produced by the decomposition of sods taken from commons or old pastures; and it is observed that in new enclosures, where the quick has been inserted between two sods, it always grows luxuriantly, and only requires to be protected, when young, against the cropping of cattle and sheep, which are fond of the young green shoots of this shrub. The young shoots are so tender that it requires to be protected from cattle or sheep by some fence. Sometimes the quick is planted in two or three parallel rows on the top of the bank, which in this case is made much wider, with a ditch on each side. A double fence in this case is not much needed, and the present generation was born, it is very seldom that such a hedge is met with. The high price which the nurserymen charge for this plant is another reason why it is more seldom planted.

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down the young shoots every year, in order to excite them to throw out fresh ones in greater number. But this is an error by which the growth of the hedge is much retarded. The shoot should be allowed to grow to its full extent the first and second year; the root will then have struck deep into the ground, and the third year the young shoots may be cut down to a few inches. They will then send out several fresh and strong shoots, which may be cut and pruned to the height and width of the intended hedge. The shoots can be trained along stakes and rods placed for the purpose, and tied together with oisiers. In this way every slender branch is tied to the rods, and they are laid so as to cross each other frequently, and the redundant shoots will be cut off. These hedges, when in leaf, look very close and light, and take up very little room; and birds can scarcely harbour in them. It appears at first sight that much labour is required to train hedges in this way, but once grown to the proper height they only require to be regularly clipped.

In forming a hedge it is necessary to take into consideration the soil, the aspect of the bank, and whether the land is porous, or very retentive of moisture. In the first case it will be advantageous to plant the quick in the side of the bank, raising the earth above it to keep it firm and dry; and in a young hedge the first sod is drawn up at a couple of inches from the edge of the ditch. The water which may fall on the bank and run down the smooth side is arrested by the hedge and soaks into the root. In the second case the edge of the bank is the proper place, and a small concavity may be given to it to retain the water and keep the roots moist.

In a dry soil which does not require draining, ditches are unnecessary, and it is just as well to plant on a piece of ground on a little bank formed by the sods about eighteen inches wide, with a small water-furrow on each side. The whole width need not be above two feet six inches, whereas a bank and ditch take up at least six feet, and the plough cannot get nearer than three feet from the edge of the ditch or the bank. Thus eight feet are taken up by the fence.

When a hedge has been left uncut for several years, it grows wide and high. It requires to be cut down once in seven or eight years; in this case much care is required when the cutting of the shoots may grow out again regularly. The common labourers often do this very carelessly by cutting the stems downwards with one or more cuts of their hilt, but this is before the stems are only on cutting hedges. Portions of the stems are often left of a greater length than the rest for the purpose of holding the bushes, which are generally laid over the cut stumps to form a hedge. The Brietian cut hedge-grown regularly, one row close to the ground, and one a few inches longer; this will strengthen the foot of the hedge, and prevent its being thin and hollow at bottom.

When a hedge has become old, and, many of the plants are decayed, it is very difficult to renew it. If young quicks are planted on the same spot, they will scarcely ever succeed, unless very great precautions are taken. The soil is exhausted and detritured and must be renewed; but manuring is not sufficient; fresh earth is required for the new quick. The simplest process is to level the old bank, spread the earth of which it was formed, which will be of great use to the new quicks. If a new bank be made in the same place from earth taken elsewhere; or, where it can be done without inconvenience, it is better to make an entirely new ditch and bank, and to fill up the old. This is perhaps the surest as well as the soonest way of having a new hedge which will be permanent.

What has been said of renewing a hedge is equally applicable to repairing gaps in an old one. It is of no use to put in young shoots in the intervals of a hedge which have already been cut back or removed, and fresh earth put in its place. The old hedge must be cut and trimmed, so that the young quick may not be shaded, and in that case the gap will shortly be filled up, and the hedge become as continuous as before. Where the quicks are small, and the space not more than two or three feet together, they may sometimes be advisable to plant hollies or other plants, which will grow well and fill up the deficiency.

P. C. No. 736.

Well managed hedges are the most effective fences, the cheapest, and the most pleasing to the eye. It is to the hedge-rows that England owes much of its garden-like appearance; but the trees, which are its chief ornament, are very destructive of the hedge as a fence; and where the trees are planted it would be both better if they stood within the bank, without interfering with the hedge. Whether trees can be allowed in hedge-rows, in a perfect system of agriculture, is a question which we will not attempt to answer.

There is a method of repairing hedges which is called plaguing. It consists in cutting half through some of the stems near the ground, and then bending the upper parts down in a horizontal or oblique position, keeping them so by means of bent sticks driven into the bank. Thus a live hedge is made, which fills up the gaps in the same manner as a dead hedge would have done, and the bent stems soon throw out shoots. If the stems are young, and are not too thick, they will continue to grow, and thus form the sidewalk, which, when clipped, will be close and perfectly impervious. But the work is generally done in a very injudicious manner. When a hedge is plagued which has been long neglected, the thick stems, which are backed through, leaving only a small portion of the under bank uncut, have an unsightly appearance, and seldom throw out shoots near the bottom, where they are most wanted. To do the work properly means plenty of labour; but the excellent practice: but when the stems are thick and old, the only remedy is to cut them down, or make an entirely new bank well planted with quicks.

HEDGHOG. French. The Hedges are placed by Cuver at the head of the Insectivorous Mammifers; and M. F. Cuver observes that in Chrysoclothes the normal system of dentition of the Insectivora may be reduced to the narrowest dimensions while in the Hedges it appears to be brought to the greatest development.

Dental Formula.—Incisors 6 2; Canines 0; Molars 7-7 7-7 = 36.

Generic Character.—Body covered with spines, with the power of rolling itself up in a ball by means of appropriate muscles; spines pointed; ears more or less imperfect; tail short; each foot five-toed and armed with robust claws.

Geographical Distribution of the Genus.—Species of Hedgehog have been recorded as inhabitants of Europe, Africa, and India.

We select as an example the Common Hedgehog, Erinaceus Europaeus.

This is the so-called Italiano, Erizo del Spanish, Ourizao do Portuguese, L'Hérisson of the French, Igel of the Germans, Egel van der Dutch, Pin-ruin of the Danes, Draebose and Draebo y g yd of the ancient Britons, Archis in the Greek, Echinus in the Briton, Boc in the Latin, Echinus in the Greek, Euclidia in the Latin, Gea, Erinaceus (Erinaceus) terrestris of Ray, and Acantothor virus of Klein. There can be little doubt that it is the Echinus ('Erinoc') of Aristotle.

This indigenous animal is too well known to need a lengthened description. The length is generally rather more than nine inches.

Food, Habits, Reproduction.—The food of the Hedgehog, which is a nocturnal animal, consists principally of insects, worms, slugs, and snails. That it will eat vegetables is shown by White of Selborne, who relates how it eats the root of the plantain, by boring beneath it, leaving the tuft of leaves untouched. In the Zoological Gardens it was accounted for by Mr. Broderip of an experiment made by Professor Buckland, proving that, in captivity at least, the Hedgehog will devour snakes: but there is no good reason for supposing that it will not do the same in a state of nature, for toads, adders, and other reptiles, and mice, have been recorded as its prey. From its fondness for insects it is often placed in the London kitchens to keep down the swarms of cockchafers. In this country the traders have discovered a ready hedgehogs on sale in Covent Garden market for this purpose. It is hardly worth while to refute the idle story that this persecuted animal sucks the cows; but, according to Sir William Wurdine, it is very fond of eggs, and is frequently mistaken in the green文案中没有提到。The Hedgehog hyperbatically regularly, and early in the summer brings forth from two to four young ones at a
birth, which, at the time of their production, are blind, and have the spines white, soft, and flexible. The nest wherein they are cradled is said to be very artificially constructed, the roof being rain-proof.

*Utility to Man.*—The flesh of the Hedgehog, wherein it has been well fed, is sweet and well-flavoured, and eaten on the Continent in many places. In Britain few besides the gipsies partake of it. The pricky skin appears to have been used by the Romans for hacking hemp.

Hedgehog—Ereinacme, Ereinacme squamosus and Ereinacme Grayii will be found recorded in the *Proceedings of the Zoological Society of London* for 1832. Both came from the Himalayan Mountains, and the latter was considered by Mr. Gray to be identical with Ereinacme collaris, figured in the *Illustrations of Indian Zoology*. Mr. Bennett however regarded it as a new species, insomuch as Ereinacme Grayii was destitute of a white collar, and differed in other particulars from the figure referred to. A specimen from the immediate vicinity of the collection brought from that country by Mr. A. Steedman, Ereinacme frontalis, is recorded in the same vol. of the *Proceedings*.

Ereinacme is placed under the subfamily Ereinacnidae under the family Talpidae. (Annals of Philosophy, 1825.)

**HEDGEHOG,** a name given in gardens to the round prickly pods of various species of Medicago.

**HEDGEHOG** (Hebr. Hejzal, or Hejza. [Arab.] Hejira.)

**HEGEL,** GEORGE WILLIAM FREDERICK, was born at Stuttgart on the 27th of August, 1770, and was educated at the gymnasia of his native city. At the age of eighteen he proceeded to Tübingen to join the classes of theology and philosophy, where he had for his class-fellow the illustrious Schelling. Dissatisfied with the prevailing system of philosophy, Hegel sought to found a new system by its deduction from the works of Plato, Spinoza, and Kant; and in the conviction that a truly philosophical comprehension can only be educated by an enlarged and diversified inquiry, he combined with a knowledge of philosophy a profound acquaintance with the natural and political sciences. Upon being admitted to the degree of doctor in philosophy he accepted an engagement as private tutor, in which capacity he resided for nine years in Switzerland, and afterwards at Frankfurt-on-the-Main, until, on the death of his father in 1800, he was enabled by the inheritance of a small patrimony to devote himself without restraint to the study of philosophy. Accordingly, according to Jena, where he was teaching, was his system of absolute 

On the *Difference of the Systems of Fichte and Schelling:* which treatise, notwithstanding the sincerity with which Hegel then advanced the views of the latter, contained the germ of that dissent which was afterwards expanded into a peculiar theory. He was also associated with Schelling in conducting the *Critical Journal of Science,* and among the most important of the articles contributed by him is that on *the Science of Mind,* a luminous review of the doctrines of Kant, Jacobi, and Fichte, whose several systems are represented as nothing more than so many forms of a purely subjective science. In 1806, when Schelling went to Weimar, he was appointed to supply his place as lecturer. The duty of communicating his views to others necessarily imparted to him distinctness and precision; and now for the first time Hegel openly avowed his skill with the system of Schelling. The difference between the ideas of the latter and his own was marked still more strongly in the *Phenomenology of Mind,* which was published at Bamberg, whither Hegel had retired after the battle of Jena. This work he used to call his *Voyage of Discovery,* and in the old manuscripts he had passed through in order to arrive at a clear knowledge of the truth. It contains an account of the several grades of development through which the "self," or "ego," proceeds: first of all from consciousness into self-consciousness; next into reflecting and active reason, from which it becomes philosophical reason, self-cogetant and self-ana-lyzing, until at last, rising to the notion of God, it manifests itself in a religious form. The title *Phenomenology* points out the limits of the work, which is confined to the phenomena of mind as displayed in the element of its immediate existence, e.g. in experience. It traces the course of mind up to the point where it recognizes the identity of thought and substance, of reason and reality, and where the opposition of science and reality ceases. Henceforward the mind develops a pure theory of idealism, and the several forms it successively assumes, which differ only in their subject-matter or contents, are the objects of logic, or dialectic.

During his retirement at Bamberg, Hegel conducted the political journal of that town with great ability, and with an honesty and candour rare in the journals of that period, until he was called, in 1808, to preside over the gymnasion of Nürnberg. The duties of this situation he discharged with as much energy as skill, and the benefit of the reform, and the several forms it successively assumes, which differ only in their subject-matter or contents, are the objects of logic, or dialectic.

In 1813 he published his *Logic,* which was designed, with the *Phenomenology,* to complete the whole body of science. Hegel employs the term logic in a very extended sense. He does not confine it, as is usually the case, to the account of the abstract forms of thought and the laws of their development. It is a comprehensive science, and thereby the science of the self-sufficient and self-determining idea—the science of truth and of reality. From its fundamental principle, that thought and substance are one and identical, it follows that whatever is true must also be true of the latter, and consequently the laws of logic become ontological. From this point of view Hegel describes in this work the progress of reason; how, by virtue of a peculiar and inherent impulse, it passes constantly forward and onward, and how the several forms of this progress are at once admitted, and the high powers of philosophical reflection which it evinced were acknowledged by the offer of a professorship at Heidelberg. In his first work he propounds the fundamental ideas of a distinguished class, attracted by the profoundness and originality of his views, notwithstanding the great obscurity of his style. By the publication of the *Encyclopaedia of Philosophical Sciences,* 1813, his position as a philosopher was established, and Hegel was invited by the Prussian government to fill the chair at Berlin, which he had remained vacant since the death of Fichte, in 1814. This work, being designed as a manual for his class, takes a general and transcendental view of the whole system, and in this manner the ultimate tendency of his views. Considering logic as the base of all ontology, and starting from the idea in itself or potentially, he considers it as the essence of every unity and every form of reality. He then examines this idea of himself existing in itself, then in other or in nature; next in the mind of the individual, in a purely subjective point of view; and then objectively, in its outward realisation; and lastly, as it terms it, absolutely, i.e. as manifesting itself in art, religion, and philosophy. From 1817 until death terminated his career there is nothing to relate in the life of Hegel beyond the constantly increasing celebrity of his lectures and the publication of several works. He successively published the *Philosophy of Jurisprudence;* two new editions of the *Encyclopaedia,* the 1st vol. of the 2nd edition of his *Logic,* and several articles in the *Athenaeum,* which he had established as an organ of his system, and to which he contributed to every branch of art and science. He fell a victim, on the 14th November, to the cholera which ravaged Berlin in 1831, and was, in compliance with his express desire, buried by the side of Fichte.

The history of philosophy from its earliest origin to its latest development forms so perfect and compact a whole, that no single part can be separately considered without losing something of its value. The completeness of its facility is greatly increased in the case of a philosophy which gives itself out not only as the completion of its immediate forerunner, but as the sum and result of all anterior systems. Moreover, the imaginary world of the idealist system will be unintelligible unless preceded by a rapid sketch of the states of philosophy out of which it grew. The transcendental idealism of Kant formed the transition from the empiricism of the eighteenth century, and, effecting, as it were, a compromise between the antient realism and
The scepticism of Hume. To the system of Kant succeeded the pure and absolute idealism of Fichte, destined to be displaced in its turn by Schelling's system of absolute identity and intellectual intuition, which was itself to be further modified and developed by the dialectical momentum of Hegel. Essentially the systems of Hegel and Schelling are the development of the different degrees of the absolute identity of thought and being; for there is evidently little difference between the doctrine of Schelling, which supposed that the human mind contains within it the full man of itself, and the absolute of which it may attain to simply by contemplating its own nature, and that of Hegel, according to whom the concrete notion, or the thing, comprises within itself all verity, and that in order to arrive at the science of all existence, it must be thought in its logical thought, or dialectic. The difference is purely a difference of method. For the cold and narrow abstractions, the rigorous formalism, of Fichte, Schelling had substituted a sort of poetical enthusiasm, and banishing from philosophy all lowering detail, he had introduced it into that rapturous mysticism of the intellectual intuition. Hegel however, insisting that the scientific system is the only form under which truth can exist, restored the rights and utility of method by his doctrine of the dialectical momentum, or development of the idea. Indeed with Hegel the method of philosophy is philosophy itself. This he defines to be the knowledge of the evolution of things. In the cognition of the Hegelian the idea is a thing which is diversely determined, and has in itself the principle of its activity. The origin of the activity, the action itself, and the result, are one, and constitute the concrete. Its movement is opposed to the static; its truth is not merely potentially realized. The concrete in itself, or virtually, must become actual; it is simple, yet different. This inherent contradiction of the concrete is the spring of its movement. Here arise differences, which however ultimately vanish into unity. There is a strife and repose in the movement. The difference scarcely becomes apparent before it disappears, whereupon there issues from it a full and concrete unity. Of this he gives the name determination. So many are the elements which enter into the many qualities, one; no single quality that belongs to it is wanting in the smallest of its leaves, and every portion of the leaf possesses the same properties as the entire leaf. Hegel divides philosophy into three parts: 1. Logic, or the science of the idea in and by itself; or, in the abstract element of pure thought; 2. Philosophy of nature, or the science of the idea out of itself—or in nature; and 3. Philosophy of mind, or the science of the idea in its return into itself. Into the details of this division it would be idle to enter, as it would only lead to a dry barren dissertation. But we may mention, as an instance, a philosopher, who has made some useful attempt for this holy number determines throughout the divisions and subdivisions of the system. In this respect, as well as for its obscurity and neologism, Hegel well deserves the reproach of Wolfianism. The old Hegelian, where he is not wrong against him. Schelling indeed disavowed him as his disciple, which honour however Hegel still loved to claim with a satisfaction mingled with regret. A complete edition of the entire work of Hegel, in 17 vols., collected by Michelet and others of his disciples, is in course of publication.
take 500 manuscripts from the Vatican, carried off 39 of the Heidelberg collection. In 1815, when France was obliged to restore all its plunder, the Pope not only gave up those 39 manuscripts to Heidelberg, but, at the intervention of Austria and Prussia, ordered all the German manuscripts to be restored. Accordingly, 847 ancient German manuscripts, and also the celebrated Codex Palatinus of the monk Ottfried's poetical paraphrase of the Four Gospels, and four Latin manuscripts containing the history of the university, were deposed to Heidelberg. A new era for the university commenced in 1822, when it was assigned, together with the bailiwick, which has 80,000 inhabitants, besides the population of the town, to the grand-duke of Baden, who is of the Lutheran religion, and is himself the rector. The reputation of the university is increased as the number of the students has been much reduced, because Prussian subjects must have a special permission from their government to visit it. Its annual revenue is now 108,000 florins, of which more than a quarter, is by the government; and its library, much increased by the purchase of the library of the Cistercian convent of Salmsweiler (or Salem), is said now to consist of 120,000 volumes. All the institutions and collections attached to the university have been much improved and among the twenty professors are some of the most eminent men in Germany. The streets of the town are narrow and gloomy, and there are no manufactures except on a small scale, and yet it is the most beautiful city in Germany, and its many other advantages have caused a great number of foreigners to settle there. There are numerous descriptions of Heidelberg; one of the latest is E. W. Toepffer's able little work as to the present day, Stadt, Universität, Schloss, und Umgebungen.'

**Heights, Measurement Of.** There are three very distinct ways by which heights may be measured. The first is by the use of the angle of elevation or depression, supposing their distances to be known, which is explained roughly in works of trigonometry and mensuration, and with more precision in those on geodesy. [Mensuration.] The second serves for the measurement of heights in cases where the height of the object is known, and the angle of elevation or depression is determined; the point of departure is that of the slope which leads to it, at different distances from the summit; and this is done by means of the level. [levelling.] The third, which we propose here to describe, is accomplished by means of the barometer. [Barometer.]

If we ascendent with a barometer through any height, the weight of the column of air which presses on the instrument is diminished, and the contrary; namely, the column of mercury under the vacuum, must diminish likewise; that is, the mercury must fall. The amount of this fall depends upon the height in question: and when the relation between the two is thus discovered, we ascertain the barometer, since the pressure of the air intermediate between the higher and lower stations may be treated as if it had throughout the mean between the temperature of the two stations. The second, taken from Lindesaus' Barometric Tables (Gotha, 1869), is on the scale (1+256) (which, with the addition of (1+256) (which, with the addition of 0.002588 cos. λ)(1+ε−64) (1+ε−64) (1+ε−64) (1+ε−64) 900 x = c (log A−log A0).

Then z itself is a near approximation to the number of yards in the difference of level between the two stations (for metres use 1833.46 instead of 2003.95); but if a more exact one be required, it may be found by calculating using z itself as just found

\[
\frac{c}{(\log A−\log A0)2}\left(1+\frac{z}{r}\right)
\]

When the lower station is at a great distance from the higher on the earth's surface, then five eighths of \(\frac{z}{r}\) should be used instead of \(\frac{z}{r}\) in the last formula.

The preceding is the most accurate formula which the present state of science will allow to be given, and there is reason to believe that the constant 2003.95 could not be altered by a single unit with any precision. The following formula however is sufficient for ordinary purposes:

\[
20115 \left(1+\frac{z}{r}\right)
\]

In which the constant 20115 is that determined by a considerable number of comparisons of theory with trigonometrical observation made by M. Ramond in the Pyrenees.
The second formula, by M. Lindenaus, is as follows, the letters meaning the same things as before; but the degrees are those of Réaumur's thermometer, and the distances are expressed in toises. The toise is 2.1315309 English yards, and a reading of Réaumur is reduced to one of Fahrenheit by the following formula:

\[
\text{Fahrenheit} = \frac{\text{Réaumur} + 9}{4}  
\]

Let \( c = \frac{1 + t}{400} \left( 1 - \frac{t}{100} \right) \times 9442 \)

\( c = H \left( 1 - \frac{10}{329} \right) \)

\( H = H' \left( 1 - \frac{10}{4329} \right) \)

Then the number of toises in the difference of elevation of the stations is

\[ c = (\log H - \log H') \]

The formula which has been generally used is of the form

\[ a \left( 1 + \frac{t}{b} \right) (\log a - \log b) \]

and the following are the constants \( a \) and \( b \) used by the observers whose names are mentioned, all reduced by M. Lindenaus to those values which they should have when the thermometer is Réaumur's and the result in toises:

- **Ramond**: \( a = 9437 \), \( b = 400 \)
- **Trembley**: \( a = 9401 \), \( b = 361 \)
- **Roy**: \( a = 9388 \), \( b = 362.2 \)
- **Schnuckburgh**: \( a = 9400 \), \( b = 366.6 \)
- **Deluc**: \( a = 9220 \), \( b = 396.4 \)

HEILBRONN, the capital of the circle of the Neckar in the kingdom of Württemberg; in 49° 7' N. lat. and 9° 8' 45'" E. long. It has 8400 inhabitants, considerable manufactures, and an extensive trade, which, with the culture of the vine, give employment to the inhabitants. According to tradition, it was founded about the year 860, by Charlemagne, and named by him Heilbronn, or the 'spring of health,' from a medicinal spring in the vicinity. It was a free imperial city, till it was adjudged to Württemberg in 1803. It had formerly a commandery of the Teutonic order. The house of that order has been converted, into barracks, and the old orphan house into a handsome palace. The town-hall contains an ancient collection of archives; and the gymnasium has a library of 12,000 volumes. There are three Lutheran and two Roman Catholic churches, and an extant school, and professional works. The tower in which Götze von Berlichingen was confined in 1555, is shown as a curiosity.

HEINEGUS, JOHN GOTTLIEB, born at Eisenberg, in Saxony, in 1691, was one of the most learned jurists that Germany has produced. He was professor of philosophy at Halle in 1713, and was afterwards professor of law at Franeker in West Friesland, which he left in 1727, on account of ill health. He was then appointed professor of law at Frankfort-on-the-Oder, and lastly filled the same chair at Halle, where he died in 1741. His principal works are:—1. 'Antiquitatrum Romanarum Jurisprudentiam illustrantium Synagoga, secundum Ordinem Institutionum Justiniani digestum, in quo multa Juris Romaniri, atque Auctorum Veterum loco explicantur atque illustrantur,' 8vo, 1741; a very useful work, which has since been edited by Haubold, 1822. 2. 'Elementa Juris Civilis, secundum Ordinem Institutionum.' 3. 'Elementa Juris Civilis, secundum Ordinem Pandectarum, comoda Auditoribus Methodo adornata.' This work, which comprises a course of civil law, explains the origin, object, and application of the various laws. 4. 'Historia Juris Civilis Romanii, seu Germanici,' published with Ritter's notes, Leyden, 1749. 5. 'Elementa Juris Germanici, tum Veteris tum Hodierni,' 2 vols. 8vo, Halle, 1756. 6. 'Corpus Juris Germanici Antiqui.' 7. 'Historia Juris Civilis, in a Digestion de additionibus Accedentibus in H. Grotii de Jure Belli et Pacis libris.' 8. 'Elementa Juris Naturalis et Gentium,' translated into English under the title of 'A Methodical System of Universal Law, of the Romans and Nations, deduced from certain principles and applied to present cases,' by G. Turnbull, 2 vols. 8vo, London, 1763. 9. 'Fundamenta Styli Cultoriar.' 10. 'Elementa Philosophiae Rationalis et Moralis;' besides academical dissertations, &c. The works of Heinecclus were collected and published at Geneva, 'Opera omnia,' 9 vols. 4to, 1771, with additions and notes by his son John Christopher (Gottl.) Heinecclus, who prefixed to the first volume 'A Life of his Father.'

HEINECKEN, or HEINECKE, CHRISTIAN HENRICH, born at Lübeck, the 6th February, 1721, was the son of the painter Paul Heineckem, and younger brother of Karl Heinrich Heineckem, also an artist, and a writer on the fine arts. Heineckem was an extraordinary precocious child. At the age of ten months he could speak and repeat every word which was said to him: when twelve months old he knew by heart the principal events narrated in the Pentateuch, and second year he knew the greater part of the history of the Bible, both of the Old and New Testaments: in his third year he could reply to most questions on universal history and geography, and in the same ear he learned to speak Latin and French: in his fourth year he employed himself with the study of religion and the history of the Church, and he was able not only to repeat what he had read, but also to reason upon it, and express his own judgment. The fame of this wonderful child spread widely, and many persons resort to Lübeck on purpose to see and hear him. The king of Denmark wishing to see him, he was taken to Copenhagen, and there examined before the king and his council, and pronounced a prodigy. On his return home he learned to write, but his constitution being weak, he shortly after fell ill. Though he rallied for a time, he soon relapsed, and died on the 27th June, 1725, without, it is said, having much uneasiness of body. He was buried in the church of St. Mary. His teacher, Christian Von Schönreich, published a narrative of his life, 8vo, Lübeck, 1726, and his account is confirmed by many respectable contemporary authorities; among others Hirsching, in his 'Historie literarischer Handbuch,' 3rd part, pp. 62-64; and in his 'Deutsche Bibliothek,' vol. 17; and by most of the journals of the time. See also Johner, 'Gelehrtenlexicon,' vol. ii., p. 1454, and the 'Allgemeine Encyclopädie der Wissenschaften und Künste,' Leipzig, 1807, art. 'Heinecken.' Heineckem published a dissertation at Lübeck, 1730, in which he endeavoured to account for the circumstances of the child's early development of intellect.

HEINSE, WILHelm, the author of 'Arthingello,' was born at Langenweis, near Ilmenau in Thuringia, in 1749. After passing through a course of legal studies at the university of Jena, he took up his residence at Erfurt, where, being encouraged to apply himself to literature by Wieland, he commenced his career as an author by a translation of Petronius ('1773), which was quickly followed by 'Laidson, or the Eleusinian Mysteries.' The choice he had shown in transplanting the facts of the story into the Romish church, with which he adhered to the original, and also many parts of the other, scandalized not only the public, but Wieland himself. His next productions were less objectionable for their tendency, being a prose translation of the comic work, 'Costo's Orlando,' both of which is said to have executed during his residence in Italy (1780-83); but these last works did not prevent him from giving full scope to his unrestrained passion for enjoyment; and with what license he abandoned himself to the gratifications which Italy, long the object of his wishes, presented to him, may easily be inferred from his 'Arthingello,' which may be considered in some degree as the record of his own feelings and opinions, and, while it gives us much elegant and impassioned criticism on art, abounds not only with the most distasteful scenes, but with maxims immoral in the extreme. Fortunately the narrative and incidents are so interrupted by the dialogue which the author has frequently introduced, that it hardly ceases to be a romance; and for most of the scenes and characters to which it refers, are calculated only to corrupt. It is true, considered merely in regard to its ability as a production of the age, the story is redeemed by the refinement with which the grossness of vice is veiled; yet this does not all abate its moral turbidity. However, if we estimate the critic apart from the novel, Heinse is allowed on the whole, to have contributed a variety of articles to the 'Deutsche Mercur,' and other periodicals; including a critical account of the
principal pictures of the Düsseldorfer Gallery, in a series of letters to Gleim. A complete edition of his works in 10 vols. 8vo., with a critical and biographical introduction by Laube, is now in course of publication.

HEINISIUS, DANIEL, was born at Ghent in the year 1661 or 1661. He was taken to England at an early age by his father, who was obliged to leave Holland in consequence of the part he took in the wars which then prevailed in his native country. In 1670 his father returned to Holland, which desire the latter sent him back to England at the age of fourteen, to study law at Franeker. But Heinisius, contrary to the wish of his father, resolved to study ancient literature; and accordingly, after remaining at Franeker only a short time, he went to Leyden, where he pursued the study of the classics under Joseph Scaliger. At the age of eighteen he explained the Latin classics in the university, and seven years afterwards was appointed professor of history and politics. In 1677 he was an librarian and secretory to the university. Heinisius was considered one of the most learned men of his time, and was repeatedly solicited by many of the monarchs of Europe to settle in their dominions; but he refused to leave his native country, in which he died on the 23rd February, 1653, at the age of 75. He held the office of historian to the states of Holland, from which he received a handsome salary. He also took an active part in the political and military warfare of his time, and was appointed secretory to the celebrated synod of Dort in 1618.

The name of Heinisius is principally known by his editions of the Greek and Roman classics. But his Latin poems, which he composed in his earliest youth, were also esteemed by his contemporaries: they were published at Leyden in 1609. He also wrote some poems in his native language, which were published by Petrus Serresius in 1616.

The following is a list of the principal classical authors edited by Heinisius:—Crepundia Silana, sive notae in Silium Italicum, 1600; Theocritus, 1603; Hesiodi, 1603; Paraphrasis Andronic Rhodii in Aristotelis Ethica, 1607, 1610; 3 vol.; Dissertatio de Nonni Dionysiaci, 1610; Senecae Tragediae, 1611; Aristotelis Poetica, 1611, 1643; Theophrasti Eresius, 1611, 1613; Horatius et Bocchus Horatiana, 1619; Animadversiones ad Nota in Librario, 1620; Notae et Emendationes in Clementem Alexandrinum, 1616; Terence, 1618; Paraphrasis Perpetus in Politica Aristotelis, 1621; Aristarchus sacer, sive Exercitationes ad Nonni Paraphrasinischen, 1627; Ovidi, 1635, 1653, 1661; Livy, 1620, 1631, 1634; Aurelius Prudentius, 1637; Exercitationes Sacrae ad Novum Testamentum, 1639. Heinisius was also the author of "Recurum ab Sylvio" in the Commentaries of Cornelii Belges anno 1629 Gestarum Historia, Leyd., 1631, fol.; Orationes variis Argumentis, Leyd., 1635, 1620, 12mo.

HEINISIUS, NICHOLAS, only son of Daniel Heinisius, was born at Leyden, 29th July, 1630. His education was indirectly intended for him by his father. But he left his advice and instruction of Gronovius, Grotius, and other learned men of the time. In 1642 he visited England, and afterwards went to France, Germany, and Italy, principally with the view of consulting MSS. of Ovid and Claudian. In 1649 he was invited by Christina, queen of Sweden, to settle at Stockholm, where he remained till the death of his father in 1655. He resided principally in Holland during the remainder of his life. He was sent on a public mission to Russia in 1667. He died on the 7th October, 1681.

Heinisius edited "Claudian," 1650, 1665; "Ovid," 1652, 1657; "Virgili," 1675; "Valerii Flaccus," 1680. His Latin editions, which are still published at Amsterdam in 1666. He also left behind him many MSS. notes on the Latin poets, which have been published by Burman, in his editions of Virgil, Valerius Flaccus, Silvus Italicus, Phaedrus, &c. (Life of Heinsius prefixed to Burman's "Adversaria," 4to, 1745.)

HEIR, by the law of England, is he who succeeds by right of blood to the real property or lands, tenements, and hereditaments of the deceased owner, designated by the common law, or, in modern times, by a will. The English law which determines the succession to personal property, when uncontrolled by local custom, is contained in the statutes of distributions (22 and 23 Chas. II. c. 19; 29 Chas. II. c. 3; and 31 Geo. II. c. 17), which are the provisions of the civil law. The persons so entitled are not called heirs, but next of kin.

The several rules of descent which regulate the right to succeed to real property spring from the system of feudal tenures, but have been somewhat modified by the recent statute of 3 and 4 Wm. IV., c. 106. [Descent; Entail; Estate; Feudal System; Heir-at-law; Heir-general, is he who succeeds according to the rules explained in the article Descent, where there is no will of his ancestor and no instrument which determines a special course of a particular succession. Heir-special is he who succeeds in the order pointed out by some instrument precedent to the death of the deceased owner, whose property was held under the special title of feudal serf. (See Entail.) Heir-apparent is he whose right of inheritance is indefeasible, provided he outlives his ancestor; as the eldest son. Heir-presumptive is he who, if his ancestor should die intestate, is immediately entitled to the inheritance, though his heir, but whose right of inheritance may be defeated by the birth of some nearer heir; the brother or nephew of a man who has no children is heir-presumptive. Heir by custom is he who, subject to the right of heir-apparent by the provisions of descent, is entitled to succeed to the personal estate of his deceased owner, according to the laws of the several states or jurisdictions to which they are attached. (See Descent; Copyhold; Gavelkind.) The expression "heirs by devise" has also been sometimes used, though such are not strictly heirs according to the English law; but have been so called inadecurately after the heres factus of the Roman law.

The rules of the civil law upon the subject long prevailed in Scotland, and have, after various alterations, been made in the Scotch law of inheritance, and now the different descriptions of heirs are far more numerous than in either the English or the Roman law. Heirs-at-law, heirs-at-testate, heirs-in-tail, heirs of tailors, and heirs of provision differ entirely in their nature. There are also heirs active, heirs by conquest, heirs of line, heirs passive, heirs male, heirs of other heirs, and heirs by will. (See Descent; Copyhold; Gavelkind.)

The French law of descent has followed the Roman law, and the obligations and privileges of the heir are essentially the same in both countries. (See Descent; Copyhold; Gavelkind.)

In America the English law of descent has been in most instances rejected, and each state seems to have established rules for itself. There is no entire information upon this subject; there is also no general tract on the subject, though "Treatise on the Law of Descent in America," has been published by the late prominent lawyer. (See Descent; Copyhold; Gavelkind.)

The term heres in the Roman law has a very different significance from the term heir in the English law. The Roman term hereditas denoted all the rights and obligations of the Roman heir to the estate, and included such as well as was completed, represented the person of the testator or intestate, and as a consequence succeeded to all his rights and obligations. A man might by his will appoint one heres or more; and the property of an intestate might be divided, or a share might be given to another heir with respect to their character. Each person was heres in proportion to his share of the inheritance. The heir appointed by will was called scripturis, or factus, or testamentarius; the heres who succeeded in case of intestacy, or leges, or legitimus, that is, appointed by the law, or ab intestato.

An important distinction between heredes as established by the old Roman law was, and the distinction was the same (so far as it could be applicable) both in the case of testacy and intestacy. All persons who were in the power (potestas) of the testator, or intestate, during his lifetime, were heredes, or were entitled to accept the inheritance with all its burdens; the inheritance in fact devolved upon them by the will of the testator, and no act of assent on their part was necessary. Other persons, not in the power of the testator, were only bound to undertake the burden of the testator's debts in case they accepted the inheritance, for which purpose their express assent was necessary. But by the legislation of Justinian the heres in all cases was only answerable for the debts of the testator, or intestate, in proportion to the value of the property which such testator or intestate left behind him, of which however the heres was required to make an inventory within a certain time. (Cod. civ. Tit. 30, c. 22; Inst., ii. 15.)

The distinguishing feature of the Roman heres scriptus belongs to the subject of wills.

In the case of intestacy the distribution of the property
was analogous to the distribution of an intestate a personal estate by the English law. The Roman law gave no preference to an eldest son over a younger, or to a brother over a sister. Emancipated sons, who, by the strict rule of the civil law, were excluded from the inheritance (Emancipatio), were placed by Justinian's legislation on the same footing as children not emancipated. It is unnecessary here to state more minutely the rules which regulated the distribution of an intestate's property. (Inst., ii.; Nov., i. c. 1.)

It is important to conceive clearly the fundamental notion of the difference between the Roman heres and the English heir. The Roman heres, when his title to the inheritance was completed, represented, represented the testamentary wishes of his father so far as corresponded to our executor or administrator. His title to the property, as heres, was absolute and derived entirely from him to whose rights and obligations he succeeded. The English heir, according to the strict principles of tenancy, derives his title to the land, not from his immediate ancestor, as such, but by virtue of his relationship by blood to the person who acquired the land, deduced through his immediate ancestor. The consequences which flow from these two different notions of the Roman heres and English heir are numerous and important. They are well stated, in a general way, by Mr. Butler in his note on Coke-Litt., 191 a. The stat. 4 Wm. IV. c. 78, 6 Geo. IV. c. 171, show in what plain and tangible manner is liable to the payment of his debts, has materially affected the antient right of the English heir.

HEIR-LOOMS are such goods and personal chattels as, by custom and usuage, are transmitted from father to son. They are still considered as part of the family estate, and are used in the family, and kept in the family, and are in such special custum along with the inheritance, and not to the executor of the last proprietor. [Chattels.] They are principally such things as cannot be removed without damage to the inheritance. This includes furniture, books, and pewter in tables, clothes, books, pictures, old silver, old porcelain, and old pictures. [Chattels.] They are sometimes disposed of by testators to go to the heir, together with the inheritance, as heirlooms, and though it is the duty of the executors to carry the intention into effect so far as they can, yet the direction does not affect the rights of creditors, neither can it effectually prevent the devolution of the chattels according to their real nature.

HELENA was the oldest and the most important of all the female forms of speech. [Prideaux.] HELEACTOS. [Bean, vol. iv. p. 91.] HELLER and HELLER CANAL. [Holland.]

HELENA, daughter of Constantine the Great and of Helena, was given in marriage by her father to Constantine to the rank of a city, under the name of Helenopolis. Her husband Constantine, on being made Caesar by Deodatian and Maximus (A.D. 292), repudiated Helena, and married the Empress Eusebia. Helena withdrew into retirement, until her son Constantine, having become emperor and triumphed over his enemies, called his mother to his court, and gave her the title of Augusta. It was agreed that she should have a sum of money, which she employed in building and endowing a church on behalf of Christ to the rank of a city, under the name of Helenopolis. Her husband Constantine, on being made Caesar by Deodatian and Maximus (A.D. 292), repudiated Helena, and married the Empress Eusebia. Helena withdrew into retirement, until her son Constantine, having become emperor and triumphed over his enemies, called his mother to his court, and gave her the title of Augusta. It was agreed that she should have a sum of money, which she employed in building and endowing a church on behalf of Christ.

However, she built a church on the spot supposed to be that of the Sepulchre, which has continued to be venerated by that name to the present day. She also built a church at Bethle-heim in honour of the nativity of our Saviour. From Palestine she rejoined her son at Nicomedia, in Bithynia, where she expired in the year 327, at a very advanced age. She is numbered by the Roman Church among the saints. (Eusebius, Life of Constantine; Hübner, De Crucis Domini per Helenam inveniente, Helmstädt, 1724.)

HELENA, the capital of Corsica, is on the east coast of the island, 1200 miles west of the coast of Benguela, in South Africa, and nearly in the latitude of Cape Negro, and about 1800 miles east of the coast of Brazil, in South America. Seen at a distance it appears as a group of barren rocks rising in a pyramidal form; on a nearer approach it is seen as almost perpendicular cliffs, from 600 to 1200 feet high, are seen encompassing the island all round, broken through in several places by deep chasms which open to the sea-shore, and which form so many narrow valleys winding up the table-land in the centre of the island. One of the principal of these openings is called Jones' Valley, on the north-west coast of the island, and at the opening of it to the sea is James' Town, the only settlement on the eastern part of the island, and consisting of 1500 acres of fine land, nearly 2000 feet above the sea, sloping gently towards the south-east. Longwood House was the place of Napoleon's residence, and his tomb is near the gate of Longwood from it, situated under a willow-tree, and covered by a plain tombstone without inscription, and enclosed by an iron railing. In the centre of the island rises Diana's Peak, 2693 feet above the sea, a very steep and rugged ridge, with precipices from east to west, sloping abruptly on the south, divides the island into two unequal parts, the larger and finer of which is on the north side of it, containing James' Valley, Rupert's Valley, Longwood Plain, the deep crater-like dell called the Devil's punchbowl, the site of the present residence of the Adminis- ration House, which is a country residence of the governor, &c. The whole circumference of the island is about 28 miles. The population, exclusive of the garrison, is about 5000, and the whole island is held by Europeans, and the rest are blacks, men of colour, and Chinese. The climate of St. Helena is one of the healthiest under the tropics, and is found beneficial to invalids from India, and even from Europe. The range of the thermometer at plantation House is from 61° to 73° within doors; it sometimes falls to 59° in the open air between June and September. In James' Town it is generally from 5 to 7 degrees higher than at Plantation House, and at about 400 feet lower. The summer rains fall in January or February, and the winter rains in July or August. Cloudy days are frequent and refreshing throughout the year. Viewed from the sea the island appears barren; but the interior is covered with a rich verdure, and is watered by numerous springs. The soil of the valleys is very rich, and produces all the fruits and flowers of Europe and Asia. Horned cattle, sheep, and goats feed on the rich pastures. Pretty cottages in picturesque situations are scattered about the island. (Mas- jeor Beatson's Tracts relative to the Island of St. Helena, written during a residence of five years, 4to., London, 1816, with plates.) The base of the island appears to be basalt, and lava and sandstone have been found scattered about the island. The island of St. Helena was discovered by the Portuguese in 1502. It was afterwards taken possession of by the Dutch, who abandoned it in 1651 for the Cape of Good Hope. The English East India Company purchased the island in 1664, and it became a resting-place for their ships between India and Europe. In our days it has become celebrated as the place of banishment of Napoleon, who landed there from St. Helena in July 1815. The island is now bought by ships returning from India, who take in fresh provisions and water, and on those occasions the place assumes the appearance of a bustling market-town.
almost perpendicularly, and varying in elevation from 90 to 170 feet above the level of the sea. The ascent to it is by a flight of 191 steps. The summit is a tolerably level plain about 4500 paces in circumference. It is joined by a bottom of rock, 500 paces long, to the low land, which is an open plain, divided with two good harbours, and to the east of the down is a road where vessels may anchor in 48 fathoms. The circumference of the whole island does not exceed three miles. In former ages it was of much greater extent. It is 200 feet high, and it is the custom for the chief of the Sicambri or North Frieslanders, and the seat of worship of a Saxon deity.

Of the rapid waste of this island, Mr. Lull presents the following account, and began in the year 800 B.C. and is much consumed by the waves. In the years 1300, 1500, and 1649, other parts were swept away, till at last a small portion only of the original island remained, consisting of a rock of red marl (of the Krämer formation of the Germans), about 200 feet high. Since 1770 a current has cut a passage no less than ten fathoms deep through this remaining portion, and has formed two islands, Heligoland and Sandy Island. (Principles of Geology, book ii., ch. 7.)

The inhabitants of the island, 2400 in number, live on the cliff. They are descended from the Frieslanders, and speak, besides the old Friesland language, the low German, respectively and cut their subsistence by fishing, and acting as pilots. They obtain turf, wood, vegetables, &c. from Cuxhaven and Hamburg in exchange for fish. The low land has now only some fishermen's huts; but in the days of it in the period of the war with Denmark, and it became the depot for goods which were smuggled into the Continental ports, the low land was covered with warehouses, and the population of the island increased to 4000. On the conclusion of peace in 1814 England retained possession of the island, probably for the sake of its double harbour, and for the advantages which it offers for defence, in having two wells of good water. The English have erected four batteries and a lighthouse. They have a garrison and a governor, but levy no taxes and do not interfere with the internal government. The lighthouse is in 54° 11' 84" N. lat. and 7° 53' 13" E. long.

Helm (Lat. albus, the sun), a term applied to the rising of a star, when it takes place just before that of the sun. If we suppose a star not very far from the sun's orbit, then as the sun approaches it will become for a season permanently invisible, for it will rise after the sun, and set after it also, the heavens remaining too light in the quarter of sunset to permit the star to be seen. But as soon as the orbital motion of the sun has carried it past the star, the latter will again be seen. But first, and in it time, it will rise so much before the sun as to become visible just before daylight. In this case it is said to rise heliacally: thus a star sets heliacally before its season of disappearance, and rises heliacally after its reappearance. The successive heliacal risings and settings form a number of consecutive seasons, and were used for this purpose among some ancient nations. But since the procession of the equinoxes slowly changes the offices of different stars with respect to the seasons, an antecedent record of the time of the year when a given star rose heliacally would enable us to make a rough guess at the number of centuries elapsed since the time of the observation. Upon such a basis Newton reéstated a great part of his system of chronology, taking the descriptions of the heliacal risings of stars from Heid, HELICARION or HELIUS, HELIX FAMILY, the general name by which the molluscs are distinguished.

Mr. Gray, in his paper on Streptocystis (Loudon's Magazine of Natural History, vol. i., new series), observes that zoologists have divided land-shells into several genera; but that the late Baron Férussac united them all into a single genus, as he wished to establish a rule, that all the genera of molluscs should be alone characterized by some peculiarity in the animal. 'The increased knowledge,' continues Mr. Gray, 'of the genus Helix has proved erroneous; some of the shells which he (Férussac) referred to the genus Helix have very different animals from the typical kind; and it is probable that eventually several of the genera established by him (Férussac) will be found to be true genera, according to his own theory. The knowledge of the animal, and the history of several species which were unknown at the time he wrote his system, have shown that several of the characters which he considered as of generic importance are common to other species belonging to quite different genera. Thus we now know that some Helixes (Caracolla smaragdina, Batea Chemnitzii, and some others) are viviparous, just as the Partulian; that the degree of development in the lower pair of tentacles is variable in the different species of Papa and Vertigo; and that to separate the latter genus from the former, on account of the partial obliteration of these organs, has been the effect of a fallacious analogy because the incident can be made to think that these and numerous similar facts, which must be well known to every practical conchologist, show us that we are warranted in establishing genera from any peculiarity in the structure or form of the shell, as well as on a peculiarity in the animal alone; especially when we consider how very few of the animals of the different species which we are called upon to arrange are ever seen alive.

Having thus laid before the reader the difficulties with which the history of this very extensive family is surrounded, we shall first endeavour to give some account of the general organization of the molluscs considered properly so called, as manifested in one of the most common species.*

Organisation. — Nutrient Organs. — In the museum of the Royal College of Surgeons, in London (Physiological Series, Gallery, No. 301.) is a specimen of Helix Pomatia, Linn., showing the form of the mouth and the part which performs the office of teeth. This is a dentate horny substance, of a dark colour and arched form, situated transversely above the aperture of the mouth, and forming as it were, the margin of the upper lip; the lower lip is divided by a vertical fissure. No. 302 of the same series shows in the head of another Shell-snail the same structure on the mouth, consisting in a line of points, and the alimentary canal has been injected with size and vermilion; so that the salivary glands, from their white colour, may be distinctly perceived upon the parietes of the stomach. Here also the semicircular, detached, homogeneous, and irregular form, of a conglomerate structure: they may be seen diminishing in breadth as they extend upwards towards the pharynx, where their ducts terminate. Here also the serous, gastric, subgastric, and termination of the alimentary canal, and the position and form of the liver, are well displayed. The next preparation (No. 768), which exhibits the mouth, oesophagus, and stomach, and the alimentary canal, shows the salivary glands at their lower extremities, and the termination of their ducts. The oesophagus and stomach being laid open, their internal structure is seen. (Cat. Gall., vol. i.)

Circulating System. — In the Shell-snail, Helix, the heart is situated near the rear of the body, under the ring of the pulmonary sacc; and in the Slug, Limax, it is situated at nearly the middle of the posterior surface of the pulmonary sacc, and protected above by the rudimentary shell, so that this part of the structure in these animals is, as in other points, nearly allied. The preparation in the College Museum, No. 882 (Gallery), is a specimen of Helix Pomatia with the shell removed in order to show the heart, which is situated on the left side of the dorsal aspect of the body, near the posterior part of the branchial sac. The pericardium is laid open, and the heart being injected, the auricle, from its thinner panicles, is seen of a red colour; a bristle has been passed through it, and the ducts may be seen running from the heart, and the ramifications over the liver. No. 883 is a specimen of Limax ater, Linn. (Slug), to show the heart situated in the middle of the back. (Catalogue, Gallery, vol. ii.)

Reproductive System. — A single preparation of Helix Pomatia are prepared (No. 1081), to show the pulmonary sacc, which receives the air by an anterior orifice on the right side of the neck. The sac is laid open from that side, and the cavity of the sacc, the right side of the cavity, upon which the pulmonary artery, or continuation of the veins of the body, ramifies, is turned back to exhibit the ramifications of the vascular and respiratory surface. The parts are then seen of the reproductive system, including the male organ. No. 1082 is a similar specimen, with the left portion of the pulmonary sacc

* The reader should especially consult Owen's edition, in whose works he will find some excellent remarks on the anatomy of the Helix.
removed, and the orifice by which the air is admitted and expelled left entire. No. 1083 is the portion of the vascular parietes of the pulmonary sac removed from the preceding preparation, and inverted to show the ramifications of the pulmonary vessels. These are continued from the veins of the body without the interposition of the propelling ventricle. No. 1084 is a similar preparation. No. 1083 shows the roof of the pulmonary sac of another Helix Pomatia. (Cat. Gallery, vol. ii.)

Brain, Nervous System, and Senses.—Not being able to refer to any preparations of the nervous system of a Shell-snail, we must call the reader’s attention to this part of the organization in a slug, which so nearly corresponds with that of the Shell-snail as to afford a very sufficient illustration. In the cephalopod mollusks, the low central nervous system is confined to the point of attachment of the head and neck, from which numerous nerves radiate to supply the body. The principal nerves are the two inferior ones, which extend on either side the mesial line of the ventral surface straight to the head, and give off the thoracic, the abdominal, the muscular, and foot or foot from their outer sides. A small unsymmetrical ganglion is formed on the nerve, which supplies the heart and respiratory apparatus. No. 1305 is the same specimen of a subcephalopod, and the viscera removed, to show more especially the subcephalopod ganglion and its nerves. A bristle occupies the place of the esophagus. No. 1306 exhibits the nervous system of a Bulinus Slug removed from the body. (Cat. Gallery, vol. ii.)

Touch.—In the Shell-snails the sense of touch will be readily supposed, by any one who has observed the motions of a common garden-snail, to reside especially in the tentacle disk, or foot, and the low central ganglion of the Body of the Collection we find, No. 1391, a specimen of Helix Pomatia prepared to show the different character of the surface of the skin in the exposed and protected parts of the body: in the latter it is thin and smooth; in the former, thick, vascular, and rugose. No. 1392 is a snail injected, slit down the back and evaginated, to show the vascularity of the foot. No. 1393 is a snail injected, with one pair of tentacles, and two or more, with their appendages intact. The body in section shows a very prominent, especially the muscular layer of the body. Here too the pulmonary cavity is laid open. (Cat. Gallery, vol. ii.)

Sight.—In the gallery (Physiological Series) of the same rich and accurate materials we have the same comment; our example is No. 1756 with the posterior tentacles or horns extended, showing the eye-specks, or ocelli, situated at the side of the extremity of each horn. This position, although destitute of appropriate organs, the eye, however, has the advantage of all the mobility with which the tentacle itself is endowed; and by the admirable construction of the same part, they are defended from external injury by being retracted and invested together with the extremity on which they are supported within the cavity of the tentacle, as in a sheath. (Prof. Owen, Cat. Gallery, vol. iii.)

Generative Functions.—In the common shell-snails (Helix), the male and the female sexual organs are complete in one individual, but it requires the reciprocal junction of two individuals to produce a fruitful impregnation. The situation of these organs is at the anterior orifice of the neck; and at the time of congress a sharp horny or glass-like excitable seminal vessels, which are sinuous and muscular, and in consequence of stimuli. Some assert that these appendages are absolutely shut out from the body of one snail into the body of another, and engravings even exist where two snails are represented, one in the act of inseminating the other. (Professor Owen, Cat. Gallery, vol. iv.)

Swammerdam describes the eyes in detail; but some are of opinion that the organs above alluded to are not eyes. Sir Edward Horns denied that they were used in convenient places, and the lens could not be opened. His ingenious and correct observations are as follows:—"In order to save those of taste and touch, the latter of which he admits it to possess in an eminent degree, he has cut away the outer part of the eye, and then, by trauma, the organs of the eye may be removed without injury, and the snail be kept alive, and become as animated as ever. (Munich’s Journal of Physiol., tomo. ii., p. 295, and also in the Encyclop. Brit.)

"(Cat. Gallery, vol. ii.)

"See also Mr. Brandy’s observations in the Philosophical Transactions, and Cu. Oralis of the Helix Pomatia, usually regarded as their eyes, locit. (Zool. Jour., vol. iv.)

"(Zool. Jour., vol. iv.)

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cochous substance was observed fixed in the upper jaw: this proved to be the new tooth. The parts then became further developed and more conspicuous, occupying a greater space, and in two or three months the injury was so completely repaired that the lighter color only of the new head served to distinguish it from the old one. These experiments were confirmed by others, by Gerard among the rest.

**Hybernatia.**—M. Gaspard remarks that in our temperate climate the first summer chills are a warning about the commencement of October, generally, *Helix Pomatia* becomes indolent, loses its appetite, and associates in considerable numbers on hillocks, the banks of ditches, in thickets, hedges, and such places. In a day or two the animal has expelled the testes, and then hides himself under moss, grass, dead leaves, or the like rubbish. Here each forms for itself, with the anterior part of its muscular foot, a cavity sufficiently large to hold at least one shell; and thus cavity is occupied by new testes and eggs. When it has succeeded in bringing the aperture of the shell to a nearly horizontal position, it stops. The foot is soon contracted within the shell, the snail then expands, so as completely fill the coiled portion of the shell, which is a whitish, pale, and transparent; and then inspires a quantity of air, after which it closes the respiratory hole. When this is done, a fine transparent membrane is formed with its margin, thus enclosing the foot, and any other substances lying above. The mantle then secretes a quantity of yellowish fluid over its whole surface, which sets uniformly, like plaster of Paris, and instantly forming a continuous covering about half a line thick. When this is hardened, the snail separates its mantle from it by another and stronger mucous secretion; and after a few hours, expelling a portion of the air it had previously inspired, it is enabled to shrink a little farther into the shell. It now turns its back, and with its head upwards, and thus retires farther into the shell. In this way sometimes a fourth, fifth, and even sixth portion are formed, with intermediate cells filled with air. Such is M. Gaspard's account; but Mr. Bell remarks that it does not completely explain the manner in which the excavation is formed. 'It is not by the pressure of the foot,' says the last-named zoologist, 'and the turning round of the shell, that this is principally effected. A large quantity of a viscid mucus is secreted on the under surface of the foot, to which a layer of earth or dead leaves adheres; this is turned on one side, and a fresh secretion being thrown out, the process is renewed, with a greater or less quantity of earth mixed with mucus is left. The animal, then takes another layer of earth on the bottom of the foot, and, turning it a little to the part where it intends to form the wall of his habitations, and leaves it in the same manner, repeating the process. The cavity is thus completely large, and the mantle is thrown up smooth, even, and compact. In forming the dome or arch of the form, a similar method is used, the foot collecting on its under surface a quantity of earth; and the animal turning it upwards, leaves it by throwing out fresh mucus, and this is repeated until a perfect roof is formed. As I have very often watched this curious process, I am certain of the facts. On removing very carefully a portion of the roof, soon after its completion, I was enabled to see the formation of the operculum. In about an hour, or even less, after the hybernaculum is covered in, the whole surface of the collar of the mantle instantaneously pours out the mucous secretion in considerable quantity, at first a thick cream, but very soon acquires exactly the consistency of bird-lime, being excessively adhesive and tenacious; and in about an hour after it is poured out it is perfectly solid.'

**Systematical Arrangement and Natural History.**

We now proceed to give a sketch of the views of systematists with regard to this numerous tribe of animals.

The genus *Limax* (Slugs) is placed by Linnaeus at the head of the Monogenae, and includes *Vaginella, Testacella*, and *Parma-cella*, the Escargots (Helix), the Hombrelles (Clusiata, Drap.), and the Agathes (Achatina). Lam.


Then come the Clausilfas (Turbo peressus, Turbo bidens, Linn., &c., &c.),

The Achatinidae, including Liguina and Polyphemus of Daubenton.

M. Lamarck defines his *Colinacuta* to be air-breathing Trachelipods (Trachipodes atricole), provided with or deprived of an operculum, and having cylindraceous tentacles. Their shell he characterizes as spirvalve, having no projecting parts on its exterior except the strium and ribula (costules) of growth, and whose aperture is often recurved or reflected outwards. He divides this, the first family of his Phthypagose (plant-eating) Trachelipods, into the following sections and genera:

(a) Four Tentacles.


(b) Two Tentacles.

* Auricula and Cyclostoma.*

M. de Fèrusseaux makes the fourth and fifth orders of Gastropods, consist of the Pulmoniferous Gastropods without an operculum (Pulmonites sans operculum), and the Pulmoniferous Gastropods with an operculum (Pulmonites Operculata).

The fourth order consists of the following suborders and genera:

1st Suborder. Geopila. The 1st family of this order consists of the different genera of *Helix*, with *Papala*, *Pula*, &c. The 2nd family embraces the following genera: *Smulis, Helicaria, Helicolema, Helix, Vertigo, Partula*. 2nd Suborder. Geophila. 3rd Family (Les Auricules). Carychium, Scoleus, Auricula, Pyramidella, Tornatella, Pedigudes. 3rd Suborder. Hyphysila. This suborder consists of the Linneens or Water-Snail, such as *Lamiaea, Planorbas, &c.*

The fifth order contains two families:

1st. The Helicinidae (Helicina). 2nd. The Turbicinidae (Cyclostoma).

The Palmaracaria form the first order of M. de Blainville's Paracolyphephora Monocera, the second subclass of the second. M. de Blainville gives the following description of the *Palmaracaria*:

Organs of respiratory resitum or arian, lining the roof and floor of the shell and floor of the cavity are situated obliquely from left to right on the origin of the back of the animal, and communicating with the ambient fluid by a small rounded orifice, pierced on the right side of the swollen (renal) part of the border of the shell and other animal parts and cavity of the operculum, is again inspired, and each separate membranous partition broken by the pressure of the hinder parts of the foot projected through the mantle, forming a laborious act of the foot of the animal. The animal, making a last effort, bursts and detaches its most obtuse angle. Then insinuating by little and little the edge of the foot between the shell and the operculum, it forces the latter off or breaks it away. (See the Abstract of M. Gaspard's Memoir, with notes, by T. Bell, F. L. S., 'Zoological Journal,' vol. I, the whole of which is well worthy the perusal of the student in natural history and physiology.)
the mud, with the exception of the Limneaean, during the vigorous season; all are phytogenous. Some of them are known in all lands.

M. de Blainville divides the Pulmonibranchiata into the following families and genera:—

1st Family, the Limneaean. (Limnea, Physa, Planorbis.)

2nd Fam., the Auricularians. (Pteropidae, Auricularia, Pyramidula.)

3rd Fam., the Limacianian. (Succinea, Bulimus, Achatina, Clausilia, Papia, Tomogeres, Helix, Heliculimex.—Testaceae, Cancellaria, Lima, Lima, Onchidium.)

4th Fam. Latrille divides the Pulmonis, his fourth order of his first section of Gastropoda (the Hermaploderitis), into the following families and genera:—

1st Fam., Nudilimene. (The Slugs, and Paramecula, Textule.)

2nd Fam., Geocochilidae. (Helicoron, Vitriva (Helicoclinax), Succinea, Helix, Caracola, Anatoma, Pupa, Chordia (Grennaile), Clausilia, Bulimus, Achatina, Verte, Partula.)

3rd Fam., Limnochoelidae. (Carychium, Scarabab, Auricularia, Conomina, Cassidula, Limnea, Physa, Planorbis, Ancylus.)

The second section, the Diencephalous Gastropoda, consists of his fifth order (Pneumonea), and contains two families:—

1st. The Helicinids (Helicinidae). 2nd. The Turbinidae (Cyclostoma).

M. Rang in his 'Tableau Méthodique' makes the Lima-gong of Férussac (Trachdiploides colemacis of Lamarck; Limacinos de Blainville; Géocochilidos of Latrille) the second family of the Pulmonis incoperculis of Férussac (Pulmonibranchiata of De Blainville).

M. Rang, following De Férussac, thus, with some slight alterations, defines and arranges the family:—Animal elongated, having the body distinct from the foot, and forming a twisting spiral, rarely furnished with a curass. Shell imperforate with a curass, always showing a flabby collar which closes the shell. Tentacula to the number of four, rarely two, the upper ocellated. Pulmonary cavity placed forward, and opening in the thickness of the collar. Organs of generation united in front; vent near the respiratory orifice. Shell always spiral, very variable in form, receiving the animal more or less completely. Terrestrial.

† Terebracous.

A. A cuirass and a collar.

B. A collar without a cuirass.

Genera. Vitrina, Draparaud (Helicoclinax and Helicoclinis of Férussac).

B. A collar without a cuirass.

Genera. Helix, Muller (Helix, Succinea, Amphibulimus, Acacius, Polydentes, Tomogeres, Anatoma, Caracola, Bulimus, Achatina, Polyphemus, Papia, Clausilia, &c., &c., &c.).

(+) Redundant.

† Volutates.—Helicoides.

I. Subgenus. Helicophanta, Férussac.

Peristome simple.

1st Group. Vitrinoidea. F. (Helix brevis, &c.).

Peristome thickened and subreflected.

2nd Group. Viteacidae. F. (H. Cyprea, &c.).

+++ Ectoletus.—Cochlaria.

II. Subgenus. Cochliachloria, F. (Succinea, Drap.; Amphibulimus, Lam.; Amphibulimus, Montf.).

(++) Inclusus.

+++ Volutates.—Helicoides.

III. Subgenus. Heliconis, F. (Helix, Linn.

Columella solid and twisted.

1st Group. Columellenae.

a. Peristome simple. (Helix natocides, &c.)

b. Peristome reflected or thickened. (Helix Jamaicensis, &c.)

2nd Group. Peristomata.—Helix ligata, &c.

Shell perforated.

3rd Group. Acarna. (Helix aspersa, &c.).

Shell umbilicate; umbilicus entirely covered.

a. Shell globulous or subtriangular.

3rd Group. Acarnae. (Helix aspersa, &c.).

β. Shell somewhat depressed (subsaïacée).

4th Group. Ermthropatra. F.

Mouth rounded; peristome open. (Helix guttata, &c.)

* Here it is that the new genus Strypea which should be inserted. Mr. Gray, who established it, states that the name was given by Laurens, and that the Antique lamp (Helix rugosa, Linn.), on which Lamarck established his genus Anatome, had been long known and valued, on account of its rarity and strange form; the animal turning up the last whorl before it completes its growth, so that the mouth of the shell is even with the outer surface of the spire. A similar form, Mr. Gray remarks, has been lately observed among the fossil shells, which on account of its resemblance to the Strypea by the roundness and simplicity of its mouth, the description as a new genus under the name of Strypea, [sic.]

Mr. Gray in his paper on the structure of shells (Phil. Trans., 1820) points out some land shells, as Helix màxima, when they arrive at a certain period of their growth, their whole bodies out of the regular series, as if the shell had been crushed, producing what may be considered as a natural distortion. Having since that time had occasion of observing among several species of the same shell in the same structure, and finding that they all agreed in the general form and position of their mouth, Mr. Gray had induced to consider them as forming a peculiar group, for which he has proposed the name of Strypea. One of the species, he states, forms, during the dry season, a band, thin, colorless epiphYSIS, differing considerably in structure from any that has hitherto been observed among the Amphineura, but this he observes, only in a peculiarity of the species, though the ophyésea in this family often forms a good subsidiary character. The following is Mr. Gray's definition of Strypea:—

Animal shell oblique; when young, sub-hemispherical, deeply umbilicate, rapidly expanding; at length the periphery, which is best seen towards the right and dorsal side of the axis, and the umbilicus becomes compressed and often umbilicated. The edge of the mouth is usually thin; the edge slightly thickened and refracted, and often with a single tooth on the outer side of the inner or outer lip.

Mr. Gray gives six species, which he subdivides into two sections, and says that these shells inhabiting the tropical parts of Africa and South America: and that two of these species of these two distant countries appear to be very nearly allied. He further observes, that the animals of these shells, like the Anatome, &c., must remain attached to the side of the shell, and it will have once formed its mouth, to which they cannot alter by re-absorption, as many of the Helicidae do, without the removal of the last whorl; for, if a new whorl be added to it, it would entirely alter the form of the shell.
** Shell trochoid and a little carinated. (Helix pyramidalis, &c.)

VII. Subgenus. Helicostyla, F.

Columella strait; peristome simple; shell subdepressed.

1st Group. Aplostomes, Aplostoma, F. (Helix missela, &c.)

Columella twisted, truncated as it was at its base, or furnishe
with an internal spiral rib, forming a gutter and appearing un
under the form of a tooth or callosity.

2nd Group. Canaliculatae, F. (Helix decollata, &c.)

Columella flattened, without either tooth or lamina, form
a sort of gutter at its intersection with the penul
iminate whorl; peristome reflected.

3rd Group. Marginatae, F. (Helix studeriana, &c.)

++ Evolutae. Cochlostoma.

* Mouth generally toothless.
  1. Columella solid.
  a. En filet, not truncated at its base.

VIII. Subgenus. Cochlostyla, F.

Peristome reflected.

1st Group. Lomostoma, F. (Helix metaformis, &c.)

Peristome simple.

2nd Group. Aplostoma, F. (Helix Dufrenneii, &c.)

β. Columella solid, flattened, and truncated at its base.

† Shell conic or very ventricose; aperture enlarged.

IX. Subgenus. Cochliotoma, F.

Shell conical; mouth short; anterior border advanced.

1st Group. The Robins, F. (Helix atroaurata, &c.)

Shell ventricose; mouth very large; external border in a
vertical direction.

2nd Group. Acathinae.

++ Shell ovoid or turriculated; mouth elongated and narrow.

X. Subgenus. Cochlicopa, F.

Shell ovoid; mouth long; exterior border in a vertical
direction.

1st Group. The Polyphemes, Monf. (Helix Priamus, &c.)

Shell turriculated, mouth short, external border a little advanced.

2nd Group. Styloides F. (Helix fulminea, &c.)

2. Shell perforated or umbilicate; umbilicus masked or
uncovered; peristome simple.

a. Whorls of the spire equalized; the last whorl shorter
than the others united.

XI. Subgenus. Cochlicella, F.

Only group. Turrita, F. (Helix conoides, &c.)

β. Last whorl of the spire generally larger and longer
than the others united.

XII. Subgenus. Cochlogena, F.

† Peristome simple or thickenmed, but with sharp edges.

a. Shell umbilicate, columella straight.

1st Group. Umbilicatae, F. (Helix flammata, &c.)

β. Shell perforated, columella twisted.

2nd Group. Perforatae, F.

* Shell oblong. (Helix fasciolata, &c.)

** Shell ovoid. (Helix costulata, &c.)

++ Peristome reflected or dentated.

Mouth crescent-shaped, without either teeth or folds;
peristome reflected and regular; columella twisted, perfo
rated; last whorl of the spire sometimes shorter than the
others united.

3rd Group. Lomostoma, F.

* Last whorl of the spire larger and longer than the others
united; shell ornamented with vivid colours.

(Helix Parnami, &c.)

** Last whorl shorter and less than the others united;
shell uncoloured. (Helix Reticiata, &c.)

Mouth short, crescent-shaped; peristome simple or
thickened and regular; columella twisted, more or less
projecting and bent, or furnished with a plait which turns
upon it and makes it appear subtruncated; umbilicus
masked or exactly closed; last whorl of the spire some
times shorter than the others united.

4th Group. Heliceteres, F.; Achatinella, Sw.

* Shell coniform. (Helix vulpina, &c.)

** Shell turritate. (Helix turritella, &c.)

*** Shell ovoid. (Helix trista, &c.)

Mouth angular at its extremities, or overlaid superi-orly,
only narrowed by the sinuosity of the 'external border'
columella large, more or less spiral, and forming a plait
more or less projecting in the aperture. Peristome thick
and reflected; last whorl of the spire longer and more con
vex than the others united.

5th Group. Stomatoidae, F. (Helix Auria Leporis, &c.)

Mouth crescent-shaped, rather angular at its extremities,
most frequently furnished with short teeth at the peristome,
which is bordered or a little opened out or reflected; never
any lamina; columella twisted, hollow, flattened at its
base, or forming a protuberance; generally perforated.

6th Group. Donostiae, F. (* Last whorl of the spire longer and longer than the others
united. (Helix Auria Boiss., &c.)

(**) Whorls of the spire equalized, often pressed and nar
row. (Helix turgens, &c.)

(*) Mouth generally furnished with teeth or laminae.
1. Without gutters; peristome generally not continuous.

XIII. Subgenus. Cochlodonta, F.

Shell cylindrical.

1st Group. Pupa, F. (Helix Uca, &c.)

Shell fusiform.

2nd Group. Cereales, F. (Helix Morticandi, &c.)

2. One or two gutters; peristome generally continuous.

XIV. Subgenus. Cochloidea, F.

(*) Shell right-handed.

* Mouth without teeth or lamina.

Peristome not continuous.

1st Group. Papoideae, F. (Helix cornuta, &c.)

Peristome continuous.

2nd Group. Trachylolae, F. (Helix Sloomi, &c.)

++ Mouth armed with great plats or elongated teeth
(Helix Gargantuaus, &c.)

(**) Shell left-handed.

Mouth without any lamina. Balea, Gray.

3rd Group. Anomalaes, F. (Helix pervera, &c.)

Mouth armed (with lamina, one of which performs the
part of the operculum).

4th Group. Claustralae, Draparnaud. (Helix torticornis, &c.)

DICKROUS.

Genera. Vertigo. (Muller.)

Animal elongated, demi-cylindrical, with a rather large
spiral body; a collar closing the shell and carrying the
orifice of the pulmonary cavity upon the collar and to
the right, appearing like that of the vent; organs of gen
eration united and showing their orifice near the right
tentacle, oviparous.

Shell cylindrical, very spiral; aperture straight, in the
direction of the axis, short, often dentated; peristome often
sinuous and reflected; right or left handed (dextral or
sinistral).

Partula. (Féussac.)

Animal elongated, demi-cylindrical, with a rather large
spiral body; a collar closing the shell and carrying the
orifice of the pulmonary cavity on the right and at the ex
ternal angle of the aperture; two tentacles only, cylindrical
and retractile, occulted on their summit; organs of gen
eration united showing their orifice near the right
tentacle, ovoviviparous.

Shell oval, pointed; spire conical, last whorl convex and
longer than the others united, whorls of the spire four to
four, aperture straight in the direction of the axis, short,
sometimes dentated or furnished with elevated lamina;
peristome commonly very much reflected, with the edge in
the same vertical plane; columella side or lip, callous at
its base; dextral or sinistral.

M. Range's 3rd family of inoperculate pulmoniferous mol
usks consists of the Auricules of Féussac (Auriculae of
De Blainville; Auriculea of Gray; Limnochilus (à col
ter) of Latreille). These are either terrestrial or marine;
and one has been announced as fluviatilis. They com
prehend the genera Carychium, Auricula (Auricula and Co
novala, Lam.; Melampus, Montf.); Pedipes, and Sacrurus.
To these may be added Chitonus, Gray and Mooreo King. None of these can be con
sidered to belong to the Helicidae, properly so called.

The 4th family, the Limnaease of Lamarck (Limmacea
of De Blainville; Linnoceradidae (without a collar) of Latreille, are nearly equally numerous, consisting of the genera Platyrhim, Lonner, or, as Lacmann writes it, Lymnaea, and Physa, Aplexus, Flem., and Amphioplia, Nils. This family cannot be considered as belonging to the Helicidae, properly so called.

The order Pulmonia or Operculida of Férussac (Trachelipodes comites of Lamarck; Pectinibranches of Cuvier; Chisombrachia cricostomes of De Blainville; Pneumones of Latreille) is thus defined by M. Rang:

Shell external, complete, spiral, globose or conical. Operculum calcareous or horny. All terrestrial.

M. Rang observes that this order was established by M. de Férussac at the expense of the Pectinibranchiata of M. Cuvier, and for the genus Cyclostoma only; but afterwards M. de Férussac added to it the genus Helicina, which was, at one time, confounded with the Comita of Lamarck.

At present, continues M. Rang, the Operculata Pulmonia established by us, the passage from the Pulmonia to the Pectinibranchiata, because they are related to the first with reference to the organs of respiration, and to the second with reference to the separation of the sexes.

1st Family. Helicinacea of Férussac (Helicinacea of Latreille). Animal furnished with a collar, and two filiform tentacles carrying the eyes at their external base upon tubercles. Shell sub-globose, with a demiformal aperture, and the columnella transversal and delicate. Operculum horny, sometimes calcareous externally.

M. Rang observes that M. de Férussac established the two families Helicinae and Turboidea, for two genera nearly approximated, and that it would be perhaps more convenient to unite them, the difference between them being really not very remarkable, except in their testaceous envelope; both are pointed out to us as a matter of the family, and the other a spiral operculum. See also the Rev. M. G. Berkeley's memoir hereinafter alluded to.

Genera. Helicina, Lam. (Oligyra, Say; Ampullina, De Blainville.)

Animal very spiral, furnished with a proboscisiform head and a bilabiated muzzle; tentacles filiform, carrying the eyes at their external base on tubercles; foot short, rounded, with a transverse anterior furo; pulmonary cavity opening in front of the mantle by means of a large transversal slit.

Shell sub-globose or conoid, a little depressed, not umbilicated, with a low spire, an aperture demi-ovar, or nearly oval, the periostracum (often gossy), the left lip enlarged upon the umbilicus, which it entirely covers; columnella transversal and planulate. Operculum horny, sometimes slightly calcareous externally, lines of growth concentric.

Helicina was established by Lamarck, and placed by him among his Comita. M. Rang is of opinion that the genera Ampullina of De Blainville and Oligyra of Say ought to be referred to Helicina, an opinion which seems to be in unison with that of M. de Blainville himself, who has arranged both those genera under Helicina in his Manual. Mr. Gray has published a valuable monograph of the genus in the 1st vol. of the Zoological Journal; and the late Rev. Landowne Guilding has recorded some other species, with plates of the animal, in the same work, vol. iii.

The definition of M. de Férussac's second family, the Turbinien, is—Animal without a collar, provided with two tentacles oscillated at their external base. Shell conoid, more less or more rounded, with a rounded aperture and conus borders. Operculum calcareous.

Cyclostoma. (Lamarck.)

Animal very spiral, furnished with a proboscisiform head, which bears two cylindrical tentacles, convex, or swollen at their summit, contractile, and oscillated at their external base; foot elongated and oblong; pulmonary cavity commonly divided into two parts, the superior and anterior part of the mantle, position of the male organ indicated by a tentaculiform appendage situated at the right side.

Shell conoid, discoid, or turriculata, more or less elevated, with a sharp or mammillated summit, having all the whorls rounded; aperture round, continuous and reflexed borders. Operculum calcareous, with concentric lines, summit subcentral. (Rang.)

The species of Cyclostoma are very numerous, and many of them are very beautiful. Mr. G. B. Sowerby has added considerably to the catalogue. They are principally the inhabitants of temperate or warm climates; there is one English species, Cyclostoma elegans. The reader will find an excellent paper on the anatomy of this species, by the Rev. M. G. Berkeley, in the 4th vol. of the 'Zoological Journal.'

M. Rang adds to these pulmoniferous operculated mollusks, the fossil genus

Fersussina, Grateloup. (Strophostoma, Deshayes.)

Animal unknown.

Shell oval, subglobulese; aperture round, bordered, oblique, simple, toothless, turned over from the side of the spine; umbilicus more or less large. Operculum ? (Rang.)

M. Rang remarks that M. Grateloup established this genus for a fossil shell from Dax, which seems at the first view very near to Anastoma, but which M. Grateloup, from the examination of the aperture, concluded was not proper to Anastoma, but to Cyclostoma. M. Rang states that he participates in this opinion, which the knowledge of the operculum can alone confirm; and he goes on to observe that M. Deshayes, double and quadruple having seen the publication of this genus in the first number of the Bulletin of the Limnian Society of Bordeaux, had subsequently published it under the name of Strophostoma. Three or four species are known. (See above, Streptophras, p. 107, note.)

Some may have doubts as to the propriety of placing these operculated pulmoniferous terrestrial mollusks under the family Helicidae. But we believe, notwithstanding the difference of the operculum, that their general organization will warrant the plates; placed under the terrestrial and the terrestrial shell-anals may without violence be placed in one great family, which may be subdivided into the Helicinae without opercula, and the Helicidae with opercula.

Before we conclude this part of the subject, we must draw the reader's attention to the following arrangement proposed by Mr. Gray in the 'Annals of Philosophy' (August, 1824):

Terrestrial.


Aquatic.


In the paper above alluded to, some interesting observations are made on the affinities of the family; and, with regard to the arrangement, Mr. Gray informs us that he has in his MS. corrected that of the first division, because the distinction between the two first families, though it is that used by Lamark, Cuvier, and others, is, in his opinion, artificial and of little importance; and the knowledge which has since acquired of the animals of several genera which were before unknown, have shown him that the character which M. de Férussac pointed out as the distinction between Arion and Limax (but which many succeeding naturalists have considered of real importance) is even of more importance than was accorded to it by M. de Férussac, affording a good character for dividing the Land Pulmonibranchious Mollusca into two families. Thus, he observes, the Arionides, not having a transversal slit on the end of the tail (which, in the gasteropoda genera, is produced beyond the mantle), and they have the orifices of the organs of generation on the right side immediately under the respective slit, while in the Limacidae it gland on the end of the tail, and the orifice above referred to is just behind the base of the upper right tentacle. There is also, he states, an important difference in the nervous system between the two families: in the first the under part of the infra-glandular ganglion is 6 lobed, whilst it is only 4 lobed in the Limacidae. Mr. Gray is further of
opinion that, at present, only a few genera, as Arion and Helicostoma, Fér., Nonina, Gray, and Stenopus, Guilding, can be referred with certainty to the Arionidae; but he thinks it very probable that, when the animals of other shells are known, many of them may be found to belong to that family.

Geographical Distribution and Habits.—The Helicidae are most widely diffused over the surface of the earth; scarcely any countries but those where the climate is surprisingly rigorous are without some species of the family. Many of the shells are strikingly beautiful in form and colour, and these are mostly the inhabitants of intertropical countries. Some of the genera (Actatina, for instance) attain a very large size, and lay eggs in proportion. Helix aspera, the common garden-snail, is distributed over a large portion of the globe. It is found, for instance, at the foot of Chimborazo, in the forests of Guiana and Brazil, and on all the coasts of the Mediterranean in Europe, Asia, and Africa. Helix Pomatia has been naturalized with us, and is still found in some countries. The first importation is attributed by some to Sir Kenelm Digby. Merrett mentions it as a British inhabitant before his time. A moist and rather warm state of the atmosphere seems most congenial to this family. To avoid great dry heat they get under stones, under old trunks of trees, leaves, &c. &c., and some of the species will burrow into the earth for protection against it. A shower will bring them forth in such numbers sometimes, the smaller species especially, as to induce the belief in some cases that it has been raining snails.

Most of the species hibernate.

Utility to Man.—The Helicidae, from their voracity, are very injurious to the agriculturist and horticulturist; but there can be no doubt that the larger species are good food. We know that they were a favourite dish with the Romans, who had their cochlearia, where they were regularly fattened with new wine boiled down and meat (sapa et farre, &c.). (Pliny, Hist., lib. ix., c. 56.) Helix Pomatia is used as food in many parts of Europe during Lent, and the snails are kept in an escargotiere (snailery), which is generally a large place boarded in, having the floor covered half a foot deep with herbs, where the animals fatten. Many are familiar with the passage in Pliny (loc. cit.), who, on the authority of Varro, relates the incredible size to which the art of fattening had brought the snails. There must, one should think, be some mistake in the text, which says, 'Cujus aris gloria in eam magnitudinem perducta sit, ut octoginta quadrantes caperent singularum alises.' Pannat, referring to this and to Varro (De Re Rustica), says, 'If we should credit Varro, they grew so large that the shells of some would hold ten quarts! People need not admire the temperance of the supper of the younger Pliny (Epist., lib. 1; Epist. xx.), which consisted of only a lettuce slice, three snails, two eggs, a barley cake, sweet wine and snow, in case his snails bore any proportion to those of Hipponus.

The following cuts, and those given under Bulimus and Bulinus, will afford the reader an idea of some of the forms of the Helicidae:—Anostoma, Streptaxis, Caroecilia, Bala, Partula, Vertigo, Clausilia, Cyclostoma.
Fossil Helicidae

Fossil species of Helicidae are by no means rare. Thus M. Deshayes enumerates thirty-five species of Helix, two of Anatomia, one of Helicina, three of Papa, two of Clausilia, three of Bullimus, three of Aschatina, seven of Pupites, and six of Cyclotoma, &c. as fossil (tertiary), mostly in the Pliocene period of Lyell, and many of them as both living and fossil.

The student should consult especially the great work of Fussace, and the writings of Cuvier, De Blainville, Deshayes, Draparnaud, Gray, Lamarck, Linnaeus, Montfort, M. Bouvier, etc. &c., and the works of Benett, Gaspard, Réamur, Redi, Schenker, Spallanzani, and Swammerdaman. He will find many new species recorded in the "Proceedings of the Zoological Society of London," and in Müller's "Synopsis Testacorum" (Berlin, 1836). He should also consult M. Bouvier's "Catalogue of the Terrestrial and Fluviatile Testacea of Aurvergne, both recent and fossil;" among the latter are two species of Vertigo.

HELICINA. [HELICIDÆ.]

HELICOLIMAX. [HELICIDÆ.]

HELICOSTEGES. [FORAMINIFERA, vol. x, p. 484.]

HELICITIS, Mr. Gray's name for a genus of quadrupeds, which inhabits eastern Asia and has the general appearance and colouring of Muyasaus, combined with a denial of the genus of Eau or Meola, but differing from the latter genera in the large internal central lobe of the upper carnivorous tooth. The genus is thus characterized by Mr. Gray:

Dental Formula: — Incisors (primores), 6; Canines (laniari) 1-1; Molars 5-6; 1-5-6

Head elongated. Feet short; soles of the feet nearly naked to the heel; toes 5-2; claws strong, the anterior ones long and compressed. Tail cylindrical and moderate.

Mr. Gray exhibited to the Zoological Society one species, Helicina moschata, the entire length of which was 234 inches, of which the tail measured 3. Inhabits China and smells strongly of musk. For further particulars see Zool. Proc., 1831. [Gutu, vol. ii, p. 463.]

HELIER, ST. [Jersey.]

HELIOMETRUM (havin the sun, and measuring, 'measure') is the name given by M. Bouvier to a microometer invented by himself about 1743, by means of which the diameters of the heavenly bodies may be measured with considerable accuracy. In its present construction consists of a conical form, and provided with two object-glasses of equal focal length, which were so adjusted as to admit of being moved in a direction transverse to the axis of the tube. By this contrivance the images which are formed in the focus of the eye-glass may be made to diverge, coincide or lap over each other, by merely varying the distance between the centres of the object-glasses, and this distance is indicated by a graduated scale attached to the tube. When the two images coincide, the angle subtended by the observed object will be equal to that subtended by the centres of the object-glasses, which being known, the magnitude of the observed object may readily be computed when its distance is given, or the distance determined when its magnitude is given. As this instrument does not differ in principle from the divided object-glass micrometer, the reader is referred to the article Micrometer; and for further information relating to the invention, see M. Bouvier, "L'Académie Royale des Sciences," 1743, p. 11. [BOUVEUR.]

HELIOPOLIS. [BALEEB; EGYPT.]

HELIOPORA, a genus of stony Polyparia, established by Blainville, from specimens of Mr. Gray and Gaimard on a recent species called by Lamarck Pociopora cereus. Generic Character. — Animals short and cylindrical, provided with a simple circle of thick tentacles, fifteen or sixteen in number, contained in vortical or diverging cylindrical cells; cells immersed, internally crenulated by imperfect radiating lamelle, united into a calcareous mass, which is regularly porous in the intervals of the cells. The coral is found attached to various bodies.

Three recent species are mentioned by Blainville, all from warm seas. One of the fossil species (Helipora porosa, Bl.; H. intertexta, Brunh) abounds in strata of the Sicilian system; the other occurs in the chalk and in tertiary deposits. (Manuel d'Entomologie.)

HELIORNIS, Bonnterro's name for a genus of waterbirds (Géreolefousquets of Buffon) which have lobate feet like the Coots and Grebes, but with a greater development of tail and sharper claws than the Coota.

HELIOSCOPE (a Greek term signifying literally 'sun-observer') is a kind of telescope adapted for making observations upon the sun without the eye being injured by the intense brightness of the solar rays. Dr. Hooke wrote a treatise in 1742 expressly upon the subject of heliocopes, wherein he recommends four reflecting-glasses to be so placed within the tube of the telescope that the solar rays may suffer four reflections before they strike the lens. Thus, he observes, their intensity will be reduced to the 250th part of their original intensity. Hevelius and other philosophers preferred the use of coloured glasses, which is the common practice of the present day; while Huygens

Hyasphas, king of Ethiopia, and Theagenes, a noble Thebanean. It has been remarked that the work of Heliodorus served as a kind of model to the subsequent Greek writers of romance. Though not without merit in point of style and animated description, it belongs to that kind of works of fiction which deal in improbabilities and strange adventures, and in no respect approaches to that class which fix our attention and hold fast our sympathies by exhibiting a portrait of human life and its incidents. This work was published for the first time by Obsequens, 4to, Basel, 1534; afterwards by Cornelius, 8vo, 1556; Bourdolotus, 8vo, Paris, 1619; Pareus, 8vo, Frankfort, 1631; Schmidius, 8vo, Leip., 1772; Mitscherlich, 2 vols. 8vo, Bipton edition; but the best edition is by Coray, 2 vols. 8vo, Paris, 1804. The 'Ethiopica' has been translated into most of the modern European languages—in French by Anquetil, 8vo, 1550; anonymous, 8vo, Paris, 1623; anonymous, 8vo, London (Paris), 1743, Paris, 1757; by Quenneluis, 5 vols. 12mo, Paris, 1803; into Spanish by Ferdinand de Mena, 12mo, 1616; into Italian by Ghinelli, 1556, frequently reprinted; into German by Meinhard, 2 vols. 8vo, Leipzig, 1767; and by Göttingen, 8vo, 1822, said to be a good translation into English by Underdowne, 4to, 1597; Lisse, 4to, 1622; Tate, 8vo, 1686 and 1733; anonymous, 2 vols. 12mo, 1791; into Dutch, 12mo, 1669; and into Polish, 8vo, 1806. At least half a dozen other Greek writers of the name of Heliodorus are mentioned.
merely blackened the inner side of the eye-glass by holding it over the smoke of a lamp or candle. (Dr. Hooke's treatise.)

HELIOSTAT (Hfoc, the 'sun', and the root era, eta, to 'put or place') is the name given to an instrument employed in optical experiments to fix the position of the solar rays. The only way of obviating the inaccuracy of the accidental fall of the light, which is usually made in a room so darkened as only to admit the solar rays through a single aperture. The solar ray thus admitted is in two respects unfavourably circumstanced for being operated upon. In the first place, from the ordinary elevation of the sun, the ray enters the room obliquely, is immediately thrown upon the floor, and thereby that portion of its length which can be experimented upon is inconveniently short. This is remedied by placing a long, indrindrical rod adjusted perpendicularly to the plane of the mirror. The subordinate parts, which are numerous and complicated, are explained in Desaguliers's translation of Spence's "Natural Philosophy," vol. ii. p. 197, ed. 1747; and in Biot's "Physique Experimentale," tom. ii. cap. 4.

HELIX. [HELICIDE.] HELIX. [SCREW.]

HELIOCICUS, one of the early Greek prose writers, was born at Mytilene in the island of Lesbos, B.C. 496 (Gell, xvi. 23). According to Lucian (Macrobi, c. 22) he was alive at the age of 85. Sidusia says that he lived at the court of Amyntas, king of Macedon, together with Herodotus; but this statement is inaccurate, since there was no king of Macedon of the name of Amyntas during the lives of Helianicus or Herodotus.

He wrote several works, which are frequently quoted by ancient writers, of which the most important appear to have been, a History of Argos," arranged in chronological order, according to the successive priestesses of the temple of Hera in that city; a History of Attica, Cyprus, Aetolia, and Locris," an account of Phoenicia, Persia, Syria, and other Eastern nations; and some geographical works. Helianicus is mentioned by Thucydides (i. 97).

The fragments which remain of the writings of Helianicus, his brother, are collected in "Sturt, ed. 1826; and in the "Museum Criticum," vol. ii. p. 90-107, Camb. 1826.

HELEBORE, WHITE. [VERATUM ALBUM.]

This is a common heliotrope, with plants belonging to the natural order Ranunculaceae, among which it is known by its having eight to ten very short tubular petals, permanent sepals, and from three to ten leathery follicles. The most remarkable species is that which produced the Black Hellebore, a dangerous acid poison, much used by the ancient Greek physicians in mania, epilepsy, and dropsy. This plant, the Helleborus orientalis of botanists, was found by Pliny, in Pliny's "Natural History," and by Houtcot, in his "Gardener's Dictionary," 1719, under the name of scaphce (Scapha). It has a thick black rhizome, pedate leaves downy on the under side, and corymbose purple flowers. Except in the colour of the flowers and downy leaves, it resembles the Helleborus niger, or Christma rose, an alpine plant now common in gardens, where it flowers about Christmas time, whence its common name. Other species are H. viridis and fathis, two herbaceous plants with green flowers; of these the properties are nearly the same as those of H. orientalis, but less energetic. Their leaves are emetic and purgative, and are recommended as a very efficacious vermifuge.

HELLE'BORUS OFFICINALIS (Salisbury), H. Orientalis (Dec.), has been substituted in the Pharmacopoeia for the H. Niger, from a belief that it is more powerful. It is a perennial species, growing in mountainous places in the north of Europe, and is to be collected at the Hellebores, Botolia, on Helicon, Geta, and in the island of Anti- cyra; by the moderns it is gathered in Greece and the Levant, as mentioned in the previous article. The root, which is the part employed, is black, the caudex thick, the fibres coarse, and the smell is extremely strong.

The root of H. Niger will long continue to be employed as the officinal one, and it is to be regretted that many other roots, especially those of Actaea spicata and Adonis verna, are of a similar nature. These may be discriminated by physical characters (particularly the internal structure) and by chemical tests. The activity of Hellebore seems to reside in its resinous matter, for which rectification is generally sold in the market.

Like most ranunculaceous plants hellebore can occasion rubefaction and inflammation of any surface with which it is brought in contact; when taken into the stomach in a moderate dose it is moderately good in cases of dropsy of the abdomen; but in large doses it is a fatal poison. It was celebrated in ancient times as a cure for various forms of insanity, which it sometimes accompanied by its drastic effects. It was also used in the treatment of rheumatism.

HELLEBORES. [DANDELIES.]

HELMET, an ancient armour of defence for the head, still worn by the officers and soldiers of some of our cavalry regiments. It is probably derived from the Latin (of the lower age) helmus. Skinner however derives it from the Anglo-Saxon verb helmet, to hide. *Helm* certainly occurs both in Caedmon's "Paraphrase" and in the Saxon Gospels, as well as in *Ælfric's Glossary." Helmets were probably adopted, in the middle age, from the Italian elmeto.

As a part of defensive armour the helmet is of high antiquity: some sort of covering for this description for the head appears to have been worn by the warriors of every country. Helmets were found even among the inhabitants of the South Sea Islands when discovered by Captain Cook. Among the oldest specimens now remaining are probably the two helmets found on the field of Cannae in 1759, preserved in Sir William Hamilton's collection in the British Museum. Another ancient helmet, bearing an inscription, found at Olympia, was presented to the British Museum by King George IV.

The form of the Greek helmet and its general description may be collected from various passages of the Greek writers from Homer downwards, and more especially from the medals and marbles on which it is represented. [Athen. p. 13, and the Library of Entertaining Knowledge (Elgin and Townley Marbles), published by the Society for the Diffusion of Useful Knowledge.] It does not appear that the Greeks wore a breastplate. Both the helmets found at Cannae however protect the face, and have projecting nasals. Lipsius's treatise De Militia Romana (iii, c. 5) contains a full account of the Roman helmet, and the British Museum contains engravings and descriptions in the third volume of Count de Caylus's Recueil d'Antiqu. For the helmets in more modern use Grose's Treatise, and Meyrick's Critical Account, of Ancient Armour must be referred to. Among the various which had separate names we find the Chapelle de fer, the Bacinet, the Burgonet, the Castell, the Hufken, the Morion, the Salade, and the Skull. These were almost invariably of steel. It is also the justing Helmet, used in tournaments, which was sometimes of leather.

The nasal, the ventail or moveable front, the visor, lifted up by pivots, and the bevor, to allow of drinking, were the names of parts of certain helmets introduced at different periods, and not always used.

As ornaments over the shield or coat of arms, helmets are still used in heraldry. The full-faced helmet with six bars, all of gold, damasked, is for the sovereign and princes of the blood; the full-faced helm of steel for marquises and dukes; earls, viscounts, and barons have a profile or side-standing helm of steel ornamented with bars; the full-faced helmet of steel, with the visor or beaver open, is for baronets and knights; the full-headed helm, with the visor closed, for an esquire.

HELMONT, VAN. [CHEMISTRY.]

HELMSTEDT, a town in the district of Schöningen in the duchy of Brunswick, in Hanover; it has about 6300 inhabitants, who carry on a pretty considerable trade. Helmstedt was formerly the seat of a univer-
HELOISE. [ABELARD.]

HELO'NIA. [CEVADILLA.]

HELO'TI'DE (Leach). a family of Coleopterous insects of the sub-family Stenelytra. Distinguishing characters—head short, obtusely terminated anteriorly; mandibles notched at the apex; antennae placed near the eyes, generally filiform, or nearly so, or slightly thorny; the second joint of the antenna, the more slender, and occupies the whole head; the third joint long; terminal joint of the maxillary palpi large and secundiform; eyes emarginated anteriorly; body generally simple or but slightly emarginated; claws simple; body usually convex, and of an oval form.

The larvæ of these insects live in rotten wood, upon which they feed, and have seven legs, without which they cannot move, and have six small legs, attached, two to each of the thoracic segments. The perfect insects, like the larva, also found in rotten wood, or under the bark of trees; they are rather slow in their movements, and generally associated with the larvae of other insects.

In the genus Helops, as it is now restricted, the joints of the antenna are somewhat compressed; the two basal joints are short, the third is long; the two or three terminal joints are short and oblong, the last joint is the shortest; the intermediate joints are moderately long and nearly cylindrical. The thorax approaches to a square form, or is slightly attenuated behind, and is closely applied to the elytra: the body also of the oval form.

Helops Caraboides, an insect very abundant in various parts of England, will afford an example of this genus. It is rather less than half an inch in length, of an oval form and black; it has a pair of large blue eyes; the upper surface of the body is finely punctured, and so are the strigula of the elytra. This insect is usually found under the bark of trees, near the root.

HELOTIS. [SPARTA.]

HEL'SINGFOR'G, the capital of the Russian government of Finland, at the mouth of the Wannå, in 60° 16' N. lat. and 25° 11' E. long. It is contained of a Grecian and Roman city, and has been a great trade and naval station. In 1686, a fleet of the Russian navy was defeated by the Swedes and Gustavus II. of Sweden, and in 1690 the town was captured by the Swedes and burned.

HEL'SON, the most remarkable are the palaces of the governors and the barracks; and likewise the magnificent building for assemblies, on the Esplanade, which was finished in 1833. After the destructive fire at, also the university, called Alexander's University, was transferred by an act of 21st December, 1827, to Helsingfors. It is divided into four faculties, with 22 professors; and has a library and a botanical garden. There are now above 400 students.

HELSTON. [CORNWALL.]

HEL'VeTICK, was born at Paris in January, 1715, and was educated at the Jesuits College of Louis-le-Grand, where his earlier years were far from betokening those talents of shrewdness and observation which subsequently manifested. Having passed through a course of legal study, Helvetius was sent to his maternal uncle d'Armancourt, directeur des fermes at Caen, in order to acquire a practical knowledge of finance, and he shortly afterwards obtained the lucrative appointment of fermier-général, to whom his father was physician. But disgusted with the oppressive nature of its duties, which however he discharged with singular facility, he resigned this situation, and proceeded to the establishment of a household. At this period Helvetius led a disorderly life, without having any elevated or moral end in view, though his general conduct was relieved by occasional acts of the noblest generosity. The excesses into which he had been led by an inordinate vanity of spirit for universal adoration. Thus, in order to gain the applause of the theatre, he danced on the public stage in the mask of J发酵 (for masks were not yet being used) by the name of Zephyr, and his name was very studious of mathematics was stimulated by the honours and attention which were lavished by the highest circles at Paris upon Maupertuis after his return from a scientific visit to Lapland. Agreeably to the description of this illustrious specimen of literature, Mr. Lecizens, to whom he had given the name, said that it was vain, and an act of beneficence was as dear to him for its own sake as the applause which he courted so eagerly. When Saurin the academical maestrus, Helvetius not only made him a free gift of 200l, but also sided upon him an annuity of 80l, and when Maupertuis, to whom he allowed a yearly pension of 120l, forgot the decrees of gratitude, Helvetius mildly observed, 'How would I have answered him if he had not been accepting my favours, laid me under an obligation to him?'

In 1751 Helvetius married the beautiful and accomplished daughter of the Comte de Lignerville and niece of M. de Bougainville, by whom he was blessed with a son. At this time he lived chiefly in retirement at a small estate at Vore, enjoying with his wife and children the pure pleasures of domestic life and ameliorating the condition of his tenants and vassals. He is said to have been very jealous of the game on his estates, and very severe against violators of the game-laws. In 1758 he published the treatise 'De l'Esprit,' which, while it was favourably received by the self-styled philosophic party, was denounced by Marie-Jacques De La Concorde. He court and the Jesuits as dangerous to society and to religion, and as being nothing less than a summation of all the evil doctrines of the 'Encyclopédie.' A strong passion for praise usually accompanied I mean a strong spirit of revenge; to regain the favour of the court Helvetius thought no concession too great, and he successively published three letters of apology which gradually advanced in humility and submission. Notwithstanding the confession which he made in the first, he was not heard. The party had no patience with such evasions inconsistently with its spirit, and the doctors of the Sorbonne drew up a formal condemnation of the work, which they declared to be a compendium of the evil contained in it, and an attack upon the best principles of the Catholic Church. It was published, burning according to a decree of the parliament of Paris. As to the literary merits of this work, the style is vicious and declamatory, but the argument is well sustained throughout, and enforced by great force of illustration. In 1764 Helvetius visited England, and in the following year Germany, where he was received by Frederick the Great with marks of the highest consideration and esteem. Helvetius died at Fasanenhorst, 27th December, 1771, leaving behind him a work entitled 'De l'Homme,' Vol. XII.—Q
HEM des Facultés et de son Education," which was published the same year at London by Prince Gallatin. This treatise, which was composed of a dedication and some commen-
tary upon his earlier philosophical work, is vastly superior to it in style and diction. Among the earliest works of Helvetius is his poem ' Sur le Bonheur,' which, however secondary, is a model of poetical composition, exhibits all the more
observation of men and manners which forms at once the
truth and the charm of his philosophical essays. These
may be considered to constitute the practical portion of the
second part of the treatise in which the patient
by Condillac, who confined himself to the exposition and deri-
vation of the cognitive faculties. By 'esprit' Helvetius
understands as well the mental faculties as the ideas acquired
by the senses. He distinguishes and identifies sensation, and he accounts for man's superiority over the
brutes by the finer organism of his senses and the struc-
ture of his hands. Man, he considers, is the work of
nature, but his intelligence and virtue are the fruits of cul-

tivation. The end of virtue is happiness, and utility deter-
mines the value of all actions, of which those are virtuous
which are generally useful. Utility and inutility are how-

er merely relative, and there is consequently nothing
which is absolutely good or absolutely evil. The
happiness and enlightenment of the people he makes to be
the true end of all human government; and, denying a

Divine Providence in the government of the world, he
declares and affirm that total and an prejudice.

(Œuvres d' Helvetius, 3 vols., Paris, 1816.)

HELVIN, a crystallized mineral of which the primary
form is a cube. Cleavage parallel to the planes of the
regular cubic system: fracture: \(6^\circ\), \(6^\circ\), \(5^\circ\); scratches glass; colour pale-cream and greenish-
yellow; streak white; lustre resinous, vitreous-trans-
lucent; transparent on the edges; specific gravity \(3^\circ166\).

It is hardening in Sicily.

Before the blowpipe or charcoal it melts with efferves-
cence into a globule of the same colour as the mineral: in the
oxidizing flame the colour becomes deeper and the flame:
with borax it yields a transparent glass often coloured by manganese.

Analysis by Gmelin—

| Sodium | 33-272 |
| Glucose | 8-056 |
| Alumina and Glucose | 1-445 |
| Potash of manganese | 29-344 |
| Sulphuric of manganese | 14-000 |
| Loss by calcination | 1-125 |

97-233

HELVERTIIUS. [Holland.]

HEMATIN, the colouring matter of the Hematoxylon campechianum, or logwood, discovered by Chevrel. It
is prepared by evaporating a watery infusion of logwood to

dryness, treating the residue with alcohol, filtering the
spirituous solution, and evaporating it to the consistence of
a syrup. If a certain quantity of water be added to this,
et evaporation be performed with a gentle heat, the

ehydrin crystallizes, and requires only to be washed with

a little alcohol and dried. Hematin crystallizes in small

crystalline lamons of a reddish colour. The taste of he-

matin is at first sweet and astringent, and afterwards bitter.

It is decomposed by heat, and ammonia being one of the
products, proves that it contains azote. Wertheim

dissolves he-

matin in a solution of an orange \(\text{Fe}^2\) at \(21^\circ\) Fahr,

decays yellow on cooling. Acids saturated with oxygen
turn its colour first to yellow and afterwards to red;

the alaks in small quantity render hematin purple, and

when in a cold state, and, eventually decomposing it,

make it yellowish-brown.

This colouring principle is a constituent part of all the
colours prepared with logwood, and the changes which it undergoes by a partial digestion and alaks render it useful as

a re-agent to detect their presence.

HEMEL HEMSTEAD. [Hertfordshire.]

HEMISARLOPIA, a word which is now used to signify
"night-blindness," though in fact it means "day-seeing,"

being similarly formed to the genuine Greek word 'nymta-

lopia,' which means "night-seeing." Much
collision has arisen in regard to the use of the two words,

in consequence of an error committed by others. Hippocrates

or one of his early editors. In the 2nd book of his "Pre-
diet," he says: "We call those nyctolopists who see by night,"

but in the 4th and 6th books of his "Epidemics," the disease

is called "necrolophia," which is "night-blindness," and in

which the patients are blind at night; and his transla-
tors, Paulus Egineta, Attius, and Galen, quote various
authorities to show that those only are properly called

"nyctolopists, or nyctolopists;" Linnaeus and Vogel

however, admit it as a disease incompletely known. It

has been followed by Bontius, Sir G. Blane, and many

naval surgeons, who apply to the present disease the name

of nyctalopia, or dysopia tenebrarum. Linnaeus and Vogel

however, report it as a disease incompletely known, and

night-blindness, hemeralopia; and as their meanings have been

since received by Scarpa, Lawrence, and all the chief

writers on diseases of the eyes, they will be adopted here.

Night blindness is continued to some degree in the East and West Indies, the Mediterranean, and in all

hot countries, and affects in a slighter degree soldiers and

the natives in the same parts of the globe. To persons

affected by it, all objects appear at sunset as if covered

with an ash-coloured veil, which becomes gradually denser,

and at last involves them in complete darkness. In slight cases

they can see by bright candle-light or by moon-light; but

after the disease has lasted a few days, even the largest

objects are invisible after sunset, and the patients have

to grope their way even when the moon or candles are shining

brightly. The disease will daily increase in severity if not

judiciously treated, till the sight becomes weak by day-

light, and then it is considered that total and

premature, though it very rarely follows. The pupils are
generally dilated, and at night cannot be made to contract

even by a brilliant light.

The cause of this disease is the exhaustion of the retinas,

produced by the continued glare of a bright sun,

either directly transmitted to it, or reflected from the
clear waters of the tropical seas, or the bright sands of

their islands in the condition of which, from part of the

inability to perceive objects in a dimly lighted

room after leaving one where there was a glare of light. In

many cases it is connected with a disordered condition of the
digitation, and, in others, with a state of the

Hemeralopia," in the 5th vol. of the "Medico-Chirurgical

Transactions."

Nyctalopia, night-vision, or day-blindness, probably never
occurs as a disease. It is often a symptom of serious
ophthalmia, or other diseases where the eye is

so irritable that the stimulus of day-light cannot be borne,

as well as of those conditions in which great dilatation of

the pupil is requisite for vision, as in commencing cataract,
or opacity of the centre of the lens or its capsule.

HEMICHIREDIUM. [Conchaecola, vol. viii., p. 427.]

HEMICYCLOSTOMA, M. De Blainville's name for

the fourth family of his order Asaphonhonta, the latter

being the second order of the first subclass (Paracal-

phaphora Diptica) of the class Paracalaphora, the

second class of his Malacocones. [NERITIDE.]

HEMIDA CYTUS, [Greeks, vol. xi., p. 183.]

HEMINGFORD, WALTER, a country called HE-

MINGBURGH, a cannon regular of the Austin Priory of

Gisburn, or Gisborough, in Yorkshire, where he died in

1347. His history, which begins from the Norman Con-

quest, concludes with the reign of King Edward I., the

first published by Gale in his 'Scriptores V.,' fol., Oxford,

1857; and again by Hearne, in 2 vols. 8vo., Oxford,

1731.

HEMIPCYRIA (from hem, "half," and ophel, "the eye") is a
disease of the eye, where the patient sees the objects as

he looks at; the middle of it, or its circumference, or its

upper or lower part, or more commonly one lateral half,

being completely obscured. In some cases it arises from a

partial mechanical obstruction to vision, as from the

transparent tissues of the eye become opaque, or when the

upper eye-lid falls over half the pupil. But more frequently

it is the result of a morbid and partial insensibility of the

retina, produced by the excessive stimulus of a bright light,

and will cease after a night's rest; sometimes it is a con-
sequence of disordered digestion; and sometimes a symptom of commencing amoebiasis, or gutta serena, and terminates in complete blank appetite, with constant opisthoparesis [Eyes]; and it is remarkable that the appearances found in his brain after death were such as on that theory might have been anticipated. But in a large proportion of the cases the affection is too transient to admit of the supposition of any organic disease.

HEMIPLEGIA. [Apoplexy.]
HEMIPDUS. [Tetragonid.] HEMISPHERE, the half of a sphere. [Sphæra.]
HEMIPPUS, [Myti, and τρίγω, a wing], one of the orders of the class Insects.

The order Hemiptera, according to the twelfth edition of the 'Systema Naturae' of Linnaeus, contains insects which agree in having incomplete metamorphoses (i.e. the larva and pupa both possess the power of locomotion, and bear a great resemblance to the perfect insect), and also in having the superior wings generally coriaceous, and the inferior membranous. Thus Linnaeus included in this order the Corvoæ, Locustæ, Grasshoppers, Buggæ, Cicæ, &c.

The last-mentioned insects, the Bugs and Cicadas, however differ very materially from the former, inasmuch as they possess a sucking mouth-part, and most of the more ancient entomologists, the term Hemiptera has been restricted to such insects as have imperfect metamorphoses, but the first joint is sometimes very short. The second family, to which the name of Hydrocoris is applied, have the antennæ enclosed and hidden in a groove beneath the eye; the tarsi have but two distinct joints, and the eye is generally very large.

The Hemiptera are divided by Latreille into two sections; to the first he applies the name of Heteroptera, and to the second that of Homoptera. The Heteroptera are characterised by having the prothorax attached to the fore part of the head; the elytra coriaceous with the extremity membranous, folding one over the other when at rest, and the first segment of the trunk (or the prothorax) the largest, and forming the most conspicuous part of the thorax. The second section, Homoptera (which by many of the English entomologists is regarded as an order), is distinguished by the proboscis being attached to the lower portion of the head, near the chest; the elytra almost always of a uniform coriaceous texture, and with their inner margins more or less contiguous: the three segments of the thorax are united in a mass, and the first is frequently shorter than the second. All the insects of this section feed exclusively on vegetable juices; their structure is more fully described in the article Homoptera. We shall at present confine our remarks to the first section, or to the true Hemipterous insects.

In the greater number of the Heteropterous Hemiptera the head is small, situated on the same plane as the thorax, or nearly so; the fore part is somewhat produced; the eyes are of moderate size, very convex, and hence project rather suddenly from the sides of the head; between the eyes there are two antennæ, or simple organs; the latter being of moderate size, composed of long joints, few in number, and situated in front of the eyes: the part usually termed the thorax in descriptions, but which is in fact the prothorax, is of moderate size, often broader than long, and is very usually produced on each side, so as to form an angular projection; the scutellum is large, generally triangular; but in some (the Scutelleræ, for instance) it assumes the form of the body and is so large that it completely covers that part; the body itself is often rather flat or convex above; convex and more or less distinctly keeled beneath: when the wings are closed, the upper part of these insects generally presents a smooth slightly convex surface, and is seldom very convex. The legs are of moderate size, or not infrequently long. In certain groups (the Coriscæ) the posterior thighs of the males of many of the species are remarkably large, and many have the tibia also large, often broad and compressed.

The proboscis springs from the fore part of the head, and when not in use is suddenly curved downwards and backwards, and lies close to the under surface of the thorax and between the fore pair of legs. It consists of a jointed process (a), which is grooved upon the upper side, and in this groove there are four setæ (b), or bristle-like organs, which are covered above, at their base, by another appendage (c), which is supposed to be analogous to the upper lip or labrum of mandibulate insects; whilst the four setæ probably represent the mandibles and maxillae, and the jointed process the labium. In the figure, the setæ (b) are represented as disengaged from their sheath (c), and the labrum is lifted up. When in the ordinary position these organs form to gather a tube, by means of which the juices of plants or animals are extracted and conveyed to the esophagus.

The insects belonging to the second family (Hydrocorisæ) live, as their name implies, in the water, and they prey upon other insects.

The two families which have just been characterized are by most entomologists regarded as sections or subsections rather than families; the latter is in fact an aberrant group, the former containing by far the greater portion of the species. Regarding them therefore as sections, they may be divided into the following families:

Geocorisæ.

[Hydromorhipidæ.]

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Geocorisæ.

2. Pentatomidæ.
3. Coriscæ.
7. Hydromorhipidæ.
4. Acanthiidæ.

Hydrocorisæ.


HEMITONE, an interval in antient music, the ratio of which is 243.

HEMLOCK. [Contum.] HEMP. [Canapa.] HEMP. Our supplies of this article are almost wholly brought from Russia. Of 586,032 cwt. exported in 1835 into the United Kingdom, 536,458 cwt. were shipped at St. Petersburg and Riga. Some trifling shipments were made at ports in the north of Germany and the Netherlands, and a small supply is brought from India. The total quantity of hemp imported in each of the ten years from 1827 to 1836 was—

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
</tr>
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<tbody>
<tr>
<td>1827</td>
<td>572,839 cwt</td>
</tr>
<tr>
<td>1828</td>
<td>504,130 cwt</td>
</tr>
<tr>
<td>1829</td>
<td>374,932 cwt</td>
</tr>
<tr>
<td>1830</td>
<td>506,770 cwt</td>
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<tr>
<td>1831</td>
<td>530,820 cwt</td>
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</tbody>
</table>

The price of hemp fluctuated exceedingly during the war. While the ports in the Baltic were closed against us it became.

* The third joint is to be found (as least in some of the species, if not all) within the apex of the tibia.
came exorbitantly dear. In the year 1792 the price was 23 fl. per ton, and in 1808 it had risen to 118 fl., under the restrictions imposed on the trade of this country by the Milan and Berry decretals. By this advance the ingenuity of mercantile men was so stimulated, that the obstacles raised by the governments then subject to the dictation of France were overcome, and the importations, which in 1790 were 225,057 cwt. in 1808, 858,875 cwt. in 1809, and 953,779 cwt. in 1810, when the price fell to 58 fl. per ton, which rate was below the cost, including the exorbitant freight to which it was subjected. Shortly after this the price had dropped between 24 fl. and 50 fl. per ton; during the last few years it has scarcely ever gone beyond 30 fl. per ton.

HELMERHUYS, TIBERIUS, son of a French physician, was a writer. He entered the university of that town in his 14th year, and studied theology and philology under Braun, Oriental literature under Schultens, and mathematics and philosophy under Bernoulli. He afterwards went to Leyden to hear the lectures of Perizonius on ancient history; where he was engaged to put in order the MSS. belonging to the university library. In his 19th year he was appointed professor of mathematics and physics at Amsterdam, and shortly afterwards undertook to complete an edition of Pollux which Lederlin had left unfinished. Bentley in two letters to Helmerhuys pointed out the faults of this edition; which so much discouraged Helmerhuys that he did not open a book for reading for many years. Consequently he resolved to acquire an accurate knowledge of the Greek language, and for that purpose read through all the Greek writers in chronological order. In 1722 he succeeded Lamberti as professor of the history of the Greeks, and in 1740 removed to Leyden, where he was also professor of the same language. He died 7th April, 1766.

Helmerhuys did not write much; but he was an accurate scholar, and it was principally owing to his reputation and exertions that the study of the Greek language, which had been greatly neglected in Holland, again became general in that country. He introduced what had been called the Petrologiae, into the universities of Holland for a long time, and which is fully developed in the writings of Lennep. Helmerhuys was not only a good classical scholar, but he was acquainted with several of the Oriental languages, and had a considerable reputation for his knowledge of mathematics and philosophy.

The principal works of Helmerhuys are: the latter part of the edition of "Pollux" by Lederlin, 1766; "Lucianus Codex," 1735; "Plutus" of the Aristophanes, 1744; "Latin Orations," published by Valckenier, 1784; Latin translation of "The Birds" of Aristophanes, in the edition of Kuster; "Notes and Emendations on Xenophon of Ephesus," in "The Library," vol. I. Amsterdam. He also edited the early part of the edition of Lucian, which was completed by Reitz.

The life of Helmerhuys has been written by Ruiken. This work has been reprinted at Leipzig, together with the life of Wyttenbach, edited by Lindemann, 1802.

HENNAULT, CHARLES JEAN, born at Paris in 1685, was the son of a fermier-general. He showed at an early age a taste for literature, and wrote several poems. Being made intendant-general of the queen’s household, he became by his pleasing address and suavity of manners a great favourite with the high society of the capital. He was also appointed secretary of the Court of Cassation, and was made a member of the French Academy. At the age of fifty he withdrew from the fashionable world, and gave himself up entirely to study and to practices of devotion; but his devotion was from monitory counsels or superstition. He died at Paris in 1770. Not many years before his death he wrote to Voltaire, with whom he had been on intimate terms, a serious letter representing to him the impropriety and bad taste of his continual religious exercises. (Correspondance de Mad. de Daffand, the 33rd letter of those addressed to Voltaire.) The work for which Hennault is best known is his "Agréé Chronologique de l’Histoire de France," which is a very good model of works of this kind. It has been through numerous editions, and has been translated into several languages. In two small volumes the author has registered under each year every event of any importance in the annals of the French monarchy, from its first establishment to the death of Louis XIV.; with a happy conciseness of expression he has cleared up many doubtful or contested points, and has given many wise, moral, and political reflections on the character of men and times. The arrangement is clear, and the hand of a man deeply versed in the laws and the records of his country is visible throughout the work. At the beginning of every reign he exhibits the policy of the preceding, and the result of the past, and at the end of every dynasty he adds an interesting dissertation on the social, civil, and intellectual condition of France at the time. A good index completes the work. Hennault had also a copy of the 8th edition of "The Recueil Chronologique de l’Histoire de France de 1759 jusqu’a 1819," 1 vol., 8vo., Paris, 1823, in which all the multiform events of those thirty years are registered in due order. Hennault wrote also "Histoire Critique de l’Etablissement des Français dans les Gaules;" and several dramatic works collected under the title of "Pièces de Théâtre," 1 vol. 1770.

HENRI, for his kingly title. HENDECAGON, a figure of eleven sides. For the regular hendecagon see REGULAR FIGURES.

HENLEY on Thames. [ONFORDSHIRE.]

HENLEY in Arden. [ARDEN; WARRICKSHIRE.]

HENNEBON. [MORBIHAN.]

HENRI I. of France, son of king Robert, and grandson of Hugues Capel, succeeded his father in July, 1031, being but 14 years of age. His reign was prolonged to the year 1052, when, by a mischance in battle, he was killed. His death was occasioned by the treachery of Provence, who wished to favour her younger son Robert, excited a civil war, in which Eudes, count of Champagne, and Baldwin, count of Flanders, took her part, while the rest of the kingdom adhered to Henry. The event was decided by Henry in defeating several rivals who claimed the dukedom. A new pretender however arose some time after in the person of William of Arques, cousin to the late duke; and Henri, who had become jealous of the power of William the Bastard, assisted his competitor, who however was in the end defeated by the Bastard about the year 1047. Henri married, in 1044, Anna, daughter of Jaroslav, duke of Russia. From whom he had a son, Philip, who succeeded his father Father Francis I. in 1054. In 1050 he concluded the war which was then pending with England, which gave up to him Boulogne for the sum of 400,000 crowns. About this time Mary Stuart, the queen of Scotland, then a minor, came to France, under the guardianship of her uncles of Guise, and was betrothed to Francis, son of Henri. In 1052 Henri assisted Maurice, elector of Saxony, and Albert, marquis of Brandenburg, who had united for the defence of the religious and civil liberties of Germany against Charles V. Henri invaded Lorraine and took Metz, Toul, and Verdun, which were from that time annexed to France. It is curious to see how the French government, in 1056, having taken the town of Toul, put up arms for the professed purpose of supporting the Protestants of Germany. After the abdication of Charles V. the war continued between his successor Philip II. and the Emperor; and it was during this period that the Count of the Constable Montemorency, were defeated by the Spaniards at the battle of St Quentin in 1357; the French arms were likewise unsuccessful on the side of Italy, where the duke of Alba commenced the Spanish war. The treaty was between Margaret, Henri’s sister, and the duke of Savoy. The festivals given on this occasion had a tragical end. Henri was accidentally wounded at a tournament by the count of Montgomery, with the shaft of his broken spear.
HEN HEN

which struck the king on the right eye. Henri died shortly after, July 10, 1559. - By his wife Catherine de' Medici he had thirty-five children, who followed him in succession to the throne, beginning with the eldest, Francis II. He also left several children by various mistresses. He had none however by his principal female favourite Diana de Poitiers, who bore him two sons, the brothers Charles IX. and Henry, afterwards Henry III., who survived him. The great influence of the Guises began under his reign. [GUISH, Dukes of.]

HENRI III., born at Fontainebleau in 1551, was the third son of Francis I., and brother to Charles IX., when he was called the Duke of Anjou, he fought courageously at the battles of Jarnac and Moncontour against the Huguenots. In 1573 he was elected king of France, and in 1578 he married the beautiful Mary of Guise; but a few months after, upon hearing of the death of his brother Charles IX., he suddenly quitied Poland and returned to France, where he assumed the title of Henri III. His reign was marked by the decline of unworthy favourites. A mixture of bigotry and debauchery, of vice and folly, characterized his court. Under his weak administration factions and civil and religious wars desolated France; and instead of checking party spirit he was himself the leader of the majority party. A vendetta between the two parties, that of the Guises under Henri of Guise, and that of the Huguenots under Henri of Navarre, and the war which ensued was approved by the Duke of Guise, who reviled in favour of the Guises, and Henri had recourse to assassination, by causing the Duke of Guise and his brother the cardinal to be murdered. Most of the towns of France, including Paris, gave up their foreign garrisons to Henry and instituting his trial; and the pope excommunicated him. In this emergency Henri felt for a moment his old spirit revive; he applied for assistance to his generous enemy Henry of Navarre, who, without any stipulation on his part, granted him the Duke of Mayenne, the leader of the League, and the two kings laid siege to Paris. During this siege a fanatical Dominican monk, named Jacques Clément, excited by the devil, was thenceforward by persons who thought it an evil deed to have him taken prisoner and executed. The death of Henri III. was a signal event in the history of France, and the dynasty of Valois, which had reigned in France since the accession of Philip VI., in 1328.

HENRI IV., king of France and of Navarre, born at Pau in the Bearn, the 15th December, 1553, was descended in a direct line from Robert, count of Clermont, sixth son of Louis IX., who married, in 1572, Beatrix of Bourbon, to whom she was betrothed by the mother of her husband, the marquis of Montmorency, who should bear the name of Bourbon. [BOURBON.] Henri's father, Antoine de Bourbon, married Jeanne d'Albret, only daughter and heiress of Henri d'Albret, king of Navarre, under whose dominion the Basque country was French, and the mother of his wife. Henri IV., during his youth, was trained up to hardness and privations in his native mountains, after which he was sent to the French court till 1566, when his mother Jeanne d'Albret received him to Pau and had him instructed in the Calvinist communion. In 1569 he was acknowledged at La Rochelle as the leader of the Calvinists, and fought at the battles of Jarnac and Moncontour in the same year. After the peace of 1570 he was invited to the French court, and two years after he married Margaret, sister of Charles IX. By the death of his mother, June, 1572, he became king of Navarre. At the massacre of the St. Bartholomew, which followed close upon his marriage, Henri's life was spared on condition of his becoming a Roman Catholic; but as the court did not trust a conversion which was extorted by force, he was kept under watch as a suspect for about three years. Having escaped in 1576, he put himself at the head of the Calvinists, and began a series of hazardous and hard-fought campaigns, interrupted by short cessations of arms whenever Henri III. of France made promises which he or the Guise never failed to break. Henri won the battle of Coutras in Guayenne, October, 1587, in which his antagonist the Duke of Joyeuse was killed. In 1589 he made his peace with Henri III. and joined him against the League. Henri III. before he expired named the king of Navarre as his successor, telling him at the same time that he wished him a quieter reign than his own had been. Henri however was opposed by one half of the kingdom, which obeyed the Duke of Mayenne, whom the parliment of Paris had appointed Lieutenant-General, and he was obliged to raise the siege of the capital.

He soon after, in the battle of Parnes, lost at Ivry, received some reinforcements from Elizabeth of England, and pursued the war with renewed vigour. At last in 1593 Henri began negotiations with several of the leaders of the League, and in August of that year a commission was induced to make a public profession of the Catholic faith at St. Denis on the 25th of July of that year. In March 1594 Paris opened its gates to him, and Rouen and the other cities of Picardy had been submitted. In the same year, 1594, Charles, duke of Guise, likewise made his submission. In the following year the Pope acknowledged Henri, and in 1596 the Duke of Mayenne submitted. It was not however until after the assassination of the Duke in May 1597, after his assumption of the crown. The peace of Vervins, concluded in that year, put an end to the interference of Spain in the affairs of France. From that time till his death Henri enjoyed peace, and took up a short campaign against the Duke of Savoy in the year 1599, which terminated in favour of the French arms.

The king applied himself to reform the administration of justice, to restore order in the finances, and to promote industry and commerce. He established the strength of the state. He introduced plantations of mulberry-trees and the rearing of silkworms, and he began the botanical garden of Montpellier. He embellished Paris, and founded the hospital of Saint-Louis. He was a member of the order of the Knights of the Garter, and he added to the collection in the royal library, and encouraged and rewarded men of learning, among others Grotius, Isaac Casaubon, Joseph Scaliger, De Thou, Malherbe, &c. During his reign France took an active part in the struggle between the United Provinces of the Netherlands and the Catholic powers, and the king supported the independence of Holland, and took part in the negotiations of Germany against the encroachments of Rudolf II. Henri was crowned for his change of religion, and by no means without propriety. The king was the tireless champion of the religion of his fathers; he was not capable of serious religious meditation, and that he knew as little of the religion which he forsook so as that which he embraced. In his long conference at Chartres in September, 1593, with Duplessis Mornay, which took place after his abjuration, he told his friend that the step he had taken was taken not only of prudence, but of absolute necessity; that his affections remained the same towards his friends and subjects of the Reformed communion, and he said that one only of the causes which led him to entertain doubts about a union between the two religions, which, he observed, differed less in essentials than was supposed. To which Duplessis replied, that no such union could ever be effected, that community of action was the condition of the theory, which his Protestant subjects had so long laboured, and such it would have proved, had the provisions of the edict been honestly and fully carried into effect, and had not the king's intentions been frustrated in great measure by the intolerance of the different parliaments and courts of justice.

Henri found the finances of the kingdom in a most wretched condition; of 150 millions of livres taken from the people only 20 millions reached the king's coffers. His able minister Sully had the task of restoring order in this financial chaos. He adopted the method of letting the taxes by public auction; he entered into a rigorous examination of the accounts of foreign nations; he abolished the old staples, and introduced forms of accounts which were to be filled up and accompanied with the necessary vouchers, so that no pretence was left for obscurity or omission. During a ministry of fifteen years he reduced the taille from 5 millions of livres, and other impositions were abolished; he redeemed the public debts while he added four millions to the king's revenue, and left 35 millions in the treasury, besides a value of 12 millions in arms and ammunition, 5 millions expended in fortifications, and above 20 millions on public works. [Histoire Générale de Henri IV., Histoire Financière de la France, Paris, 1829.] The sympathy which Henri felt and showed for the humble classes of his subjects, whose predecessors had looked upon as an inferior race of beings, would alone be sufficient to account for his popularity with the French people, a popula-
rity which has survived all the eventful changes in that country. By his death the monarchy whose memory is still popular in France. His brilliant qualities, his tastes, even his failings, such as his excessive gallantry, were national, and they flattered the self-love and the vanity of the people. He was, says the President Hénault, his overlord and minister, 'a disgrace to a king and a monarch.' He was the very essence of that frankness the most dexterous policy, to the most elevated sentiments a delightful simplicity of manners, and to an undaunted courage a most touching feeling of humanity and a strong and just indignation in case of wrong, if he forego punishment, as in the case of Biron, he did it with extreme regret. His life was repeatedly attempted by assassins who were stimulated by the old fanaticism of the League; and a royal edict, dated to death by the purge, on the 14th May, 1616. He was succeeded by his son Louis XIII. under the guardianship of his cousin Maria de' Medici. The grief for his death was deeply felt all over France. (Mémoires de Sully; Hénault and the other French historians; Thomas, Essais sur les Étapes; and a collection of Henri's most remarkable sayings and doings, entitled L'Esprit de Henri IV., Paris, 1769.) Longueil de France, in the 4th vol. of his Journal de Henri III., publishes many letters of Henri IV. When the royal tombs at St. Denis were ransacked in the time of the Revolution, 1793, the body of Henri IV. was found in very good preservation; his features appeared hardly changed. A work of English and French scholarship, as he said it, was a work of Beaucaire, or the Scholar, was the fourth and youngest son of William the Conqueror, by his queen Matilda of Flanders, and was born in 1068 at Selby in Yorkshire, being the only one of his brothers to escape the Conqueror with the name of the English crown by birth. His surname attests that he had received a more literary education than was then usual given either to the sons of kings or to laymen of any rank; and this advantage was of no small ability for his order. Of an early age he and his next brother, William, appear to have monopolized the favour of their father to the exclusion of his eldest son, Robert Richard, the second son, died in his father's bed; his brother's first wife was Miss. The Conqueror's arms are incorrectly attributed to his indignation at having one day had a pitcher of water thrown down upon his head, in mockery or sport, at the town of L'Aigle in Normandy, by his two younger brothers, and at his father's refusal to punish them for the insult. If this incident took place at all it must have been when Henri was a mere child, not beyond his eighth or ninth year;—his brother William was about twelve years his senior. In the last days of their father's reign jealousies arose between the two brothers; and William, the younger, quarrelled the father seems to have attached himself to the one who was on the whole most like himself in character. At his death in 1087, the Conqueror expressed his wish that William's sons should be crowned as kings of England, and only left Henri a legacy of 5000l. of silver. With 3000l. of this money he so soon after obtained, from the faculty of his brother Robert, the whole of the district of Coutances, comprising nearly a third of Normandy. Although in the first instance a quarrel between the two arose out of this bargain, they were afterwards reconciled; and in 1090, when the intrigues of William, now king of England, had excited a revolt of the Norman barons against Robert, Henry came to the assistance of the latter, and was chiefly instrumental in putting down the insurrection. Upon this occasion Henry gave a striking proof of the relentless determination of his character. Comming, with the chieftains of Rouen, one of the most active and powerful of those who had taken part in the treason, having fallen into the hands of his enemies, Duke Robert thought it punishment enough to imprison him to perpetual imprisonment, but Henri, deeming it expedient to have better security against his future attempts, led the unfortunate man, on pretence of giving him a view of the surrounding country, to the highest tower of the castle in which he was confined, and there threw him over the battlements. When Robert escaped the following year, they turned their united arms against Henry, who was soon compelled to evacuate even his last stronghold, the fortress built upon the lofty rock of St. Michael, after which he wandered about for some two years in a state of nearly complete destitution. At length, on the invitation of the inhabitants of the town of Domfront, he assumed the government of that place; and it would appear that from this point he gradually raised himself to the repose of nearly all the territory that he had lost. He also became reconciled to Rufus, and was in England and in the House of Parliament on the 3rd of August, on which day he was crowned in Westminster Abbey by Maurice, bishop of London. The next day he published a charter confirming the rights and liberties of the clergy and the borough of Dover, which privilege had been restored by the Conquest. Henry from the first put forward his English birth as one of his chief claims to acceptance with his subjects; and he hastened to strengthen this title by an act which almost amounted to a tacit admission that the rights of the old Saxon line were not yet extinct, his marriage with Matilda, daughter of Malcolm, king of Scotland, and niece of Edgar Atheling, which, after a delay occasioned by the reluctance of the princess to unite herself to the suppliant of her house, and by the circumstance of her having been at least designed to pass her days as the inmate of a nunnery, if she had not actually taken the veil, was at last celebrated on Sunday the 11th of November, 1100. It is evident that the marriage affected a complete change of manners, laying aside the open licentiousness in which he had heretofore indulged, and with much apparent zeal clearing the court of the mismanagement and misgovernment of which the previous show of reformation, like most of his other professions, was soon found to be merely an expedient adopted for the purpose of the moment. The haranguing of a Councill of the realm opens with the contest between Henry and his elder brother for the crown. At the moment of the death of Rufus the gallant and thoughtful Duke Robert, after a brilliant career of arms in the Holy Land, was dead, and his son, born in the home of the Saxons and the Normans in the Duchy of Bavaria, had come over to England, which was a considerable force at Portsmouth, soon after Whitsuntide, a.D. 1101. But this effort ended in nothing; Henry, having overthrown and deprived of his property his two brothers, and taken over his brother before he could reach Winchester, of which it was his object to obtain possession. After some negotiation the two princes met in a vacant space between the battle of the army of Robert and the French of Robert. Although the differences on the terms of Henry retaining England, and Robert Normandy, with the proviso that, if either died without legitimate issue, the survivor should be his heir. The easy temper of the one brother and the craft of the other are equally conspicuous in this treaty, by which Henry extricated himself, at little or no cost, from all the inconveniences and hazards of his present position, while Robert at once relinquished the whole object in dispute, laying only what part of it he may have conceived was made over to him in his qualified and precarious reversionary right. It was by no means Henry's intention however that he should escape even at this sacrifice. Several of the English barons who possessed estates in Normandy, anxious for their own interests to secure the union of the two countries, had taken part in Robert's attempt: it was one of the stipulations in the treaty that a full pardon should be extended to all the subjects of either who should have gone over to the other; but no sooner was the duke returned to Normandy than Henry proceeded to take systematic measures for effecting the ruin of the leading barons who had assisted him. In a series of petty insurrections in England, which he easily crushed, extinguishing thereby, one after another, all the persons that were most obnoxious to him, and acquiring their estates to distribute among his ungrateful and his devoted adherents. These proceedings could not fail to rouse the indignation of Robert; and Henry was not slow in taking advantage of the courses into which his irritated feelings drove him, to declare that the peace between them was for ever at an end. Circumstances were now in every
way much more favourable for the English king than when he formerly contrived to avoid a contest with arms with his brother: on the one hand, some years of possession had established him more firmly on his throne; on the other, the strength of Duke Robert was broken and wasted, and his extravagance and misgovernment had both dissipated his inheritance, and made it the предмет of every man's envy and covetousness. It was the imperious and arbitrary will of his sovereign Henry. Henry, in the first instance, called upon him to cede the duchy for a sum of money or an annual pension: he then (a.d. 1105), on this demand being rejected, wrote to the king of France, and in a letter to the Holy Roman emperor, the king of Hungary, and the king of Anjou, and speedily made himself master of many of the chief places of strength.

The following year the king, who had returned home, again entered the sea with many numeroius forces, and in the month of August, when he concentrated the siege of the castle of Tencereh: Robert, after some time, advanced to its relief; and on the 28th September a long and sanguinary battle was fought between the two brothers before the walls of that fortress, the result of which was the utter ruin of Robert and his cause. He himself, after a last splendid display of the heroic valor which he had always shown, was taken prisoner, with 400 of his knights. He was condemned by his brother for condemnation to life. According to Matthew Paris, an unsuccessful attempt which he soon after made to effect his escape was diabolically punished, on the order of his merciless brother, by the execution of his wife and the blind boy who held before his eyes, which were kept open by force, until they were burned blind; and in this state the miserable prince survived for twenty-eight years, dying in Cardif Castle, in the following year, 1128. In the meantime, not quite twelve months before Henry immediately after the victory of Tencereh, Henry was, without opposition, acknowledged their duke by the Norman barons. About the same time also was terminated by a compromise, for the present, the claim of the English to Normandy by Louis VI. of France, and pulp, earl of Anjou, acting in confederacy in support of the interests of William, styled Fitz-Robert, the son of Duke Robert, who had escaped the vengeance of his uncle, and became from this time a rallying-point for the friends of his father's house and the enemies of the English king. The war lasted for about two years, and was on the whole adverse to Henry; but he then managed, with his usual dexterity, to bring it to a close by a treaty, which restored to him all that he had lost, and for the present wholly detached the earl of Anjou from the cause of his young protégé. It had been agreed that this marriage should take place between William and the earl's daughter, but not until she was given up, and it was arranged instead that Matilda, another daughter of the earl, should be united to Henry's only son, Prince William of England. But Henry seems to have made this engagement with no intention of ever fulfilling it: as soon as it had served its immediate purpose, he showed in the most open manner his disregard of every stipulation of the treaty. The consequence was the formation against him of a second Continental confederacy, in which the earl and the king of France received the active and zealous co-operation of Baldwin, earl of Flanders. Another war of about two years followed, in which success inclined sometimes to the earl, sometimes to the king; but at last the earl of Flanders of a wound received at the siege of Eves, the succession of the earl of Anjou, again drawn off by a renewal of the propinquity for the marriage of his daughter, the idea of a confederacy in England; and, finally, the mediation of the pope, brought it also, in 1120, to a termination entirely favourable to the English king.

Immediately after this peace Henry's brightest hopes were turned to sudden want by the frightful calamity of the loss, on Friday, the 25th November, of the ship in which his son had embarked at Barfleur for England: with the exception of one individual, a butcher of Rouen, all on board perished, to say nothing of the whole barony of Normandy, which was by his half-brother Richard, his half-sister Marie, and the earl of Chester, with his wife and her brother, who were the niece and nephew of the king, among 140 of the members of the most noble houses of England and Normandy, of whom eighteen were females. Henry is said never to have been known to smile after this blow. It did not however extinguish his spirit of ambition. Two years before this he had lost his consort, the good Queen Maud; and a daughter, Matilda, married in 1114 to the Emperor Henry V., was now his only legitimate progeny. In the hope of male offspring, he determined to marry his eldest daughter Matilda, with the beautiful Adelasia, or Alice, daughter of Geoffrey, duke of Lorraine. He entered into an alliance when he found himself called to meet a new revolt in Normandy, exciting the loyalty of the barons of Anjou, who, now having lost all hope of the English marriage, had renewed his connection with Fitz-Robert, and again alluded to him his younger daughter Sibylia, putting him in the mean time in the custody of Sibylia of Mons. But this movement was very soon put down by his instructions; and it was determined once more to gain over the fickle and vassal earl of Anjou, and so to deprive the Norman prince of the hand of the fair Sibylia, when he had it almost in his grasp. When four or five years of his second marriage had passed without producing any issue, Henry determined upon the bold enterprise of endeavouring to secure the succession to his dominions for his daughter, the empress Matilda, who had become a widow by the death of her husband in 1125. On Christmas-day, 1126, she was unanimously declared his heir, in a great council of the lords spiritual and temporal assembled at Windsor Castle. The marriage was consummated, by being solemnized for the Holy Roman emperor in 1127. He married to Geoffrey, surnamed Plantagenet, the son of Fulk, earl of Anjou, to whom, although only a boy of sixteen, his father had remarried that earldom on his departure from the country, and who had not quitted the sceptre of his late- deposed king of Jerusalem. Soon after this settlement of his daughter, Henry was relieved of a source of perpetual annoyance and apprehension by the death of his nephew William Fitz-Robert, which took place 27th July, 1128, in the twenty-sixth year of his reign. He had abandoned by King Louis of France, who, after giving him in marriage Joan of Morienne, the sister of his queen, but he at first put him in possession of the counties of Pontoise, Senlis, and Chaumont, and had taken him in his favor and favor of the Frankish church, and had, by the pious Charles the Good, had invested him with the earldom of Flanders. The intrigues and the money of Henry however speedily stirred up against him a revolt of a party of his Flemish subjects, who put its Toulou, and Thierry, landlord of Alnaco, at their head, resolved to drive him from the country; and it was in a battle with Thierry, under the walls of Alast, that, in the moment of victory, received the wound of which 1121 exposed the life of the earl of St. Omer. It was not however till March, 1132, that Henry's longings for a grandchild were gratified by the birth of Matilda's first child, Henry, styled Fitz-Empress, afterwards Henry II. The natural son of Henry and William, were born in the course of the next two years. These events had been preceded by such divisions between the ex-empress and her husband as at one time occasioned their separation; and now that they were again living together, Henry and his son-in-law quarreled about the Norman duchy, of which the latter wished to be put in immediate possession, according to a promise which he said had been given on his marriage. From these family broils Henry was only delivered by his death, which took place at Rouen on Sunday, the 1st December, 1135, being the seventh day of an illness brought on by eating too much from a relapse, after a day spent in hunting. He had completed the 57th year of his reign, and 35 years of his earldom of Anjou. He had reigned through the maximum of his power and influence. Besides the son and daughter born in wedlock that had already been mentioned, the genealogists assign to Henry I. the following natural children:—1. Robert, earl of Gloucester; 2. Eustace, earl of Hertford; 3. Richard, earl of Pembroke and de Tracy; 4. Fitz-Herbert; 5. Edith, daughter of Sigewolfe, a Saxon nobleman; 6. Gilbert; 7. William, surnamed de Tracy; 8. Henry Fitz-Herbert, who was killed in battle in 1157, also, according to Talbot, a natural son of Eustace de Tracy (otherwise called Maud, or Ada), countess of Perche, another of those who perished in the shipwreck of 1120; 9. Maud, married to Conan the Gross, earl of Brittany; 10. Juliana, married to Eustace de Breteuil, earl of Puisin.
Normandy; 11. Constance, married to Roselin, Viscount of Chamboulain in France; 12. another daughter, married to William Goet, a Norman; 13. another, married to Matthew Montmorency, the founder of the illustrious French family of that surname; and 14. Sibylia (otherwise called Elizabeth), who was married in 1167 to Alexander I. of Scotland, and died in 1225, by Elizabeth, wife of Gilbert de Clare, earl of Pembroke, and father by her of the famous Strongbow. (See accounts of these personages and their descendants in Fisher's Companion and Key to the History of England.)

The character of Henry is sufficiently indicated by the facts that have been detailed. In a moral point of view it was detestable, but in the line of policy and craft it evinced singular ability. He was a great statesman, who, in the midst of an unscrupulous ambition however he cherished a love of letters, and in his hours of leisure was fond of the society of learned men. It must be admitted also that his government and establishment, particularly in the realm of laws, was, if not, of the Saxons, by Henry, and by his charter, the example of that series of subsequent royal concessions, the same in form though much more extended in amount, which lie at the foundation of constitutional liberty. There can be but little doubt that the country made considerable social progress in his reign, undisturbed as it was by any internal commotion, and enjoying, notwithstanding much oppression on the part of the crown, probably a more regular dispensation of justice between man and man, from disorder and violence, than it had known since the coming over of the Normans. Henry I. was succeeded on the throne of England by Stephen.

HENRY I, fourthly named Fitz-Empress, was the eldest son of Geoffrey Plantagenet (so named from a spire of broom — in Latin, planta genista — in French, plante genêt — which he used to wear in his cap), earl of Anjou, and of Matilda, daughter of Henry I. of England, whose husband had been the Emperor Henry V. (Henry I.) He was born at Le Mans, the capital of his father's dominions, in March, 1133. In the struggle between Stephen and Matilda for the English crown (Stephen), Matilda's husband Geoffrey had, by the year 1141, reduced nearly the whole of Normandy, and his infant son Henry had been acknowledged by the majority of the nobility of that country as the legitimate heir. In June of the following year it was, of the Saxon laws, and by his charter, the example of that series of subsequent royal concessions, the same in form though much more extended in amount, which lie at the foundation of constitutional liberty. There can be but little doubt that the country made considerable social progress in his reign, undisturbed as it was by any internal commotion, and enjoying, notwithstanding much oppression on the part of the crown, probably a more regular dispensation of justice between man and man, from disorder and violence, than it had known since the coming over of the Normans. Henry I. was succeeded on the throne of England by Stephen.

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back the Welsh from those parts of the English territory which they had seized during the reign of Stephen, and even, as it would appear, compelled the princes of North and South Wales to acknowledge him as their feudal superior. His next attempt was upon the great French earl of Toulouse. False claims to the duchy of ancient Aquitaine, whose grandfather William, duke of Aquitaine, had married Philippa, the only child of William, the fourth earl of Toulouse. He was here opposed both by Raymond de Gillespie, the claimant to the duchy of ancient William, in whose line the principality had descended for nearly a hundred years, and by Louis of France, whose sister had married Raymond, and to whom, besides, the progressive aspirations of Maine, the state of the country seemed a subject of more serious alarm. Henry's expedition to France in support of this claim is memorable for the introduction of the practice of committing the military service of the vassals of the crown for a payment in money, an innovation, and the credit of which is attributed to Becket, recently elevated to the place of chancellor of the kingdom. [Escoge.] The contest which ensued was suspended by a peace in May, 1166, by which Henry was allowed to return, and although it soon broke out anew, it was after a few months put an end to by a second peace, concluded in 1162 by the mediation of pope Alexander III. The power with his hands was now strengthened by the death of the archbishop of Canterbury, forthwith proceeded to assume the bearing of a rival monarch, and made his former master feel that he was only half in the dominions he called his own. The death of the archbishop, between the church and the state was not even terminated by the murder of Becket, 29th December, 1170; the blood of the martyr crying from the ground was found to be still more powerful than that which had been his living voice. In 1174 Henry performed a great act of magnanimity by releasing the unintentional instigator of his slaughter; and two years after, the famous constitutions of Clarendon, passed in 1164, by which the clergy had been made amenable to the civil courts, was a compromise between the church and the state. The marriage of the sons of King Philip with the princesses of the royal house of England, and the marriage of his daughter, Constancia, between whom, young as they both still were, the marriage ceremony was now solemnized for the sakes of this arrangement. On the 10th of September, 1161, Henry married, the ex-empress Matilda, died at Rouen. Some further hostilities in which he now became involved with the French king were, before producing any important result, terminated by a new peace concluded at Runnymede, 13th January, 1169. By this treaty it was arranged that Henry, the French king, his daughter, and the eldest son, should do homage to Louis for the earldoms of Anjou and Maine, and that his second son Richard should in like manner hold the duchy of Aquitaine of the French king, and espouse a daughter to the French king's pleasure. The news of the marriage of the prince of Wales with Constance, the daughter of Henry, was solemnized by the marriage of the eldest son of Louis of France with the princess Matilda, who was afterwards married to the future Edward I. But the greatest event which divided the manifold activity of King Henry with the affairs of Becket was the conquest of Ireland, which was begun in 1169 by a body of procateurs. They ascended through the country, during which he received the submission of the princes of all parts of that except Ulster, and holding his court or assembling councils at Dublin, Cashel, and elsewhere, sailed for London, from where he returned to England, Monday, the 17th of April, 1172. The national spirit however recovered itself after this first prostration, and a prolonged struggle ensued between the people and their overlords; but the acquisition of Ireland was finally sealed by a formal treaty concluded in 1175 with Roderick O'Connor, considered the head king of the country, in which he consented to become Henry's liege-man, to pay an annual tribute, and, although he was still to retain his nominal royalty for his life, to hold his crown in subjection to the English king. Much of the remaining portion of Henry's life and reign presents an involved and deplorable scene of family discord and contention; sons against their father, wife against husband, brother against brother. His eldest son Henry had not only been invested, as mentioned above, with the earldoms of Maine and Anjou, but his eldest son John, who was born in 1167, had, after the custom which prevailed in the French monarchy, been, as heir apparent, solemnly crowned in Westminster Abbey on Sunday, 15th of June, 1170. On this account that prince is in old writings sometimes styled Henry III., and his common title during his life was Becket, this date the junior or younger king; that of the senior or elder king being given to his father. In 1172 the ceremony of his coronation was repeated, his wife Margaret of France being this time present in person. The disaffection of the barons against the death of Becket had been speedily followed (in March, 1173) by the flight first of the prince, then of his younger brothers Richard and Geoffrey, to the court of Philip of France. Richard considered himself entitled to Aquitaine in virtue of the homage he had performed to Louis for that duchy after the peace of Montmirail, and Geoffrey founded on his marriage and his marriage settlement. With the death of Henry the son that was the young king, and the infancy of the two sons of the queen, the barons might have thought that a new and more just basis of government in England was to be found in the hands of the queen and her sons. The absence of Henry, and the presence of his wife, Margaret of France, during the first two years of her reign, and that in which his greatness stood at the highest. With his ancestral dominions of England, Normandy, and
Hen undisturbed by any rival claimant, for matrimonial acquisitions of Aquitaine and Poitou bound in the subjection of Ireland, he was secure. The effect of his alliance with Ireland, he was undoubtably at this time the most powerful of the European sovereigns, and from the proud and turbulent spirit of the princes led the way to a new succession of family wars. This time Richard took up arms against Henry and Geoffrey, because his father called upon him for the help of France for Aquitaine. A reconciliation between the brothers, effected by their father’s interference, only suspended hostilities for a few months; the old king and his son Richard were then compelled to take the field against the other two. After crossing his father and his youngest brother alternately about half a dozen times, Prince Henry was suddenly taken ill, and died at Château-Martel, 11th June, 1185, in the twenty-seventh year of his age. The resistance he offered to his son was feebly put forward. A solemn family reconciliation then took place, at which even Eleanor was released from her prison and allowed to be present. But it did not last for more than a few months; Geoffrey then, in consequence of his father’s death, was made lord of Anjou, rich in the court of France, where Philip II. was now king, and prepared for a new war; but before he could carry his design to execution he was, in August, 1186, thrown from his horse in a tournament, and so severely injured that he died in a few days after. No sooner was Geoffrey thus removed than his brother Richard hastened to the French court to take his place; but after unsuccessfully attempting to exact a new revolt in Aquitaine, he was compelled to throw himself upon his father’s clemency. A project of a new crusade, at the call of pope Clement III. in the beginning of 1188, for a moment united Henry and Philip; the impious Richard actually took the cross, treasury, carried away by the feeling which thrilled all Europe on the arrival of the news of the capture of Jerusalem by Saladin in the preceding September; but before the end of the same year the unhappy father saw his son again bearing arms against him in alliance with the French king. The pretext on the part of Philip and of Richard for this new war was Henry’s refusal to deliver up the princess Alice, the sister of the former, and the accursed bride of the latter, whose persons as well as part of her dowry he had for many years had in his possession. Richard pretended to believe that his father wished to marry the princess himself, and even asserted or insinuated that a nobleman’s honour had already fallen a sacrifice to Henry’s passion; it appears to be certain however that he restitution was only made a demand of the two confederates for popular effect, and was a very small part of the motives of Richard, having Philip for all his father’s Continental possessions, immediately proceeded to wrest them from the old man by the sword. Henry’s spirit seems now to have given way at last, and the resistance he offered to his son was feebly put forward. The pope made an attempt to bring about a reconciliation, which failed; in the end Henry was compelled to sue for peace, on which he and Philip met on a plain in the presence of the latter, when it was agreed, among other humiliating conditions, that all Henry’s vassals, both Continental and English, should do homage to Richard, in acknowledgment of his rights as heir apparent, and that all those persons who had taken his side should from that time be considered as his liegemen unless they should of their own accord return to his father. Henry was stretched on a sick-bed when this treaty was rend to him; but when he found in the list of those that had deserted him to join Richard, his trusted and favourite son John, whose fidelity till now he had never had cause to suspect, the discovery appears to have broken his heart; he turned himself to the wall, saying that all his interest in the world was now over. He was seen, removed to Chinon, on the Loire; and there, after a few days more of suffering, he died, 6th July, 1189, in the fifty-seventh year of his age and thirty-fifth of his reign. He was buried in the Church of Fontevrault, in presence of his son Richard, who succeeded him on the throne.

The character of this great king is a mixture of all the qualities, good and bad, naturally arising out of a strong intellect, a strong will, and strong passions. His early life was passed in the wars of Ireland and in the contest with John of Salisbury and Peter of Blois, both of whom have left us ample testimony, in their writings, how greatly they were dreaded by his brilliant and commanding genius. He was found at a time when it was licentious, and easily kindled to frantic excesses of rage, it must be admitted on the other that he was neither a cruel nor a vindictive or unforgiving enemy, and that he was far from already separated into the subdivisions out of which have sprung the present Courts of King’s Bench and Common Pleas (which is doubtful), the important institution of justices itinerant, or justices of oyer, as they were styled, that is judges making periodic circuits through the king’s dominions for the trial of causes, was now a permanent part of the judicial establishment of the country.

[Excels.] Another important legal improvement now introduced was the English law of the ancient nations, a departure from the old ceremonial of the grand seigneur, for the old ordeal of battle.

[Assizes.] The earliest of the English law-writers, Ranulf de Glanville, the supposed author of the Latin treatise De Legibus et Consuetudinibus Angliae, held the office of chief-justiciary in the time of Henry II.

To this reign also belong the 'Dialogue de Scaccario,' and the two collections of charters, &c., known as the 'Liber Niger' and the 'Liber Ruber.'

Henry’s children by his queen Eleanor were: 1. William, born 1152, died 1156; 2. Henry, born 28th February, 1155, died 11th June, 1183; 3. Maud, born 1156, married to Henry V., duke of Saxony, died 1189, a few days after her father; 4. Richard, who succeeded him on the throne; 5. Geoffrey, born 28th September, 1158, died 19th August, 1186; 6. Eleanor, born 13th October, 1162, married to Alphonso VIII., king of Castile, died 1214; 7. Joan, born October, 1164, married first to William, king of Jerusalem, September, 1195; and 8. John, who succeeded Richard as king. His illegitimate children were: 1. by the famous Rosamund, daughter of Walter, lord Clifford, William, named de Longuepere, and his wife, daughter of his wife Ela, daughter and heiress of William Beverse, died 1226; 2. by the same, Geoffrey, who became bishop of Lincoln, lord chancellor, and afterwards archbishop of York, and died 1234; 3. by the wife of Rolfchelv, Morgan, a churchman, who held the office of provost of Beverley.

HEN III., married of Winchester, from the place of the brother of Emperor Frederick, who had succeeded his son Henry, was born 1 October, 1206.

His father having died 16th October, 1116, the boy was,
honours, and the most lucrative offices in the kingdom. In the midst of the contest thus occasioned between the crown and the nobility, the political and national affairs were now commonly called parliaments, a renewal of active hostilities with France was brought about through a private resentment of Henry's mother Isabella, who, after the death of her husband, had remarried to Hugh, count of La Marche, to whom she had been espoused before she gave her hand to John: she had instigated La Marche to insult and defy Alphonse, count of Toulouse, the brother of John, by doing homage for the dauphin Louis and the French had been compelled to quit the country, their evacuation having been finally arranged in a conference held at Kingston 14th September, 1259. The expedition was a national calamity, for the government fell into the hands of Hubert de Burgh, who had greatly distinguished himself in the expulsion of the foreigner, and Peter des Roches, bishop of Winchester. De Burgh however and the bishop, who was not an Englishman, but a native of Poitou, from condottieri soon became rivals, and their attempts to throw each other down at length led, in 1254, to the resignation of Des Roches and his withdrawal from public life. Meanwhile, on the 14th May, 1259, Henry, in consequence of some doubts being entertained about the efficiency of the former ceremony, had been crowned a second time at Westminster by Langton, and that solemn act was then celebrated by the union of England and alliance with Scotland, which had subsisted ever since the departure of the French, were made closer and firmer by the marriages of Alexander II., the king of that country, with Jane, Henry's eldest sister, and of De Burgh with the daughter of a peer; a celebration which had an influence. About the same time Pandulf, who had succeeded Guazo as papal legate, left the country, which was thus practically freed from the dominion of Rome, although that power was by no means entirely evicted, and by the marriage of Alphonso, king of Castile, with the daughter of John, which was effected by these advances; the parliament was found as impracticable as ever, and the king resumed his arbitrary courses. In 1253 he succeeded in obtaining a grant of money by consenting to a solemn ratification of the great charter; a ceremony which had already been performed in the course of the reign; and this enabled him to proceed at the head of a military force to Guisene, where a revolt against the English dominion had been excited by Alphonso, king of Castile, the dissident, seduced by the arrangement of a marriage between Henry's eldest son Prince Edward, and Eleanor, the sister of Alphonso. [Edward I.] After this Henry engaged in a project which involved a complication of difficulties, the acceptance of the nominal crown of Sicily for his second son Edmund from pope Innocent IV., who pretended to have it at his disposal in consequence of Frederick II., the late king, having died (a.d. 1254) in a state of excommunication, and who had ever since been hawking about the empty title among the princes of Europe, without finding any one simple enough to close with his proposals till he applied to the king of England. The exorbitant extent to which Henry was prepared to carry the scheme of meeting his engagements with the pontiff raised a spirit of resistance, which grew stronger and stronger, till it broke out into an open revolt against the supremacy of the crown. The discontent was at first directed against the old parliament at Oxford, 11th June, 1258, by adjournment from Westminster, where it had met on the 2nd of May previous, and placed the whole authority of the state in the hands of a committee of government, consisting of twelve persons appointed by the barons and as many by the king. The leader of the barons on this occasion was the famous Simon de Montfort, who was a Frenchman by birth, being the youngest son of the Count de Montfort but who, in right of his mother, had succeeded to the English earldom of Leicester, and had so long ago as the year 1239 married Eleanor, countess-dowager of Pembroke, a sister of Henry. After the enjoyment however of a long course of court favour he had quarrelled with and was insulted by his royal brother-in-law in 1252, and although they had been apparently reconciled, it is probable that the barons, who were then on tour with the king, had been distinguished in either. From the imperfect accounts and partial temper of the annalists of the time, it is difficult to obtain a clear view of De Montfort's character and objects; but if his purpose was to reasonably suspected to have acted upon him with its natural tempers to form designs more ambitious than he could venture openly to profess, it must be admitted that he stands remarkably free from any well-established or even probable defection affecting his actual conduct. He was undoubtedly a person both of eminent ability and of many excellent as well as proper moral qualities. His cause was also undoubtedly in the main that of the national liberties, and he appears to have had through the national voice and heart with him. He and his friends soon
contrived to monopolize the whole power of the committee of government, and compelled the principal nominees of the king to relinquish their situation. The downfall of one faction enabled Henry, in the beginning of the year 1261, altogether to throw off the authority of the committee of government; and although the parliamentary party was on this occasion crushed by Prince Edward, it was for the present effectually put down, De Montfort himself being obliged to take refuge in France. He returned however in April, 1263, and being now supported by Gilbert, earl of Gloucester, his late rival, proceeded to procure the quash of the crown with the force of arms. Henry had now his son Edward on his side; but the success of the insurgents nevertheless was such as to threaten the complete overthrow of the royal power, when an accommodation was effected through the interference of the king's younger brother, Richard, earl of Cornwall, called King of the Romans, to which dignity he had been elected a few years before. The result was the treaty of the De Montfort and parties: once more at the head of affairs, the king being reduced to a cipher, or a mere puppet in their hands. In the course of a few months however we find the war between the two parties renewed. The most of arms was suspended for a short time in the beginning of the following year (1264) by an appeal on the part of a number of the most influential barons and bishops to the arbitration of Louis IX. of France; but his award, which was upon the whole in favor of Henry, was more or less disregarded. On the 14th of May the forces of the barons, led by De Montfort, and those of the royalists, commanded by the king in person, and by his son Edward, met at Lewes, in Sussex, where the former gained a complete victory, both Henry and his son being taken prisoners. This success of course once more placed all the power of the kingdom at the feet of the great baronial leader. His arrogance and assumption, moreover, is said to have alienated from him some of his most powerful adherents, and disposed them to take measures for the restoration of the royal authority, when, on the Thursday of Whitsun-week, 1265, Prince Edward contrived to make his escape from Dover Castle, and to join the earl of Gloucester, who had now deserted the interest of De Montfort, and waited to receive him with an army at Ludlow in Shropshire. This event immediately decided the progress of the war. On the 4th of August the two parties again encountered at Evesham; Edward here gave brilliant proof of the military talent which distinguished his future career; and the result was the defeat of the baronial forces, with the total overthrow of De Montfort himself and his son Henry being both in the number of the slain. In this battle the king is said to have had a narrow escape; the earl, in whose camp he was, had compelled him to put on a jacke and went on a war-horse from which he was thrown down in one of the charges, and would probably have been put to the sword or trampled to death had he not called out that he was 'Harry of Winchester,' when his voice was heard by his son, who came up and rescued him.

The victory of Evesham however, although it liberated Henry and re-established the royal government, did not completely put down the defeated party. The adherents of De Montfort maintained themselves notwithstanding all the efforts of Prince Edward, in various parts of the kingdom, for more than two years longer. Even after the parliament, in October, 1267, had passed an Act of Conform, known by the name of the Statute de nullitate regni, which by easy terms of pardon were offered to all who would submit themselves, the insurrection was renewed by the people of London, with the earl of Gloucester at their head; but that rash and fickle personage, almost immediately threw himself up upon the king's mercy without drawing the sword, and was glad to obtain pardon through the mediation of the King of the Romans, leaving his brother to his fate. A final settlement was effectuated in a parliament which met at Marlborough on the 18th of November. The short remainder of the reign of Henry after this date passed without disturbance, or any requirement. His son Edward, now at last tranquil, set out for the Holy Land in July, 1270, in which he had not returned when Henry died at Westminster on the Feast of St. Edmund, being the 16th of November, 1272, in the sixty-seventh year of his age, and the fifty-seventh of his reign.

The children of Henry III., by his wife, Eleanor of Provence, were,—1. Edward, who succeeded him; 2. Margaret, born in October, 1240, married to Alexander III., of Scotland, at the age of 15; 3. Edward, who died in 1275; 3. Beatrix, born at Bordeaux, 25th June, 1242, married to John de Dreux, duke of Brittany and earl of Richmond, at Londen in 1256, died 1273; 4. Edmund, surmounted by the strong cheerfulness with which he was upon his return, like having made the voyage to Jerusalem, born 16th January, 1245, created earl of Chester 1255, earl of Leicester 1264, earl of Lancaster 1267, died 1296, married 1st, 1255; and 5th, 25th November, 1253, died in 1258; and four sons, Richard, John, William, and Henry, who died in infancy.

The reign of Henry III. is especially memorable in the history of the constitution as affording us the first distinct example of a parliament constituted as at present, of representatives from the counties, cities, and boroughs, as well as of the barons and higher clergy, or great tenants of the crown, lay and ecclesiastical, in the assembly in question met at London, 22d January, 1265, having been summoned in the name of king Henry, while he was in the hands of De Montfort, a few weeks before. Hence this great leader of the barons regarded as the founder of the principle of popular representation into the English constitution, and the founder of the House of Commons. The fact simply is however that the writs for his parliament of 1265 are the earliest extant directing the return of knights of the shire, and representatives, 1265, and 1267; and there is nothing either in the writs themselves or, what is more important, in the notices of any of the contemporary historians, from which it could be gathered that what took place was an innovation. Moreover, as no new representation, as at least an occasional usage, may certainly be distinctly traced to a date half a century earlier than this.

Our statute law also begins with this reign—the earliest enactment being that of the Statutes of Merton, of the 25th of Henry III., A.D. 1235-6. Only two of the statutes passed in this reign however are extant on the rolls in the Tower, namely, the 'Magna Charta' and the 'Charta de Forester,' and even these are only found in charters of inaspeuse, or confirmation, of the next reign. The 'Charta de Forester' was first made a distinct charter in the 2nd of Henry III., A.D. 1217 (not in its 9th year, as stated by mistake in the article on Forester Law). For an enumeration of the repeated confirmations both of that and of the great charter which were obtained in this reign, and which form the principal legislation of the period, see in the Magna Charta, Fourth of his Laws, or to the Introduction to the Statutes at Large in the edition of the Record Commissioners. Bracton's law treatise entitled De Consuetudinibus et Legebus diversis, or the Laws of England, contains a regular account of the

HENRY IV., surnamed Bolingbroke, was the eldest son of John of Gaunt, duke of Lancaster, the fourth son of Edward III. The king was the Lady Blanche, younger daughter and eventually heiress of Henry Plantagenet, duke of Lancaster, who was grandson of Edmund, second son of King Henry III. He was born at Bolingbroke in Lincolnshire in 1366, and as early as 1380 is styled earl of Derby, which was one of his father's titles. In 1397 he was created duke of Hereford, having married Mary, daughter and coheiress of Humphrey de Bohun, the last earl of Hereford. He became duke of Lancaster on the death of his father, February 3, 1399. The first occasion on which the earl of Derby appears in English history is as one of the lords associated with Thomas, duke of Gloucester, the uncle of Richard II., in the inscription of 1387. It appears however that whatever may have been the designs of the barons, in connection with this event, nothing more than the temporary control of the royal authority. According to, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 13689, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary control of the royal authority. Accordingly, in May, 1389, when the king recovered his authority, his cousin Derby was one of the persons whom he humiliated. The immediate event was at all events nothing more than the temporary
of Hereford, he and the duke of Norfolk, formerly the earl of Nottingham, who had also participated in Gloucester's rebellion ten years before, were involved in the same ruin with their former associates, in circumstances leading to a strong suspicion that, notwithstanding the forgiveness and even advancement given by king James, the re-

siduous king had never forgotten their offence, but had still cherished a secret determination of revenge. It appears that while Hereford was riding from Beaufort to London in a carriage, by being compelled into a conversation with him, expressed his conviction, on grounds which he stated, that the king was preparing to destroy them. In some way or other, but how is doubtful, a report of this conversation spread. The conse-

quences of hereford in obedience to a royal order appeared before Richard and the parliament at Shrewsbury, January 30, 1398, and there formally accused Norfolk of having spoken to him in the terms that had been men-
tioned. Apparently he had been induced to take this course as affording his only chance of escape from destruc-

tion; but it did not save him, although it perfectly answered the end the king probably had in view. The charge against Norfolk was in the first instance referred to a committee of twelve peers and six commoners, and eventually it was de-

termined that it should be brought before a high court of chivalry. That court assembled at Windsor on the 29th of April. Norfolk was seized and brought there, and he was to be tried between the two judges at Coventry on the 16th of September. When the day arrived and the combatants had en-
tered the lists, and were on the point of advancing to the encounter, Norfolk was taken. The king declared that he was the eldest of the English king, and a truce with Scot-

land had restored quiet for the present in that quarter. It was in the time of this truce that on the 30th of March, 1405, an English ship, laden with wool, was boarded by her warden, and so arrested both where they stood. Norfolk was ordered to go on a pilgrimage to the Holy Land, and

banished from England for life; Hereford was also sen-
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main abroad for the next ten years. He retired to Paris, and while he was resident in that city his father the duke of Lancaster died, February 3, 1399, on which Richard im-

mEDIATELY seized the succession, and to banish the son disqualified him from inheriting. This injury determined the latter immediately to return home, with the avowed object of maintaining his rights as duke of Lancaster, but doubtless with a re-aim of a higher pitch. He landed with a few attendants at Ravenspur in Yorkshire on the 4th of July, while Richard was in Ireland. The events that followed belong to the history of the reign of that king; it is sufficient to state here that Henry, who was immediately joined by the two powerful earls of Northumber-

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This change was undoubtedly in the highest degree ac-
cepted by the majority of the people, among whom the visage and misgovernment of Richard had made him an object of hatred or contempt, while Henry of Lancaster had long been the idol of their affections and hopes. The new settlement was first disturbed by a plot of a few of the nobility, the lords who had appealed the duke of Gloucester, and who for that act had now been deprived of the titles and estates they had received as the reward of their ser-

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wards flew to arms they were everywhere fallen upon and easily overpowered by the spontaneous loyalty of the people. A slight resistance there was for a moment enticed, from the feelings naturally excited in the king and people of that country by the treatment of Richard II., who had lately married Isabella, the young daughter of Charles VI., was overt by the restoration of that prince. Military operations however speedily com-
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successive campaigns to put it down; while two Scottish armies, that marched across the borders pretending that they came to restore Richard, who, it was said, was still first and ruling there, were defeated by the restoration of the king on the 22nd of June, 1402, at Nesbit Moor, the second on the 14th of September, in the same year, in the much more destructive fight of Homildon Hill. The victo-

rous commendants in this last affair was Henry Percy, the re-

nowned Hotspur, eldest son of the earl of Northumber-

land, the nobleman to whom more than to any other individual Henry owed his throne. That great house, conscious of its power and its services, now broke with the king of its own accord, and it was among its tumultuous proclamations that Henry Percy's wife's brother, Sir Edmund Mortimer, who had been taken prisoner by Glendower, and whom, as the uncle and natural guardian of the young earl of March, the king had designated his heir apparent, Henry had his own reasons for wishing out of the way. A formidable rebellion followed, in which the Percys were joined by Hotspur's uncle the earl of Worcester, and Scoope, archbishop of York, and leagued both with Owen Glend-

ower, who now gave himself out as the son of Edmund Mortimer, and with the Scottish Earl Douglas, whom Percy liberated without ransom, on condition of his siding them, with all his power. The mighty confederacy however was an-

ihilated, 21st July, 1403, by the battle of Shrewsbury, in which Henry Percy, the commander of the rebel forces, was himself slain. This decisive victory established the throne of Henry of Lancaster. Some further hostilities with the Scots and the Welsh, the latter being assisted by a

force from France, continued to give him occupation for two or three years longer; but before the end of 1405 Owen Glendower was effectually put down, principally by the activity and skill of his son, who, as the eldest son of the English king, and a truce with Scot-

land had restored quiet for the present in that quarter. It was in the time of this truce that on the 30th of March, 1403, an English ship, laden with wool, was boarded by her warden, and so arrested both where they stood. Norfolk was ordered to go on a pilgrimage to the Holy Land, and

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rückward march was destined to be extremely mis

fortune, and in relation to the throne of the families of March (afterwards York) and Lancaster, see this number, p. 420, vol. iv, in which however the line drawn from Ll Howell, duke of Clarence, ought not to be accepted upon his death. For in 1425, and not, as it has been joined by mistake, upon her husband Edmund Mortimer,
1411, died 1421; 2. John, created earl of Kendal and duke of Bedford, 1414, afterwards regent of France, died 1435; 4. Humphrey, created earl of Pembroke and duke of Gloucester, 1414, died 1446; 5. Blanch, married successively to Lewis Barbatus, elector palatine and duke of Bavaria, to the Roman Catholic Church, and to William of Holland, son of the last of the dukes of Blankenburg. The last, Philip of Holland, married to Princess Philipa, married to Eric X, king of Denmark and Norway. By a second wife, Joanna, daughter of Charles II, king of Navarre, and widow of John V, duke of Brittany, whom he drowned in a river.

Of the laws made in this reign the most memorable is the statute against the Lollards (the 2 Henry IV, c. 10), one of the enactments of which was that persons guilty of heresy, schism, or rebellion, or abjuring the Church, should be publicly burnt. It is commonly supposed however that the writ 'De Hincetico Comburendo' was a common-law process before the passing of this statute. Several executions took place upon the new law in the course of the reign.

In Henry's first parliament also the law of treason was brought back (by the 1st Henry IV, c. 10) to the state in which it had been placed by the act of the 25th of Edward III, certain new treasons created in the 21st year of the preceding reign being all repealed. The defects of Henry's title to the crown, and the repeated applications he was obliged to make to parliament for the means of putting down the insurrections by which the new settlement of the Church was endangered, the enhancing of the importance and power of the House of Commons under this king and the other Lancastrian princes.

HENRY V, surnamed of Monmouth, from the place of his birth, and Lancaster, from his being the son of Henry IV, was married to his first wife, Mary de Bohun, and was born in the year 1388. He was educated at Queen's College, Oxford, under the superintendency of his half-uncle, the great cardinal Henry Beaufort. When his father was created earl of Bedford, he came to be raised to the earldom, and, with his household, accompanied his father to Ireland, and placed in custody in the castle of Trim, where they remained till the deposition of Richard. On his father's accession to the crown of France, he accompanied the earl of Lancaster, and Cornwall, and earl of Chester, and declared by act of parliament heir-apparent to the throne. He was introduced to arms, while yet only in his sixteenth year, at the battle of Shrewsbury, where, though severely wounded in the face, he fought gallantly to the close of the bloody day.

Immediately after this he was sent to Wales in command of the army employed against Glendower, and for some years resided in the country in the contest with that able and active leader, in the course of which he evinced extraordinary military genius, defeating his adversary in a succession of engagements,—in one of which, fought at Grosmont in Monmouthshire, in March, 1405, he took his son Gloucester, driving the English back to the sea. The following year, 1406, he took till all Wales, except a small part of the north, was reduced to submission. It is said that the renown and popularity the prince acquired by these successes so inflamed the jealousy of his uncle, that he was compelled to go to France, and that after this, allowing the energies of his ardent mind to run to waste in riotous intemperance and debaucheries, he drew upon himself as much reproach and odium by his wild and dissipitated life, as he had gained glory and favour among his countrymen by his previous conduct.

The story of his being sent to prison by the lord-justiciar Sir William Gascoigne, for striking him in open court, and other accounts of his disorderly and reckless courses, are familiar to every reader. These anecdotes however are not recorded by the more ancient chroniclers, and do not appear to have found their way into our written history before the middle of the 16th century, when they may have been floated among the people as traditions from a considerably earlier date. It is likely that they had some general foundation, though many or most of the details are probably fictitious.

Henry V was proclaimed king on the 21st of April, 1413, the day after his father's death, amidst universal and enthusiastic joy. He began his reign with several acts of a generous stamp,—transforming the remains of Richard II, to Westminster Abbey—releasing the young earl of March from the captivity in which he had been held all the preceding reign—and recalling the son of Hotspur from his exile in Scotland to be reinstated in his hereditary lands and revenues. On this day and repeated times during the next ten years, he twice visited the persons in the Parliament, both Lords and Commons, and by the nation generally, he entered upon the enterprises of the conquest of France, which forms nearly the whole history of his reign. The claim which he advanced to the French crown was the same that had been put forward in the preceding century by Edward III, to the throne, and he set out to have regarded himself as the legitimate successor in virtue of his possession of the throne, although he was certainly not the heir of that king by lineal descent, and this particular pretension was one that stood wholly upon descent by blood.

The first enterprise on which Henry set out after occupying the throne was the capture of Harfleur, which, when at last secured in September, the town was carried, and the king and queen of France were made prisoners. The capture of Harfleur, the first day of August, was followed by the battle of Agincourt, fought on the 26th of September, in which the English won a complete victory over the French army, and the extinction of the French power in this kingdom. The great battle of Agincourt was fought on the next day, in which the English gained one of the most complete as well as the most victorious victories on record. [Asiourcer.]
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by the French party; and then it was discovered that the duke had concluded a treaty with the Dauphin and the faction of the Armagnacs. On this Henry immediately resumed his advance upon Paris. Meanwhile the hollowness of the apparent reconciliation that had been hastily patched up between the two rivals factions became abundantly clear. The result of the chafing had been evident in a notable effect in uniting their followers. At length, on the 10th of September, Burgundy having been induced to meet the Dauphin on the bridge of Montereau, there was foully fallen upon him, and many of the chief leaders of his party; the queen in the name of her husband, immediately assented to all Henry's demands, which were—the hand of Charles's eldest daughter, the Princess Catherine, the present regency of the kingdom, and the succession to the throne of France on the death of Charles. It was also arranged that one of Henry's brothers should marry a sister of duke Philip. Several months were spent in the settlement of certain minor points; but at last the treaty of "Perpetual Peace," as it was styled, was completed and signed at Troyes by Queen Isabella and Duke Philip, as the commissioners of King Charles, on the 20th of May, 1420; and on the following day the oath to observe peace was renewed by William of Bourbon, who in December preceding by the expressed consent of the parliament, the nobility, and deputies from such of the communes as acknowledged the royal authority. Henry's marriage with Catherine was solemnized on the 2nd November. The expense of his military operations, and some months were spent in reducing successively the towns of Sens, Montereau, Villeneuve-le-Roi, and Meulan. On the 18th November Henry and Charles entered Paris together in triumph, and on the 19th was signed the treaty of Troyes (19th December) in an assembly of the three estates of the kingdom. Henry soon after set out with his queen for England, and on the 2nd February, 1421, entered London unmet such parades of rejoicing as that capital had never before witnessed.

He did not however remain long at home. On the 22nd March his brother the duke of Clarence, whom he had left governor of Normandy, was defeated in a battle fought at Baugé, in Anjou, by a force chiefly composed of a body of Scottish auxiliaries under the earl of Buchan, who slew Clarence with his own hand, an exploit for which the Dauphin conformed; the force consisted of the greatest constables of France. This victory appears to have produced a wonderful effect in reanimating the almost broken spirits and extinguishing hopes of the Dauphin's party. Feeling that his presence was wanted in France, Henry again set sail from England, this time for Calais, with the King of Denmark and Archbishops of Canterbury and York. Henry met with a Scottish force commanded by Archibald, Earl of Douglas, and also his prisoner, the Scottish king, to whom he promised his liberty as soon as they should have returned to England. His wanted success attended him in this new expedition; and he drove the Dauphin before him, from one place to another, till he forced him to retire to Bourges. In his triumph, and the constable Buchan having again advanced from the south, and laid siege to the town of Coise, Henry, though ill at the time of the battle, reappeared on horseback again, in an illness of about a month, he breathed his last, on the 21st of August, in the 34th year of his age, and the 10th of his reign.

The unnecessary in the present day to waste a word on either the injustice or the folly of the enterprise on which Henry thus threw away the whole of his reign. In estimating his character it is of more importance to remember that the folly and injustice, which are now so evident, were as little perceived at that day by his subjects in general as by himself, and that there can be no doubt whatever that both he and they thought he was, in the assertion of his fancied rights to the crown of France, pursuing both a most important and a most legitimate object. That motives of personal ambition mingled their influence in his views and proceedings must not be admitted; but that was undoubtedly admirable kind—energy, both of body and mind, which no fatigue could quell; the most heroic gallantry; patience and endurance, watchfulness and activity, steadiness, determination, policy, and other moral constitutions, as they may be called, of genius, as well as more military skill and resources. Nor does any weighty imputation dim the lustre of these virtues. His slaughter of his prisoners at the battle of Azincourt, almost the only stigma that rests upon his memory, was an act of self-preservation justified by what appeared to be the circumstances in which he was placed. No monarch ever occupied a throne who was more the idol of his subjects than Henry V.; nor is any trace to be found of popular dissatisfaction with any part of his government, from the beginning to the end of his reign.

HENRY VI, surnamed of Windsor, was born there 6th March, 1421, and was the only issue of Henry V. and the Princess Catherine of France. He was consequently not quite nine months old when the death of his father left him king of England. His reign is reckoned from the 1st of September, 1422, the day following his father's death.

In the settlement of the government which took place upon the accession of the infant king, the actual administration of affairs in England was committed to the guardianship of his two uncles, Humphrey, popularly called 'The Good,' the Duke of Gloucester, as substitute for the elder, John, Duke of Bedford, who was appointed president of the council, but who remained in France, taking his late brother's place as regent of the kingdom; and the Duke of Gloucester, as regent of the Realm and Church of England.' The care of the person and education of the king was some time after committed to Richard De Beauchamp, Earl of Warwick, and to the king's great-uncle Bishop (afterwards Cardinal) Henry Beaufort.

The history of the earlier and longer portion of this reign is the history of the gradual decay and final subversion of the English dominion in France. The war having been in several respects, the power of England was reduced in several respects, the power of England was reduced to such a state of depression that the English, in the summer of 1424, left by a council held in Rouen, was followed in a few weeks (22nd October) by that of his father-in-law, the imbecile Charles VI. Immediately on this event the Dauphin was acknowledged by his adherents as Charles VII., and the English power was placed in the hands of the Duke of Bedford, who was governor of Paris, and whereon the English power prevailed as king of France. The next events of importance that occurred were the two great victories of Crevant and Verneuil obtained by the English in the summer of 1424. The English allies, the former on the 31st of July, 1423, the latter on the 17th of August, 1424. In the interim the king James of Scotland, after his detention of nearly twenty years, had been released by the English council, and had returned to his native country after marrying a near connection of the royal family, the Lady Jane Beaufort, daughter of the Duke of Somerset. One of the engagements made by James on his liberation was that he should not permit any more of his subjects to enter into trade with the possessions of the Duke of Bedford or the Dauphin, and the Dauphinian career was now at an end. The Dauphin and the constable Buchan having again advanced from the south, and laid siege to the town of Coise, Henry, though ill at the time of the battle, reappeared on horseback again, in an illness of about a month, he breathed his last, on the 21st of August, in the 34th year of his age, and the 10th of his reign.

This however was the last great success obtained by the English in France, and their fortune began to loosen and shake, and then to crumble faster and faster away, until it fell wholly to ruin. The first thing which materially contributed to unsettle was the disaffection given to the dukedom of Exeter by the Duke of Gloucester with Jacqueline of Hainault, and their subsequent invasion and seizure of hereditary territories, then held by her former husband John, Duke of Brabant, who had seized the country around the Duke of Burgundy, on being left to pursue his quarrel with Jacqueline, whom he soon succeeded in crushing, after she had been abandoned by Gloucester, did not go the length of openly breaking with the English on account of the matter, his attachment was never afterwards to be much relied upon,
and he merely waited for a favourable occasion to change sides. Meanwhile another of the most powerful of the English allies, the duke of Brittany, openly declared for Charles VII. Other embarrassments also arose about the same time out of the mutual jealousies and opposition of Gloucester and Warwick. They both had a strong hand at last in open and violent hostility. It required all the moderating prudence and astuteness of the duke of Bedford to break as much as possible the shock of these various adverse occurrences. Fortunately he had no opportunity of availing himself of the situation. On the 29th of May, 1429, he died, maintaining his actual position. It was not till the close of 1428 that he proceeded to attempt the extension of the English authority beyond the Loire. With this view the alliance was consummated by the marriage of the king's eldest daughter, the future Mary of Burgundy, on the 12th of October of that year, by the earl of Salisbury, and, on his death from a wound received a few weeks after, carried on by the earl of Suffolk. The extraordinary succession of events that followed was, in some respects, singular. The coronation of King Edward, after a reign of one year, was more than once adjourned, although some partial successes, and especially the brilliant exertions of the famous Talbot (afterwards earl of Shrewsbury), in Normandy and elsewhere, gave a check to time to time to this rapid revolution of the kingdom, the prevailing current of events ran decidedly in the contrary direction. In 1444 a truce was agreed upon, to last till 1st April, 1446; and in this interval a marriage was arranged between two of the heiresses of the House of Lancaster, the daughter of René, king of Sicily and Jerusalem, and duke of Anjou, Maine, and Bar. These lofty dignities however were all merely titular; with all his kingdoms and dukedoms, at this time near desultory both of land and revenue. Thus circumstanced, in return for the hand of his daughter, he demanded the restoration of his hereditary states of Maine and Anjou, which were in the possession of the English, and the marriage was at length assented to. Nor was this occasion uneventful. Not only that period to the first to excite popular feeling in England against the marriage. Margaret was a near relation of the French king, and had been in great part brought up at the English court. The marriage proposal was therefore seconded to be one thoroughly French in spirit, and it is no wonder that the earl of Suffolk, by whom it had been negotiated, became from this time the object of much general odium and suspicion. It was more especially, when it was found that Margaret, who soon evinced both commanding talent and a most imperious temper, distinguished him by every mark of her favour, and made him almost exclusively her confidant, what was more alarming, she turned the feebler and plant husband. The marriage was solemnized in the abbey of Tichfield, 22nd April, 1445, Suffolk having a few months before, on the conclusion of the negotiation, gone to Valladolid, on his marriage with the daughter of the duke of Lancaster, at that time on the 1st of April, 1449. The first remarkable event that followed was the destruction of the duke of Gloucester, who, although he appears not to have openly opposed the marriage, was certainly the most formidable obstacle in the way of the complete ascendency of Suffolk and the queen. Having been arrested on a charge of high treason, 11th February, 1447, he was on the seventeenth day thereafter found dead in his cell. In the popular feeling, which however may very possibly have been mistaken, his death was generally attributed to the agency of Suffolk, who, now raised to the dignity of duke, became, ostensibly as well as really, prime, or rather bastard, minister. Soon after his death, the queen was renewed in France, and a numerous force having been poured by king Charles into Normanby, through the adjacent county of Maine, no longer a hostile frontier, town after town was speedily subdued, till the disaster of the battle of Tпочтур, 4th November, 1449. Early in the next year another heavy reverse was sustained in the defeat of Sir Thomas Kyriell at Fournigny; and at last the fall of Cherbourg, 12th August, 1450, completed the loss of the duchy. Before this catastrophe however the public indignation in England had swept away the unhappy minister on whose head all this accumulation of disasters and disgraces was laid; the duke of Suffolk, after having been committed to the Tower, on the impeachment of the House of Commons, and banished from the kingdom by the judgment of his peers, was seized as he was sailing across from Dover to Calais, and was beheaded the following day. Sir William de la Mar, one of the adventurers, was detained for a few days, and at last had his head struck off by an executioner who came alongside in a boat from the shore, May 2nd, 1450. The murder of Suffolk was immediately followed by a popular movement in England in its external intercourse since the rebellion of Wat Tyler, seventy years before. [CADD, JOHN.] Before the close of the following year the French, in addition to Normandy, had recovered all Guienne; and with the exception of Calais, not a foot of ground restored to England. It was subject to the English government for three centuries and a half; it restored the following year; and the brave Talbot, now eight years removed from the field of battle, was killed in a battle near the coast of Calais. In 1453, on the 10th of October following, Dorset surrendered to Charles. The remaining states of the reign of Henry VI. is made up of the events that arose out of the contest for the crown which eventually placed another family on the throne. [EDWARD IV.] It is only necessary here to enumerate the eventful years of the reign of Henry VI., and the story of Henry's personal fortunes. On the 13th of October, 1453, Queen Margaret was delivered at Westminster of a son, who was named Edward, and early in the next year, 1454, he was crowned king of England. On 10th of October, 1455, at the battle of Towton, near Guisborough, the head of the house of Lancaster, Richard Duke of York, was killed in the action, and the whole house became extinct. About the same time the king sunk into a state of mind amounting to absolute incapacity. By the beginning of the year 1455 however he had recovered such a degree of his faculties as he had formerly possessed, and, upon him the actual administration of the government, which during his malady had been committed to the duke of York. In the court of arms that soon ensued, he was taken prisoner by the earl of Warwick at St. Albans, 23rd May, 1460, and towards the end of that year he again declared to be in a state of incapacity, and the duke of York resumed the management of affairs with the title of protector. Again however in a few months Henry recovered his health, and the government was conducted in his name till his second capture by the young earl of March (afterwards Edward IV.) at Northampton, 10th July, 1460. On this occasion the queen escaped with her son, and eventually married the Earl of Warwick. Meanwhile, however, Margaret over the earl of Warwick at Barnet Heath, 17th February, 1461, again liberated her husband; after which, and the issue of the battle of Towton, 29th March, which established the young earl of March as the acknowledged sovereign of the country, Margaret married Duke John of Burgundy, and Prince Edward to Scotland. Here he fixed his residence in the first instance at Kirkcudbright; but it appears that he afterwards, as well as his queen, proceeded to Edinburgh, on the 2nd of July, 1461, where he died, laden with the infamy of his connection with the House of Lancaster (Marmion.) When Margaret again took up arms and invaded England in 1462, Henry was placed for security in the Castle of Hardlough in Merionethshire; and here he finally remained, with a group of followers, the Duke of Buckingham and the Prince of Wales to join a new insurrection of his adherents in the north of England. After the two final defeats of the Lancastrians at Hedgeley Moor, 25th April, and at Harham,
was also a Margaret Beaufort, a great-grand-daughter of John of Gaunt. But her father was a younger brother of the father of the Countess of Richmond, whose son therefore undoubtedly stood first in the line of the family succession.

The following anecdotes are related by Bacon at the close of his History of England VII. "When the Lady Margaret, his mother, had divers grand assemblies, she was wont to dream one night that one in the likeness of a bishop in pontifical habit did tender her Edmund, earl of Richmond, her son, the king's father, for her husband; neither had she ever any child but the king, though she had three before. One day when King Henry VI., whose innocence gave him holiness, was washing his hands at a great feast, and cast an eye upon King Henry, then a young youth, he said, "This is the lad that I dreamt of, and gave him to the person that was to bring to a close the contest between the two Houses. It must have been at this time also that he was sent to Eton, if he ever really studied as is reported by the historian. At the same time, at that period, the Duke of Buckingham was restored to the world abroad and for a simple man, it was afraid it would diminish the estimation of that kind of honour, if there were not a distance kept between innocents and the crown.

HENRY VII. was born at Pembroke Castle, 21st January, 1456. His father was Edmund Tudor (or rather Tudor, pronounced Tuddor, that is, Theodore), enounced of Hadham, who had been created Earl of Richmond in 1450, being the son of Sir John Tudor and the lady of Henry, widow of Henry V. He was thus humbly descended both from the royal house of France and also, it is said, from the antient sovereigns of Wales, for such is the derivation that would not pass for the name of Owen Tudor (as Camden remarks in his 'Remains') that can with any propriety be considered as the family name which was really merely the Christian name of Owen Tudor's grandfather, father of John of Gaunt, duke of Lancaster, the root of the Lancastrian race. But it was his maternal extraction that gave Henry Tudor his political importance. His mother was Margaret, the only child of John Beaufort, duke of Somerset, whose father of the same name, to break into his prison and carry him to the doors of parliament, which appears (though there is some doubt as to that point) not to have opened to them the succession to the crown, were not at first looked upon in the estimation of those men as deserving strictly a branch of the House of Lancaster; their name itself distinguished them as another family. But towards the close of the reign of Henry VI. their royal descent and proximity to the throne began to be spoken of as giving them important pretensions. After the termination of the wars the Somerset family remained the only representatives of the House of Lancaster, in England: there were indeed in Portugal, Spain, Germany, and Denmark, nearly a dozen descendants of the daughters of John of Gaunt by his two earlier marriages, some of whom at least, namely, those sprung from Henry IV., had clearly a more remote claim. It was now desperate. Henry V. was on his deathbed, and the legitimacy of the latter was ever so perfect; but the circumstances of the time were not such as to allow any validity to these foreign titles. After Richard III. obtained the throne, only two or three of the sons of House of Lancaster survived, namely, this Henry, earl of Richmond, and Henry, duke of Buckingham, whose mother P. C., No. 740.
persed his ships as he crossed the Channel, and when he reached the English coast found it prudent to retreat, in view of the formidable force that he had remaining, not to land. Meanwhile the hasty, ill-organized revolt of Buckingham and his associates fell to pieces without the striking of a blow. Buckingham himself was taken and executed at treason, and eight chief persons engaged in the attempt, several underwent the same fate; others escaped death by flight; many were attainted, among the rest the countess of Richmond, whose life was only spared at the intercessions of his friends. He should have hastened to Bretagne, and here at Christmas, in the presence of a meeting of the English exiles to the number of five hundred, held in the cathedral of Rhiem, he solemnly swore to marry Elizabeth, and to consult with her. He should have hastened to Bretagne, and in return the assembly promised him fealty on that condition, and did him homage as their sovereign. A few months after this however Henry and his friends found it for their escape to the territory of the French king, where they spent another year in making preparations for a new expedition under the countenance and with the assistance of the godsd. VII. At length, on the 1st of September, they were conveyed with all speed from Harlech and on the 7th landed at Milford-Haven in Wales. The two rivals encountered at Bosworth in Leicestershire, on the 22nd, when the result was that Henry obtained a complete victory, which, with the death of Richard, who fell in the battle, at once placed the crown on the head of the heir of his house. Henry afterwards reckoned the first day of his reign, an arrangement by which only those who had actually drawn their swords against him at Bosworth were made to be guilty of treason, and whatever acts had been done in the service of the usurper (as Richard was considered) up to the eve of that battle were overlooked. [BOSWORTH; RICHARD III.]

Henry's marriage with Elizabeth was not solemnized till the 30th of December, 1486, before which time it had been enacted by the parliament that "the inheritance of the crown should be, rest, remain, and abide in the most royal person of the then sovereign lord Henry VII., and the heirs of his body lawfully coming, perpetually with the grace of God so to endure, and in none other;" the only security taken for the marriage being a request subsequently presented to the king by the Commons along with the grant of tenements and poyntage fees, that he would be pleased "to take to wife and consort the princess Elizabeth," with which, after it had been formally concluded in the lord spiritual and temporal, Henry intimated that he was willing to marry, and that he had been usually throughout their union treated his queen with marked coldness and neglect. He must have felt indeed that he owed nothing to any preference that had been shown for him by her family, and that he was equally ready to give her hand to his deadliest enemy, had the fortune of the contest been different; but it would appear that, from policy, if not from affection, he latterly behaved to her with more attention than he had done before; and there is some evidence that their domestic intercourse came at length to breathe more cordiality and tenderness than has been generally supposed.

It was not to be expected that a reign commencing in such circumstances should be undisturbed by insurrectionary attempts. A succession of movements kept Henry in quietude for many years. The first that occurred was that headed by Francis, viscount Lovel, in April, 1486, which speedily and effectually put down. Before the end of the same year another movement, even more formidable commotion was excited by the imposture of the boy Lambert Simnel, the son of a joiner at Oxford, who was put forward as Edward Plantagenet, earl of Warwick, the son and heir of the late duke of Clarence, brother of Richard III. The young prince in question had, in fact, been lodged in the Tower by Henry among the first acts of his reign, and he remained immured in that fortress while the pretender assumed his name receiving royal honours in Ireland as Edward VI. Simnel was at one time declared heir to the crown by the late king after the death of his own son. The duchess of Burgundy, another sister of Edward IV., also gave her countenance and adhered to the pretender's enterprise, besides probably the friends of the House of York merely intended to make use of for effecting their first object, the ejection of the present king. The brief royalty of Simnel however was terminated June 16th, 1486, by the defeat of his adherents at the battle of Stoke, in which Lincoln himself was slain. The imposture of Simnel was followed after some years by the appearance of the more celebrated pretender Perkin Warbeck, who was assented to by his adherents to be the son of Edward IV. He himself ventured to make a landing at Bordeaux, and to make his way to England; but he was overtaken by Edward V., and generally supposed to have been murdered along with him in the Tower. Warbeck arrived in Ireland from Lisbon in the beginning of May, 1492, and was afterwards received with joy and enthusiasm at a meeting of the lords of the King of England not only by the duchess of Burgundy, but by the governments both of France and Scotland.

This affair occupied Henry for the next five or six years, for it was not till the end of 1497 that the adventures as finally put down. Another pretended earl of Warwick next arose, one Ralph Wulford, or Wilford, the son of a shoemaker, whose attempt however was immediately nipped in the bud by his suppression and execution, in March, 1499. The restless succession of these conspiracies seems at last to have convinced Henry that his throne would never be secure, nor the kingdom at peace, until the persons who were most calculated to promote such enterprises were removed. The same year in which Wilford was put to death witnessed the executions of both Perkin Warbeck and the earl of Warwick. From this time Henry's reign was one of complete internal tranquillity, of which he chiefly took advantage to soften, in the service of his policies, all the old hatreds and resentments—extracting money from his subjects on all sorts of pretences, which were not the less oppressive for being generally legal in their form and colour. The English law at this time was so strong as to prevent any request made in the service of the Crown being abundantly sufficient for the purposes of the most exorbitant tyranny. The chief instruments of Henry's rapacity were two lawyers, Sir Richard Empson and Edmund Dudley, names immortalized by the detestation of the country.
By successive treaties with James III. and James IV., the peace with Scotland was preserved till 1495, when, on the recommendation of the French king and the duchess of Burgundy, Perkin Warbeck was received in that kingdom as the rightful heir of the English crown. King James not only assisted the adventurer with money and troops, but gave him in marriage the lady Catherine Gordon, a relation of his own. After Warbeck's final discomfiture however in 1497, a new truce was concluded between the two countries, by which even after both kings should be dead; and this led in 1502 to a treaty of perpetual peace, cemented by the marriage of James with Henry's eldest daughter, the princess Margaret. This marriage was an important political result of the union of the two crowns, was solemnized at Edinburgh on the 8th of August, 1503. It was reported, Bacon informs us, that when the project of the marriage was discussed in the council of the English king, an objection was raised on the ground that it might possibly lead to the kingdom of England falling to the king of Scotland. 'Whereunto,' continues the historian, 'the king himself replied, that if that should be, Scotland would be but an accession to England, not so much as to England to Scotland, for that the greater would draw the less; and that it was a safer union for England than that of France. This passed as an oracle, and silenced those that moved the quenches before him.

Nearly two years before this, namely, 14th November, 1501, a marriage, long contemplated and agreed upon, had been solemnized between Henry's eldest son Arthur, prince of Wales, and the fourth daughter of James, the lady Catherine, daughter and heir of the lion of Scotland. Arthur however, who was a prince of the highest promise, died within six months after this time; and then it was arranged that Catherine should be married to his brother George. The lady Catherine, who married Arthur and proved still more momentous in its consequent than that of Margaret and James.

Queen Elizabeth died 11th February, 1503, a few days after giving birth to a daughter, on which Henry lost no time in bestowing on her the name of the first woman of her line that had been born to him at the age of the crown. On the same day he wrote to Lord Herbert, 'I have acquired an able servant, a woman of ability, and one able to make the crown of this kingdom more glorious and illustrious,' the queen, who was insane,—he died before he could accomplish that desideratum. As for the crown, it was as the royal palace at Sheen was now called, 22nd April, 1509, in the twenty-fourth year of his reign, and the fifty-third of his age.

The children of Henry VII. by his queen Elizabeth of York, were Henry, Edward, John, Katherine, Margaret, Arthur, born 26th September, 1456, created prince of Wales 1489, married to Catherine of Spain (to whom he had been contracted eleven years before), 14th November, 1501, died at Ludlow Castle, 2nd April, 1502; 2. Margaret, born 29th November, 1489, married to king James IV. of Scotland, 8th August, 1503, died 1539; 3. Henry, who succeeded his father as Henry VIII.; 4. Elizabeth, born 2nd July, 1499, died 14th September, 1499; 5. Mary, born 3rd May, 1496, married to Louis XII. of France, November, 1514, and secondly, in 1515, to Charles Brandon, duke of Suffolk, died 25th June, 1533; 6. Edmund, born 21st February, 1499, soon after created duke of Somerset, died in infancy, 7th March, 1502, Edward, born 2 February, 1500, died young; and 8. Catherine, born 2nd February, 1503, died a few days after her mother.

Bacon, in his striking and masterly 'History of the Reign of Henry VII. in his monarchical policy and craft, who may almost compete with the 'Principe' of Machiavel, if we make allowance for the greater ruthlessness and more sanguinary spirit natural to the Italian blood. It may be noticed, in this great writer, in the elaboration of his history, that his design has been either a magnification or over-refinement; and he has probably also suffered the more reductive features in Henry's moral character, as much as he has unduly exalted his intellectual endowments. But the difficult position which he occupied, and the success with which he maintained himself in it, vindicate the title of this sovereign to be regarded as at least one of the greatest monarchs of the English crown that pursue his history. Bacon compares him, justly enough, to Louis XI. of France and Ferdinand of Spain, designating the three as 'the tres magi' of kings of those ages. The age in which Henry lived was not that of the birth of modern policy, and that in which the foundations were laid of the still greater power of the European states. Nothing that was then established has been greatly shaken since; all the changes that have since taken place have for the most part, if not entirely, for more than the growth and development of the arrangements in the past, and the principles that were called into action. This reign therefore may be considered as the beginning of the modern history of England.'
parties were affianced on Sunday the 26th of the same month, the son of Salisbury’s house in Fleet Street, although the dispensation was certainly not obtained from Pope Julius II. till the 26th of December following. This bull however contains a clause legitimizing the marriage, although it is not clear when this was published or authenticated. It may be observed that nobody at this time seems to have doubted that Catherine’s preceding marriage with Arthur had been followed by consummation.

Henry became king 22nd April, 1509, being then his 15th year. On a memorial being presented by the Spanish ambassador, it was, notwithstanding the opposition of Warham, archbishop of Canterbury, resolved in the council that the marriage with Catherine should be completed; Fox, bishop of Winchester, being strongly urged by other real reasons, "that there was no room to doubt that the princess was still a virgin, since she herself affirmed it, offering even to be tried by matrons, to show that she spoke the truth." The marriage was accordingly solemnized in Lambeth Palace on the 7th of June, though not so early as the 3rd of that month, the date assigned both by Lord Herbert and by Holinshed and the other chroniclers, as appears from the act of resignation of the see of Canterbury to the pope, and the consent of the king to the marriage, which was signed by the king as early as the 7th of June, in which she still styles herself Princess of Wales, (Rymer, iii, 231.)

Henry was indebted for the warm and general gratulation with which the news was welcomed to his subjects, partly to his distinguished personal advantages and accomplishments, and to some points of manner and character adapted to take the popular taste; partly to the sense of relief conveyed by the termination of a protracted and repressive rule of his predecessor. One of the earliest proceedings of the new reign was the trial and punishment of his father’s ministers, Dudley and Empson. They were indicted for having taken as their commission the bones of the French king and the head of an armed force during the last illness of the late king, and being convicted on this charge, and afterwards attainted by parliament, were, after lying in gaol for about a year, beheaded by order of the council, 17th July, 1516.

Henry had not been long on the throne when he was induced to join what was called the Holy League, formed against France by the pope, the emperor, and the king of Spain. A force of 8,000 men was sent to Biscay under the Earl of Dorset in the spring of 1512, to cooperate with an armament promised by Flanders for the conquest of Guenne; but the Spanish king, after dexterously availing himself of the presence of the English troops to enable him to overrun and take possession of Navarre, showed plainly that he had no intention of assisting his ally in his object; and after having had his ranks thinned, not by the sword, but by disease, Dorset was compelled by disasters in his camp, which reduced his forces to little more than 2,000, to return on July 1, 1512, when what was called the Battle of the Spurs, from the unusual energy the beaten party are said to have shown in riding off the ground, and took the two towns of Tercuene and Tournaiz. On the 8th of September also the Scottish king James IV., who as the ally of France had invaded England, was defeated by the earl of Surrey in the great battle of Flodden, he himself with many of his principal nobility being left dead on the field. This war with France however was ended the following year by a treaty, the principal condition of which was that Louis XII., who had just lost his queen, Ann of Brittany, the same who had been in the first marriage of his predecessor Charles VIII. [Henry VII.], should wed Henry’s sister, the Princess Mary.

The marriage between Louis, who was in his fifty-third, and the English princess, as yet only in her sixteenth year, was solemnized 9th October, 1514; but Louis died within three months, and scarcely was she again her own mistress when her young widow gave her hand to Charles Brandon, duke of Suffolk, an alliance out of which after-wards to spring the crown.

The members of Henry’s council, when he came to the throne, had been selected, according to Lord Herbert, "out of those his father most trusted," by his grandmother the countess of Pembroke, "noted to be a virtuous and prudent lady." A rivalry however and contest were soon broke out between Richard Fox, bishop of Winchester, secretary and lord privy seal, and Thomas Howard, earl of Surrey (afterwards duke of Norfolk), who held the office of lord treasurer. This led to the introduction at court of the famous Thomas Worsley, who, being then dean of Lincoln, was brought forward by Fox to counteract the growing ascendancy of Surrey, and who speedily made good for himself a place in the royal favor that reduced all the rest of the king’s ministers to insignificance, and left in his hands for a long course of years nearly the whole power of the state. [WORSLEY, CARDINAL.] The reign of Worsley may be considered as having begun after the return of the king’s ministers from their expedition to France, towards the close of the year 1513; and henceforth the affairs of the kingdom for fourteen or fifteen years were directed principally by the interests of his ambiitious character, which governed and dictated his purposes even the vanity and other passions of his master. The history of the greater part of this period consists of Henry’s transactions with his two celebrated contemporaries, Francis I. of France, the successor of Louis XII., and C in the neighborhood of Calais. Worsley’s object at this time however was to detach his master from the interests of the French king; and a visit which Henry paid to the emperor at Gravelines, on his way home, showed Francis how little he was to fear upon any plausible pretext. The effect of their recent cordialities. Before the close of the former year Henry was formally joined in league with the emperor and the pope; and in March, 1522, he declared war against France. Early in August, the emperor flattered him by paying him a visit at London; but his vanity having also been a short time before gratified in another way by the title of ‘Defender of the Faith’ bestowed upon him by the German university of Erfurt (see V. VI.) for a Latin treatise which he had published ‘On the Seven Sacraments,’ in conformist of Luther. Henry continued to attach himself to the interest of the emperor,—even sending an army to France, in August, 1523, under the duke of Suffolk, which succeeded in taking several towns, though only to give them up again in a few months,—until the disappointment, for the second time, of Wolsey’s hopes of bringing England through the influence of the pope, on the death of the Kempe in September of the last-mentioned year, is supposed to have determined that minister upon a change of politics. Before the memorable defeat and capture of France at the battle of Pavia, 24th February, 1525, the English king had made every arrangement with the emperor; having actually commenced negotiations for a peace with France’s ally, James V., the young king of Scotland, on condition of giving James in marriage his sister Mary (afterwards queen of Scots and most holy), which was formed upon the usuries of the pope for the renewal of the war against Charles.

Before this date two domestic occurrences took place that had especially to do with the future course of the reign. The one was the death of the queen, 2nd January, 1533, immediately before Henry proceeded on his expedition to France, of Edmund de la Pole, duke of
Suffolk, whose mother was Elizabeth Plantagenet, sister of Edward III. He was a prisoner since a short time before the death of the late king, who had contrived to obtain possession of his person after he had fled to the Continent, and, it is said, had in his last hours received the name of the late Edward. He was now put to death without any form of trial or other legal proceeding, his crime, there can be no doubt, being merely his connexion with the House of York. Lord Herbert tells us that Henry's Gaunt's arrest took place about the time was deemed dangerous and inexpedient, on the ground 'that if the king should die without issue, however the succession were undoubtled in his sister Margaret, yet the people were so affected to the House of York, as they might take the issue of the earl of Pembroke.' Pembroke Was perhaps as yet too new in office to be fairly answerable for this state of bloodshed; in the next case the unfortunate victim is generally believed to have been sacrificed to his resentment and thirst of vengeance.

In 1521 Edward Stafford, duke of Buckingham, son of the duke beheaded by Richard III. [Henry VII], was apprehended on some information furnished to Wolsey by a dis- senced servant, and being brought to trial was found guilty and executed as a traitor. The acts with which he was charged did not according to law amount to treason, even if they had been proved; but the duke is said by certain in- dividuals to have been accused by the pride of the all-powerful minister; and, besides, he was also of dangerous pedigreed, being not only maternally of the stock of John of Gaunt, but likewise a Plantagenet by his descent. In his death, therefore, the king lost a young and vigorous son. Thomas, duke of Gloucester. With this nobleman came to an end the great office of hereditary lord high constable.

Wolsey may be called the second part of Henry's reign begins in the year 1527, from which date our attention is called to a busy scene of domestic transactions beside which the foreign politics of the kingdom become of little interest or importance. A new cardinal of the Roman Catholic Church, Thomas Cromwell, afterwards lord Cromwell and earl of Essex, who was this year made first secretary of state, and then master of the rolls. Cromwell, Thomas Cromwell, was next seen in the second of the great religious changes of the time, the execution of the young men of Lattimer, and the execution of John More. [Fisher, John; More, Thomas.] In 1535 began the dissolution of the monasteries, under the zealous superintendence of Cromwell, constituted for that purpose vicar-generals of these establishments. Latimer and other friends of Cranmer and the Reformation were now also promoted to bishoprics; so that not only in matters of discipline and polity, but even of doctrine, the church might be said to have separated itself from Rome. One of the last acts of the parliament under which all these great innovations had been made was to petition the king that a new translation of the Scriptures might be made by authority and set up for the use of the church; and ordering that 'if the fruit be sweeter benefits to be paid to the king. After this various persons were executed for refusing to acknowledge the king's supremacy; among others, two illustrious victims, the learned doctor, Fisher, and the famous poet, More. [Fisher, John; More, Thomas.]

Events now set in a new current. The death of Henry in the month of May of this year witnessed and executed the death of Anne, in less than six months after the death of her predecessor, Catherine of Aragon—and the marriage of the brutal king, the very next morning, to Jane Seymour, the new beauty, her passion for whom must be regarded as the true motive that had impelled him to the deed of blood. Queen Anne dying on the 14th of October, 1537, a few days after giving birth to a son, was succeeded by Anne, sister of the duke of Clever, whom Henry married in January, 1540, and put away in six months after—the author of the new parliament, and the not less subservient convocation of the clergy, on her mere request, pronouncing the marriage to be null, and the former body making it high treason, by word or deed to accept, take, or receive the said body, and being a subject of the king's authority over the spirituality. The dissolution of the monasteries in this and the following year, as carried forward under the direction of this energetic minister, introduced a succession of establishments, which gradually dissolved all parts of the kingdom, which were not put down without great destruction of life, both in the field and afterwards by the executioner. In 1538 all incumbents were ordered to set up in their churches a copy of the new and English translation of the Bible, and to teach the people the Creed, the Lord's Prayer, and the Ten Commandments, in English; the famous image of our Lady at Walsingham.
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and other similar objects of the popular veneration, were also under Cromwell’s order removed from their shrines and burner. In 1639, by the same name, after enacting (by the 31 Henry VIII., c. 8) that the proclamation of the king in council should henceforth have the same authority as a statute, passed the famous act (the 31 Henry VIII., c. 22) by the name of the Six Articles, or the Bloody Statute, by which burning or hanging was made the punishment of all who should deny that the bread and wine of the sacrament was the natural body and blood of Jesus. The articles of the faith were now confirmed in the form of law; and this necessity was not for salvation—or that priests might not marry—or that vows of chastity ought to be observed—or that the mass was agreeable to God’s law—or that auricular confession is expedient and necessary. This statute, the fruit of the changes proceeding from a new influence which had now gained an ascendancy over the fickle king, that of Gardiner, bishop of Winchester, the able leader of the party in church and state opposed to Cromwell, and on a charge of treason, and beheaded in a few weeks after.

On the 6th of August this year Henry married his fifth wife, the Lady Catherine Howard, whom he beheaded, 13th February, 1542. During this interval he also rid himself by the axe of the executioner of a noble lady whom he had attainded and consigned to a prison two years before on a charge of impiety in uniting him to the daughter of the late duke of Clarence, and the last of the York Plantagenets. Her real crime was that she was the mother of cardinal Pole, who had offended the tyrant, and who had been sent beyond the seas by the king. In the later part of the year 1542 was declared by Henry against Scotland, with a revival of the old claim to the sovereignty of that kingdom. An incursion made by the duke of Norfolk into Scotland, in 1542, was followed, the cause of numerous executions, proceeded from a great Scottish army under Sir Henry Seton, which was defeated and dispersed at Solway Moss, a disaster which he believed to have killed King James, who died a few weeks after, leaving his crown to a daughter, the unfortunate Mary, then only an infant seven days old. The failure of the efforts of the English king to obtain possession of the government and of the young queen, owing to the successful resistance of the Scottish army, ended the war, which was conducted with great bravery, and was followed by peace. In the sessions of 1543, and of the year 1544, Scotland was invaded by a great army under the earl of Hertford, which penetrated as far as Edinburgh, and burned that capital with the usual cruelty. In 1544 the king again invaded Scotland, and in May the same year also Henry had concluded a new alliance with the emperor against the French king; and in July, 1544, he passed over with an army to France, with which he succeeded in taking the town of Boulougne. On this occasion, the emperor made a separate peace with Francis; and on the 7th of June, 1545, Henry also signed a treaty with that king, in which he agreed to restore Boulougne and its dependencies in consideration of a payment of two millions of crowns.

He had some years before found a sixth wife, Catherine Parr, the widow of the Lord Latimer, whom he married 16th July, 1543, at the height of the fortunes of Jane Seymour, by whom he was succeeded on the throne.

The most important changes made in the law during this reign were those affecting ecclesiastical affairs, of which the principal have already been noticed. Along with these may be mentioned the statute defining the degrees within which marriage should be lawful (23 Henry VIII., c. 22), which, in regard to that point, is still the law of the land. The law of 1542 respecting the clerical elections was materially altered by the statute of Uses (27 Henry VIII., c. 10), and by various statutes permitting the devise, which was not before allowed, except by the custom of particular places, of real estates by will. [RICHARD CROSTON.] This statute, which is also to be assigned the origin of the Bankrupt Laws. [BANKRUPT.]

Wales was first incorporated with England, and the laws and liberties of the latter country granted to that of the former, in the 27th year of Henry VIII.; and Ireland, which had been styled only a lordship, was in 1542 erected into a kingdom.

HENRY (Kings of Germany). [GERMANY, History.]

HENRY IV. of Germany. [GERMANY, History.]

HENRY (Kings of Spain and Portugal). [SPAIN; PORTUGAL.]

HENRY OF HUNTINGDON, an eminent English historian, the son of Nicholas, a married priest (see TANNER, De Scrib. Smir. sive, &c.), was born about the end of the eleventh century; and, according to Warton (Hist. Engl. Poet., diss. ii., p. 125), was educated under Alcuine of Anjou, a canon of Lincoln cathedral. Aldwin and Reginald, with many others and also of his patrons. He was made archdeacon of Huntingdon (whence he took his name), by Robert Bect, bishop of Lincoln, some time before 1125. In his youth he discovered a taste for literature, and especially for himself to the study of history; and at the request of another friend and patron, Alexander, bishop of Lincoln, composed a general history of England, from the earliest times to the death of Stephen. It was published by Sir Henry Savile among the 'Scribii post Bedam,' fol. London, 1596, and Francof, 1601. The early part of this history was a compilation from older writers; the sequel, from what he had heard and seen. Warton, in his 'Antiquitates Angli.' vol. ii. p. 114, mentions the book of Henry of Huntingdon to his friend Walter, who was also abbot of Ramsey, 'De Mundi Contemptu,' which contains many curious anecdotes of the kings, nobles, prelates, and other great men who were his contemporaries. Warton (Hist. Engl. Poet., ut supr.) says, in the Bodleian Library there is a manuscript Latin poem by Henry of Huntingdon on the death of King Stephen and the arrival of Henry I. In 1157, settled at Chester in the same year as minister of a Dissenting congregation. In 1712 he left Chester, and became the minister of another congregation at Hackney. He died on the 22nd of June, 1214, of apoplexy, while he was travelling from Chester to London.

The work by which Matthew Henry is principally known is his 'Exposition of the Old and New Testament,' which originally appeared in 5 vols. fol.; and has since been frequently reprinted. This work has been greatly admired by many persons, on account of the piety of the author and the lively style in which it is written; and perhaps it is the best Commentary on the Bible for the use of those persons who are more anxious to obtain a devout sentiment from a text than to understand the real meaning of the passage. Matthew Henry did not live to complete the 'Exposition.' The remarks on the latter books of the New Testament, from Romans to Revelation, were not printed by his scholars, whose names are printed in the 'Exposition.' Matthew Henry was also the author of many other works; of which the principal are, 'Inquiry into the Nature of Schism,' 'Life of Philip Henry,' 'Scrip'ure Catechism,' 'Communists' Companion,' 'Discourses against Vice and Pro-
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sphere." In 1808 he published in the same work a form of apparatus adapted to the combustion of larger quantities of gas than could be fired in eudiometer tubes. In the same year he was elected a Fellow of the Royal Society, and in the year following he received, by the award of the president and council, Sir Godfrey Copley's donation, as a mark of their approval of his valuable communications to the Society. He published various other papers, both in the 'Manchester Memoirs' and in the 'Philosophical Transactions.' His latest communication to the Royal Society was a paper in 1808, in which he succeeded in overcoming the only difficulty he had not before conquered, that of ascertaining by chemical means the exact proportions which the gases left after the action of chlorine on oil and coal gas bear to each other. This he effectually determined by the process which had been recently discovered by Döbereiner in finely-divided platinum, of determining gaseous combinations.

Alluding to his analysis of coal-gas, other compounds of carbon and hydrogen, and various other subjects, it has been truly remarked by his friend and townman Mr. John Davies, that his papers present a fine specimen of inducive research. His investigations on the combinations of gases by violence of a different gases by water, the application of Döbereiner's sponge platinum to gaseous analysis, and a great number of other interesting subjects, have exhibited great philosophical skill and unequalled precision in manipulating. Never was there a more careful, a more impartial, a more accurate experimenter. It may be mentioned, as an instructive illustration, that on one occasion, when a young friend was assisting him in his operations, the former proceeded, before the termination of an experiment, to calculate the result. "Stop," said the doctor emphatically; "don't try what the result should be, or there will be danger of cocking the experiment so as to make it correspond with the estimate." Dr. Henry was the author of a most valuable and useful work, entitled 'Elements of Experimental Chemistry,' which has reached the eleventh edition. "A potter," it is most truly stated by the gentleman above named, "Dr. Henry deserves a much higher reputation than he has in this respect yet obtained. His characters of Priestley, of Davy, and of Wollaston, are some of the finest specimens of that species of composition in the English language. The discrimination which they manifest, and elegance and accuracy of the style in which they are written, will render them models of the highest value to those who may be required to exercise their powers upon such topics." With respect to the personal character of Dr. Henry, it is said of it, with great justice (as the writer of this memoir can testify), Dr. C. C. Henry (Biographical Memoirs of the late Dr. Henry), that in the general intercourse of society he was distinguished by a polished courtesy, by an intuitive propriety, and by a considerate forethought and respect for the feelings and opinions of others; at the same highly-toned sensibility that guided his tastes in letters, and that softened and elevated his whole moral frame and bearing. His comprehensive range of thought and knowledge, his proneness to general speculation in contradistinction to detail, his ready command of the refined elements of language, and the liveliness of his feelings and imagination, rendered him a most instructive and engaging companion. To the young, and more especially to such as gave evidence of a taste for liberal studies, his manner was peculiarly kind and encouraging. He was most anxious to promote, as far as was in his power, their progress in knowledge.

His frame, originally delicate, worn out by illness and distracted by loss of sleep, at last gave way, and he died on the 2nd of September, 1836, in his 61st year.

HEPATICÆ, a name formerly applied to a class of cryptogenic plants, part of which are popularly called liverworts. It is now subdivided into several natural orders. [Jungernanniaceæ; Marchantiaceæ.]

HEPATITIS. [Liver.]

HEPATUS, Latreille's name for a genus of branchyurous crustaceans, placed by M. Milne Edwards under the tribe of Calappians, and, in the opinion of the latter, establishing the passage between the Cancerimæ, which they approach in their general form; the Calappa, which they resemble in the disposition of their Chelæ (manus); and the Leucostoma, from which they differ but little with reference to the method of the organization of the mouth. The Carmapæ is large, convex, regularly arched anteriorly, strongly narrowed posteriorly; the hepatic regions are very large, and the branchial regions very small. The front is narrow, straight, rather projecting, and placed a good deal above the level of the lateral border of the carapace, which prolongs itself under the orbits to reach the sides of the bucal frame. The orbits are small, circular, and placed on the same level with the front. The external antennæ are somewhat apart, and are bent back very obliquely under the front. The external antennæ occupy the internal angle of the orbits, which they separate from the antennary pits; their basilar joint is narrow, but rather long; the second is, on the contrary, small, and their terminal stern is nearly rudimentary. The bucal frame, which is very narrow forwards, and nearly regularly triangular, prolongs itself beyond the level of the lower border of the orbits, and is entirely occupied by the external jaw-feet, the third joint of which is triangular and terminated internally by a straight edge, under which are concealed the remaining joints. The external plastron is oval, and presents nothing remarkable. The anterior foot are strong without being large, and are capable of a close and exact application against the lower surface of the body, where they are entirely concealed: the hand is surrounded by a crest, and the claws are rather inclined downwards and inward. The remaining foot are of moderate length, and the abdomen is divided into seven joints in both sexes.

Geographical Distribution of the genus.—The only species known, viz. Hepatus fuscatus (Calappa angustata of Faust), and Hepatus angustatus of Bosc, and Hepatus Chilenus, is inhabitants of the coasts of America: the first having been found in the north
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Eurythes. They were hospitably received by Theseus, and with the assistance of the Athenians defeated Eurythes. After the battle the Heracleids are said to have obtained possession of the whole of Peloponnesus; but they had not remained in the country long before the peace made again drove them back to Attica. They attempted soon afterwards to march again into Peloponnesus, but were met at the Isthmus by an army consisting of Arcadian, Ionian, and Achsean. In a single battle with Eclemus, king of Tegeny, Hyllus was slain; the son of Hercules, was slain, and the Heracleid promised not to invade Peloponnesus for a hundred years from that time. (Herod. ix. 26; Pausan. i. 41.) They did not however observe their engagement, for both Cleodorus and Arspinus, Hyllus, and a second time, the Heracleids, renewed the attempt, but without success. The Heracleids retreated to Doris, where they obtained a considerable army to assist them in the recovery of their dominions. With the aid of an Eolian chief named Mykalides, they crossed from Naupactus to the southern side of the Corinthian gulf eighty years after the Trojan war. (Thucyd. i. 12.) A battle took place between the Dorians under the command of the sons of Aristomachus and the Peloponneseans under that of Tisamenus, the grandson of Agamemnon, in which the latter were defeated, and all Peloponnesian, except Arcadia and Achaea, fell into the hands of the Heracleids. Eurythes returned to Olynthus, and the Peloponnesus was divided between the three sons of Aristomachus; Temenues obtained possession of Argos, Cepheus of Messene, and Aristodemus, or his sons Eurysiphon and Procles (for according to the general tradition Aristodemus was not living when the division of Greece took place); Lacedaemon. The land of the conquered country was divided among the Dorians, and the old inhabitants were obliged to emigrate, or were reduced to an inferior caste. (Pausan. i. 18. 3.) Such is the traditional account of that important event in Grecian history, usually called 'the return of the Heraclid,' by which the Dorians obtained possession of the greater part of Peloponnesus; indeed the universal tradition of antiquity that the Dorians were led to this conquest by Achsean chiefs; but this fact has been doubted by many modern writers, who have considered it improbable that the aid of such should have been commanded by foreign chiefs. It has been supposed that the Heraclids were the hereditary princes of the Doric race, who were descended from a Dorian Hercules; and that the story of the Heraclids long descended from the Argive Hercules, who performed the commands of Eurythes, was not invented till after the conquest of the Peloponnesus. (Müller's Dorians, vol. i., p. 57, Eng. Trans.) Though the general tradition assigned the complete conquest of Peloponnesus to the sons of Hercules, yet there appears probable from other traditions that the greater part of the Peloponnesus was not reduced by the Dorians till long afterwards. (Thirwali's Hist. of Greece, vol. i., pp. 262 - 273.) HERACLITUS of Ephesus, summoned the Naturalist (φυσικός), belongs to the dynamical school of the I.onian philosophy. He is said to have been born about b.c. 500, and, according to Aristotle, died in the sixteenth year of his age. The title he assumed of 'self-taught' refuses at once the claims of the various masters whom he is said to have had, and the distinguished position that he held in political life perverts the wealth and lustre of his descent. The gloomy haughtiness and melancholy of his temperament led him to despise all human pursuits, and he expressed unqualified contempt as well for the political sagacity of his fellow-citizens as for the speculations of all others. Having merit learning and not wisdom for their object. Of his work 'On Nature' (τον φύσεως), the difficulty of which obtained for him the surname of 'the obscure' (αμφότερος), many fragments are still extant, and exhibit a broken and contorted style, being rather than explaining his opinions, which are often conveyed in mythical and half-scientific images. On this account he well compares himself to the Sibyl, 'who, he says, 'speaking with inspired mouth, smileless, inarticulate, and performed, pieces though centuries by the power of the god.' According to Heracleitis, the end of wisdom is to discover the ground and principle of all things. This principle, which is an eternal and universal one, is of all phenomena, he called fire. By this term Heracleitus understood, not the elemental fire or flame, which he held to

and at the Antilles; the second on the coast of Valparaso. (M. Edwards.)

HEPHESTION, a grammarian of Alexandria, lived about the middle of the second century of the Christian era. He is said to have instructed the emperor Verus. (Julius Capitolinus, c. 2.) He wrote a treatise on Greek metres (Ευθυδοξον τιμιο μετρων), which was printed for the first time at Florence in 1526. This work has also been edited by Turnebus, 4to., Paris, 1555; by Pauw, 4to., Utrecht, 1726; but the best edition is by Gasparof, 8vo., Oxford, 1810, with the 'Chrestomathia' of Procles, reprinted at Leipzig, 1832.

HEPHESTION. (AXELEOIII.)

HEPHALIDA, a family of Leptodipterous insects of the section Lepadopera Nocturna of Latreille. The moths belonging to this family are distinguished by the want of tongue, the wings being divided, long and narrow, and the thorax devoid of crest. Their larve live in the interior of vegetables, on which they feed, or in some instances they live in the ground, and feed upon the roots of plants; they are fleshly, naked, and have six thoracic, eight abdominal, and two anal feet. The pupae have the segments of the body denticulated. The principal genera contained in this family are Hepialus, Cosma, Syxga, and Zneura.

In the genus Hepialus (Fabricius) the antennae are much shorter than the thorax, the wings are long and narrow, the posterior pair nearly equal to the anterior� The larve live in the ground and upon the roots of plants.

Hepialus humuli, an insect commonly known by the name of ghost-moth, will afford an example of this genus. This moth measures from one and a half to two inches in width when the wings are expanded, and a large female is sometimes three inches in length. The male is of an immaculate silvery white colour above, and brown beneath. When on the wing, which is usually in the evening about twlight, it is seen with tolerable distinctness if below the eye, on account of its white colour; but upon a slight change in its position, when the darker colour of the underside of the wings is opposed to the eye, it suddenly disappears; hence probably arises the name which has been applied to it.

Mr. Stephens, in his 'British Entomology,' however accounts for the name in another manner; he says it is 'very common in grassy places in the middle of June, and not unfrequently met with in church-yards, whence its name of ghost-moth.' The female ghost-moth is very dissimilar in colour to the male; indeed such is the case in all the species of Hepialus. The anterior wings are of a buff yellow colour above, with spots of a deeper hue; the under wings are palish brown, having a faint pink tint.

Five or six other species of this genus inhabit this country, for descriptions of which see Stephens, Illustrations of British Entomology—Haselattela, vol. ii.

HEPTAGON, a figure of seven sides. For the regular heptagon, see Regular Figures.

HEPTARCHY. [ENGLAND.]

HERACLEA, CALABRIA.

HERACLIUM, the descendants of Hercules. According to tradition, after the death of Hercules his children took refuge in Attica, in order to escape the persecution of P. C., No. 741.
be the excess of fire, but a warm and dry vapour, which therefore, as air, is not distinct. For the soul or vital energy, and which, as guiding and directing the mundane development, is endued with wisdom and intelligence. This supreme and perfect power of life is obviously without limit to its activity; consequently nothing that it forms can remain constantly in the same form of formation. This he has thus figuratively expressed: 'No one has ever been twice on the same stream.' Nay, the passenger himself is without identity: 'On the same stream do we and do we not embark?' and so we and we are.

The vitality of the rational fire has in it a tendency to contraries, whereby it is made to pass from gratification to want, and from want to gratification, and in fixed periods it slopes slower and slower, ending in a flux.

These opposite tendencies meet together in determinate order, and by the inequality or equality of the forces occasion the phenomena of life and death. The quiescence of death however is a mere semblance which exists only for the sense of man. For man in his folly forms a truth of his own, whereas it is only the universal reason that is really cognisant of the truth. Lastly, the rational principle which governs the whole moral and physical world is also the law of the individual; everything therefore is, is the wisest and the best; and 'it is not for man's welfare that his wishes should be fulfilled; sickness makes health pleasant, as hunger does gratification, and labour rest.'

The fragments of Herculeius and the edicts of Heracleion show the inscrutable portion of the ecclesiastical system of the later Stoics, and in times still more recent there is much in the theories of Schelling and Hegel that presents a striking though general similarity.

The fragments of Herculeius have been collected from Plutarch, Stobæus, Clemens of Alexandria, and Sextus Empiricus, and explained by Schleiermacher in Wolf and Buxtorf, of the 'Achterbroederschaps,' vol. i. See also Brand's 'Handbuch der Geschichte der Griechisch-Röm. Philos.,' Berlin, 1835; and Ritter's 'History of Antient Philosophy,' Oxford, 1837.

HERACLITUS, one of the patriarch Heracliius who was governor of Africa under the emperor Phocas, assisted in the latter's administration of the lates d. 610, and was proclaimed emperor in his place. He applied himself to reform the discipline of the army; he renewed the truce with the Longobard, Syria, turned his arms against the Avars who had invaded Thrace, and had advanced to the gates of Constantineople. These barbarians soon after retired across the Danube loaded with their spoils. The Persians meantime invaded Syria, invested Jerusalem, and advanced into Egypt, in consequence of which the usual supplies of corn that country used to send to Constantineople were stopped, and the capital was afflicted by a severe famine. Anckar, the Roman ambassador, had advanced with an army into Chalcodon, but Heraclius induced the commander to withdraw, and sent ambassadors to treat of peace with Khosru, the Persian king, who spurned his offers, and summoned Heraclius and his subjects to submit to Arianism and pay worship to the sun. Heraclius, roused by this insult, collected an army, and marched against the Persians, whom he defeated in a succession of brilliant campaigns, and pursued them as far as Tigris, d. 622-37. The first year of the expedition of Heraclius against the Persians was the same in which Mohammed openly assumed the character of prophet and legislator, after his flight to Medina. Khosru was at last dethroned by his son Sioren, who concluded peace with Heraclius, and the dominions of the latter year of the empire were passed amidst theological controversies. Heraclius supported the doctrine of the Monothelites, who taught that the human nature in Jesus Christ was entirely passive under the will of his divine nature. The reign of this emperor was a reign of despotism. Pope John IV. assembled a council at Rome d. 640, which condemned the Monothelites. Meantime the Arabians, after the death of Mohammed, and under the caliph Omar, invaded Byzantium, invaded Hungary, and, under the caliph Omar, conquered Egypt and Cyrenaica. Heraclius was unable to oppose the torrent of Arabian courage and fanaticism; he sunk under the will of his divinity, and died. A son of the d. 642, February 1641, after a reign of thirty years. From that epoch the decided though gradual decline of the Eastern empire may be dated. Heraclius was succeeded by Heraclius Constantius, his son by his first wife Eudocia, who in the fourth month of his reign was poisoned by his step-
pal herald or king of arms leading him in like manner before the sovereign, but bearing a gilt instead of a silver cup, and turning the tabard so that the sleeves hung in their proper place over the arms. A collar of SS was then put about his neck, one S being, silver, the other sable, or black, alternately, and when he was named, the prince himself poured the wine and water on his head, and after the oath was administered gave him the cup as before.

The heralds—of arms were created and solemnly crowned by the sovereigns themselves, and distinguished from the heralds by richer tabards, the embroidery being on velvet instead of satin, the badge being that of a pinwheel or a letter S surmounted by a circle of gold surmounted by seventeen strawberry leaves, eight of which are higher than the rest.

Modern heralds of all classes are now made and appointed by the earl Marshal, and their functions and privileges are much abridged and disregarded. The present number in England is fourteen, viz.: four kings of arms—Garter, Clarenceux, Norroy, and Bath; the second and third being provincial kings, Clarenceux having power over all parts of England south of the Trent, and Norroy over all parts north of it. Six heralds—Somerset, Chester, Windsor, Richmond, Lancaster, and York; and four pursuivants—Rede, Rouge Dragon, Portcullis, Blue Mantle, and Rouge Croix. In Ireland one, named Ulster.

To these regular officers are sometimes added, by command of the king to the earl marshal, a herald or pursuivant extraordinary. Such were Mr. Cawood, while kings of arms and Norroy; and in 1840, the occasion of the funeral of the late King William IV., Mr. Robert W. Woods, son of Sir W. Woods, Clarenceux king of arms, was created Fitzgeraldian pursuivant extraordinary.

HERALD'S COLLEGE, COLLEGE OF ARMS, a corporation founded by Richard III., in the first year of his reign by a charter dated 2nd of March, 1483, in which he appoints the officers and the rank of the heralds, and the house called Colde Arbor, in the parish of All Hallows, Leaden Hall, London, as the residence of the heralds. This house was seized into the king's hands under the Act of Resumption as the personal property of John Withe, then garter king of arms, and during the reign of that king and of his successor Henry VIII., the heralds made several unsuccessful attempts by petition to obtain a restoration of it, or the grant of some other building for their general use. King Edward VI., in the third year of his reign, by a charter dated June 4th, confirmed to them all their ancient privileges; and Philip and Mary, by charter of the 18th of July, 1554, re-incorporated them, and granted to them Derby House, then occupying the site of the present college, and called St. Stephen's, near the City of London. The old building was destroyed in the great fire of London, but all the books, papers, &c., were fortunately saved, and removed to the palace in Westminster, where the heralds held their chambers, &c., until the college was destroyed. The corporation consists of two kings of arms—Garter, Clarenceux, and Norroy (Bath not being a member); six heralds, and four pursuivants. [HERALD.] The arms of the college are—argent, a cross gules between four ducis azure. Crest, on a ducal coronet, Or, a ducal rising azure. Supporters, two lions rampant gardant argent, ducally gorged Azure. There is a herald's college in Scotland, composed of Lyon king of arms, six heralds, and six pursuivants.

HERALDRY, the art of arranging and explaining in proper terms all that appertains to the bearing of coats of arms, badges, and other heraldic or assumed marks of honour; also the science of manninghaling processions and conducting ceremonies, comprising the forms of peerage, marriages, coronations, obsequies, funerals, marriages, and all other public solemnities.

The origin of heraldry, in the first and most commonly understood sense, is lost in the mists of antiquity. The earliest notice of all rational writers on the subject, to the necessity for distinguishing by some outward sign, amidst the confusion of battle, the principal leaders during the expeditions for the recovery of the Holy Land. But nothing is absolutely known concerning it beyond the fact that the middle of the 12th century is the earliest period to which the bearing of heraldic devices, properly so called, can be traced; and the commencement of the 13th, the time about which the earliest arrangement of arms is conceived.

The earliest roll of arms of which we have any notice is of the reign of Henry III.; and the reign of Edward I. presents us with the earliest heraldic document extant. The famous roll of Cælavereoch, a poem in old Norman French, rehearsesthe names and armorial ensigns of all the barons, knights, &c., who attended Edward I. at the siege of Cælavereoc castle, a.d. 1300. [Banser, p. 403.] Heraldry was therein first presented to us as a science. The principal rules and terms of the art were then in existence, and from about that time the latter are continually found in the tabulae and rolls of arms. The kind of English.

The oldest writer on heraldry whose work has descended to us is Nicholas Upton, whose treatise 'De Militari Officiu' was composed in the reign of Henry V., and translated in 1553. The name of his successor, Richard Sowle, is known only as the 'Boke of St. Albans.' As Upton quotes no earlier authorities, his definitions and explanations can only be looked upon as assertions made nearly three hundred years after the origin of the practice, and consequently to be believed, or not, according to the discretion of the reader. In the reign of Richard III. the English heralds were incorporated and the College of Arms founded, and in the following century a swarm of writers arose both in England and France, each explaining the other, and wasting a world of learning and research in the most absurd and idle controversies.

On the decline of chivalry the study of heraldry became less popular, which had formed for centuries a portion of the education of princes, and occupied the attention of some of the most learned men in Europe, was abandoned to the coach-painter and the undertaker, but the heralds remained as mere appendages of state pageantry, their office ridiculed, and their authority defied.

That the pedantic nonsense of such writers as Morgan, Ferne, Mackenzie, &c., contributed to these results there can be little doubt. A taste for the critical study of antiquities generally is now however reviving throughout Europe, and the use of heraldry as a key to history and biography is daily becoming more and more acknowledged.

The rules of heraldry as now practised at the College of Arms are, as we have before remarked, comparatively modern, and vary in some points from those observed in France and Germany.

According to the received authorities there are ten classes of arms, viz.:
1. Arms of Dominions, being those which sovereigns bear as annexed to the territories they govern.
2. Of Pretension, those borne by sovereigns who are not in possession of the dominions to which such arms belong, but who claim or pretend to have a right to such possession, as for instance the kings of England from Edward III. to George IV., and George V., as a waste.
3. Arms of Community, being those of bishops, cities, universities, academies, and other bodies corporate.
4. Of Assumption, such as are assumed by a man of his proper right without the grant of his sovereign, or of a king or prominent arms. As an instance when a man of any degree whatever has taken upon himself to assume the arms of a sovereign, and bear the arms of that person, and transmit them to his heirs for ever.
5. Arms of Patronage, such as those of governors of provinces, lords of manors, patrons of benefices, &c., add to their family arms, a token of their superiority, rights, and jurisdiction.
6. Arms of Succession, borne by those who inherit certain estates, manors, &c., either by will, entail, or donation.
7. Arms of Alliance, such as the issue of heiresses take up to show their maternal descent.
8. Arms of Adoption, borne by a stranger in blood, with the special permission of the sovereign, applied for in order to fulfill the will of the testator who may bequeath certain monies or estates on condition of the party's assuming his name and arms.
9. Arms of Concession, augmentations granted by the sovereign of part of his own ensigns or regalia to such persons as he pleases to honour therewith.
10. Arms Paternal and Hereditary, such as are transmitted from the first predecessor to his son, grandson, great-grandson, &c.; thereby forming complete and perfect nobility. The son being a gentleman of second coat-armour the grandson a gentleman of blood, and the great-grandson a gentleman by birth.

These several sorts of arms are displayed on shields, or escutcheons, and on banners, the ground of either being

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called the field, and the figures borne upon it the ordinaries and charges.

The shield, or escutcheon, contains certain points or locations, viz. A, B, C, the chief A being the dexter or right-hand chief, B the precise middle chief, and C the sinister or left-hand chief. D is the honour point; E the fess point, being the exact middle of the shield; F the nombril or navel point; G, H, I, the dexter, middle, and sinister base points.

The colours of the escutcheon, or of its ordinaries and charges, are five:

- Red (the heraldic name of which is) Gules
- Blue
- Black
- Green
- Purple

To which must added, or rather prefixed, yellow and white, which being ordinarily represented by gold and silver, are called metals, and named by heralds, after the French, Or and Argent.

There are also two other colours recognised by heralds, but rarely seen in English coats of arms, viz. orange, called Tenne, and a dark blood-red inclining to purple, called Sanguine, or Murrey, from mulberry. These colours and metals have been since the sixteenth century expressed in engravings by lines and points or dots, the ingenious idea of which is attributed to an Italian named Petrascenia. Thus Or, or gold, is known by the escutcheon being filled with small points or dots.

Argent, or silver, by the shield being left perfectly plain.

Gules, or red, by perpendicular lines from the top to the bottom of the escutcheon.

Azure, or blue, by horizontal lines.

Sable, or black, by the two former crossing each other.

Vert, or green, by diagonal lines from right to left.

Purpure, or purple, by similar lines from left to right.

Tenne, or orange, by perpendicular lines crossing lines from right to left.

Sanguine, or murrey, by transverse lines from each side of the shield.

The metals and colours above mentioned are also distinguished by some heralds by the names of planets and precious stones, and there are besides, according to Sir John Ferne (Glory of Generosity), twelve other fantastical sorts of blazoning (by which word is meant, describing in proper heraldic terms, the bearings, &c., of a shield or banner): but as all these are now obsolete, we shall only allude to the fact without encumbering our columns by rehearsing them.

There are nine roundlets, or balls, also used in heraldry, the names of which are sufficient to denote their colour, without particularising the same, viz.:

- Beziants. Or
- Hurts. Azure
- Pollets. Sable
- Plates. Argent
- Pommes. Vert
- Oranges. Tenne
- Torteaux. Gules
- Golpes. Purple
- Guzes. Sanguine.

To metals and colours must be added Purp, which, according to some heralds, are of ten different sorts. These most commonly with are however comprised under the names of Ermine and Vair, the rest being variations of colour and disposition. The first is represented in heraldry thus, the field being white, or argent, the spots and tails black or sable.

The second is represented by figures like little cups or balls reversed and ranged in lines, thus. The colours being, of the field Argent, of the cups Azure, or vice versa; but where the matter is doubtful, the metal to possess the field by pre-eminence.

N.B. If the same figures are found in other colours, they are no longer to be blazoned or described as Vair; but 'Purp, Or, and Gules,' or whatever else it may be.

The principal variations above mentioned are:

1. Ermines, the field of which is Sable, and the spots and tails Argent.

2. Erminois, the field Or, the spots and tails Sable.

3. Pean, the field Sable, the spots and tails Or.

4. Ermines, the same as Ermine, with the addition of a red hair on each side the black tails.

5. Vair en point is when the point of a cup or bell is opposite to the base of another.
6. Counter Vair, when bells of the same colour are placed base to base and point to point.

7. Potent is classed as a fur, but the word signifies a crutch or a gibbet (Potence, Fr.) It is represented thus—

8. Potent-counter-potent, sometimes called Vairy cuppy, is when the crutches are counter placed; thus—

The principal charges or figures expressed on the shield are called the Ordinary; they are nine in number, and styled honourable. They consist of the Chief, the Pale, the Bend, the Bend Sinister, the Test, the Bar, the Chevron, the Cross, and the Saltier.

The Chief is the upper third of the escutcheon, determined by a horizontal line; thus—

The Pale is the middle third of the field when divided perpendicularly.

This ordinary has two diminutives; the Pallet being half the width of the Pale, and the Endorse half that of the Pallet.

The Bend is formed by two diagonal lines drawn from the right or dexter chief to the left or sinister base; thus—

The Bend has four diminutives; the Bendlet, the Garter, the Cost, and the Ribbon.

The Bend Sinister passes from the left to the right of the shield, and has two diminutives, the Scarp and the Baton.

The Test occupies the middle third of the shield divided horizontally.

The Bar is similarly formed, but occupies only a fifth of the shield, and is never borne single.

When the number exceeds five, it is blazoned Barry of so many pieces, expressing the number and colour, as Barry of Six, Or, and Gules.

The Bar has two diminutives; the Barret, half the width of the Bar; and the Closed, half that of the Barret.

The Chevron is a figure formed like the rafters which support the roof of a house, and is therefore sometimes called a Spar, and in German Sparrn. It has two diminutives, the Chevronel and the Complete.

The Cross, as an ordinary, is drawn thus. All other sorts of crosses should, in our opinion, come under the head of common charges, as they must be specially described.

The Saltier is the figure generally known in England as St. Andrew's Cross, and is indeed always so called by the German heralds, and frequently by the Scotch.

Eight of these nine honourable ordinaries give their names to the various single lines used in dividing the field of the escutcheon, where more than one metal or colour is required, such escutcheon being described as parted per pale, when divided perpendicularly; per fess, when divided horizontally; per cross, when in four squares; per saltier, when in four triangles; per bend, when diagonally, from right to left; per bend sinister, when in the contrary direction; and per chevron, when in the shape of that figure.

The Chief being itself formed by a single line, they do not say parted per chief; but when the partition-line is not straight or even, its peculiarity must be specified in every instance; and of crooked lines there are eight recognised by English heralds, namely:

1. Engrailed
2. Inverted
3. Wavy
4. Embattled
5. Nebuly
6. Raguly
7. Indented
8. Dancette, limited to three indentations

It is therefore necessary to say 'a Chief engrailed,' or 'a Cross inverted,' or 'Parted per fess, indented,' and so forth.

In addition to the nine honourable ordinaries, there are the Quarter, the Canton, the Fret, the Pile, the Orle, the Tressure, the Flanches, the Flasques, the Voiders, and, according to some authorities, the Lozengue, the Fusil, the Mascle, and the Rostado.

The Gyron is formed thus: and when the shield is divided per cross and per saltier into eight similar divisions, it is called Gyronny.

The Quarter is, as its name imports, the fourth part of the shield, and is always placed in chief.

The Canton is a square figure like the quarter, but smaller, occupying only a third part of the chief itself.
The Fret is formed thus: when composed of more pieces similarly interlaced, the field is said to be fretted.

The Pile is formed like a wedge, thus it is sometimes borne in bend, but must then be so described.

The Orle is a sort of border or frame within the shield.

The Treasure is commonly supposed to be half the breadth of the Orle, and is generally borne double, and what is called flory and counter-flory, as in the royal achievement of Scotland.

The Flanches are formed by two curved lines nearly meeting in the centre, thus:

The Flasques may be called the diminutives of the Flanches, and the Voiders the diminutives of the Flasques, as the only difference is in the quantity of the shield which they occupy.

The Lozenge is of the shape of the Diamond in a playing-card. A shield so divided by diagonal lines as to form several of such figures is called Lozengy.

The Fusil, called also a Spindle, is longer and narrower than the Lozenge. A shield so divided by lines as to form several of such figures is called Fusily; and if parted per pale and per bend, would be either Lozengy-bendy, or Fusily-bendy, according to the width of the space between the lines.

The Mascle is of the same form as the lozenge; but hollowed out, or, in heraldic term, Facted, so as to form a mere frame of that shape.

The Rustre is a similar figure, but pierced or voided round, instead of square, thus:

To these some heralds add the Inescutcheon, which is a small shield placed in the centre or top point of the escutcheon; but this, except when borne by an heiress as an escutcheon of pretence, may, in our opinion, be ranked amongst the common charges, as may also the lozenge, the fusil, the mascle, and the rustre.

We have next to speak of differences, so called from their being particular marks borne to distinguish persons of the same family from one another. While heraldry was arbitary, the son frequently assumed arms perfectly different from those of his father; but in the time of Edward I. we find two marks generally considered as family differences or signs of cadency,—the Border and the Label.

The Border is, as its name denotes, a guard or defense to the shield, and in the French heralds is accounted an ordinary. The border should always be in width one-fifth of the breadth of the shield itself, and stops when it encounters a chief, a quarter, or a canton, but passes over all other ordinaries. If the interior line is not plain or even, it must be described as engrailed, inerced, &c. When divided into four equal parts, it is called a border quarterly. When divided into small squares of different colours, it is called a border gablebonated, or gobony, or compony. When into two rows of squares, it is called a border counter-compomy. When into three rows of squares, it is called checky.

The Label, as it is sometimes called, is a sort of filet from which depend generally three or five labeaux, or points, thus,—

It is sometimes however said to have been borne as a common charge, and is to be found only with one point and with as many as nine: other authorities consider it always as a difference. The label of three points is now always used as the difference of the heir or eldest son of the first house.

For the second son the difference is a crescent

For the third, a mullet, or star of fine points

For the fourth, a martlet

For the fifth, an annulet

For the sixth, a fleur-de-ly

For the seventh, a rose

For the eighth, a cross moline

For the ninth, a double quartfoil

These are called the differences of the first house; and by the six first, the six sons of Thomas Beauchamp, earl of Warwick (temp. Edward III.) are distinguished in a window of St. Mary's Church at Warwick.

The children of the second house are distinguished by the first son bearing a crescent charged with a label; the second, a crescent charged with a crescent; the third, a crescent charged with a martlet, and so on.

The junior branches of the royal family are however distinguished by the label only, the Prince of Wales bearing it simply argent, and the rest distinguished by various charges, a practice as antient as the reign of Richard II.

In the general term charges we comprise all descriptions of figures in heraldry applied to the armament, be they animate or inanimate, real or imaginary, everything in short contained in or placed upon the shield; but those we have above-mentioned are to be distinguished from the common charges, by which expression we understand all other.

Many of these, such as crosses and crescents in all their variety, escabole shells, bezanta (the golden coins of Byzantium, or Constantinople), Saracen's heads, &c., were assumed during the Crusades, or after the return of the Crusaders, by themselves or their families, in commemoration of those expeditions. Others, such as beasts, birds, fishes, reptiles, trees, flowers, the sun, moon, stars, &c., were borne either as types of the peculiar dispositions or qualities, or as denoting some similarity of sound in the pronunciation the names of the bearers. Such have been called with us canting or punning arms, and by the French armes parlantes. It has been the fashion with modern be:
rauls to decry this species of bearing; to account it of rare occurrence in antient heraldry, and less honourable where it did occur: but recent investigations prove it to have been one of the most frequent as well as most antient descriptions of charge, and which would be worthy of respect as any other. It has indeed been suggested that the bearing frequently gave rise to the surname itself. This is however a mere conjecture; but the grants of arms which have been handed down to us prove at least that when sovereigns desired to express their approbation of noble or useful deeds by such distinctive names, the person of the person to be honoured was frequently expressed by the charge, instead of the act he had performed. In the first place, the case had been considered in those days as an inferior bearing. An acquaintance also with the language of the nation and time in which the arms were first granted or assumed, as also of its pronunciation, is of the greatest importance in such a questeast. And such researches may yet shed much light upon the origin and history of heraldry. The Cornish Family of Godolphin bear a white eagle; but those who are unacquainted with the antient Cornish language would be far from guessing that a white eagle was meant in it. A third species of allusive bearings is that which designates the place or office of the individual; and many charges appear in the arms of our nobility derived from ancestors who have held any of the great offices of state, especially those of our monarchs; and lastly, a fourth portion have been assumed, as Camden has exemplified, in honour of the feudal lord, or most powerful neighbouring chief, or been conceded to the baron, as a mark of distinction or affection.

The crest is the next object in point of antiquity to the shield. It was the ornament worn upon the helmet, and consequently the helmet itself was generally represented with upon the head of the knight or nobleman. The crest from Richard II.'s helm was rarely worn, except upon the tilting helmet, and then upon a wreath which was generally a twisted roll of silk of two colours, being those of the family of the wearer. Beneath this wreath was frequently a plume of hay or horsehair of the helmet, a piece of silk or velvet lined with ermine, which floated with jaggend upon the shoulders: these are by the French called chamescens, and by us mantlings or lambrequins. Supporters were at first supposed to have taken their rise from the fanciful devices of the early seal-engravers, who filled up the space not occupied by the shield with all sorts of monsters or natural animals, by way of ornament. They did not become common till the close of the fourteenth century, and Henry VIII. was the first monarch who formally granted supporters to peers of the realm and knights of the garter and of the bath. No person under the rank of a knight of the bath has a right to supporters, unless he be ennobled.

Mottoes had their origin probably in the war-cries of the different knights. There are several instances however of a motto being borne in addition to the cri de guerre. The marks of rank represented the order of arms, and were assumed to have been taken from the fanciful devices of the early seal-engravers. The origin of the crest; but it was altogether independent of the armorial bearings of the family, although in many instances it became hereditary. It is frequently, but very incorrectly, placed upon a wreath.

The arrangement and description of all the above insignia in proper heraldic order and terms are styled the marshalling and blazoning of arms.

We shall speak first of blazoning. The verb 'to blazon' is generally derived from the German blasen, to blow or sound a horn or trumpet, such being usually the practice before proclaiming the style or arms of any personage on his arrival in the camp, the lists, or the banqueting hall. The term however was soon applied to the proclamation of arms, and finally used as synonymous with description generally: thus we find in the old book on hunting written by Jacques de Fouiloux, and presented to Charles IX. of France, the description of the bare entitled 'Le Blason du Livre.' To spread the fame or the disgrace of any person was also to blazon it. Favra, in his 'Théâtre d'Honneur,' says, 'Les habitants discut pour blazonner leur ville; et in the Chirurgie, 1618: 'Le blason de l'épée.' In the French order of the crown are commanded not to suffer any person to defame (blazonner et mediro) the ladies.

The principal rules of blazoning are as follow:

1. A charge is always to be placed between the two chief lines of the field, noticing the lines, if any, by which it is divided, the difference of those lines, and then the colours, next the charges, beginning with the immediate charge, that is, the one which lieth nearest the field, such as any ordinary, and nearest the centre of the field if a common charge, and lastly, the more remote or inferior charges. Thus the accompanying charge would be blazoned: 'Parti per famille indented, azure and gules; on a fess argent, a crescent of the first between two mullets sable.'

2. All tautology is to be strictly avoided, and the repetition particularly of such words as of, or, and with, is considered a great fault. In above blazon, 'a crescent of the first' is said, in order to avoid the repetition of the word azure; so, if it were gules, we should say 'a crescent of the second.' For the same reason, when the field is undiffered, and the charges, though of the same description, of only one colour or metal, it would be blazoned in this way: 'Argent, a chevron between three mullets sable,' by which the chevron is understood to be sable as well as the mullets.

3. It is accounted by English heralds false heraldry to put metal upon metal, or colour upon colour; but instances of such blazoning frequently occur in foreign arms, particularly in those of German families. The objection is restricted only to one of the same, and not when the metal or colour is considered as distinct as possible, which can only be done by adhering to the English rule.

4. When a charge is represented of its natural colour, it is to be blazoned as such.

5. In blazoning animals, the teeth and claws, or talons, of the ravenous beasts are called their arms; and when they are to be represented of a different colour or metal from that of their bodies, they must be blazoned as 'armed, Or,' or 'Gules,' as may be. If the tongue is shown, the beast is said to be lanced of such or such a colour, as 'a Lion, argent, armed and langued, azure.' More docile animals, the stag and deer, for instance, are said to be 'attired,' and not 'armed,' the tongue and parts of prey being, according to their attitude, blazoned, Rampant, Rampant-guardant, Rampant-regardant, statant, passant, salient, sejant, couchant, dormant, maintant, issuant, combatant, ensanguine, erased, &c. Stags are said to be 'balled, &c.'

Birds of prey are also blazoned as 'armed' of such a colour, but such as have no talons are described as 'beaked and membered.' The Cock is said to be arm'd, crested, and foliopted, the latter term referring to the wattles, or gills.

Birds, according to their attitudes, are blazoned Volant, Displayed, Preying, &c.

Fish, when placed horizontally, are termed 'nastant; when perpendicularly, 'hauriant; when bent (as the dolphin is generally represented), 'embranché; if face to face, 'respecting each other; if back to back, 'endorsed.'

The sun must be blazoned according to his condition, full, or in his eclipse. The moon, defined as crescent, superincrescent, or crescent point upwards, with the horns presented with the horns upwards; the second, when the horns point to the dexter or right side of the shield; and the third, when to the left or sinister side. If downwards, it is called a crescent reversed.

The human figure is blazoned either vested or naked. Parts of the human figure, if cut off, are said to be severed, or if ragged or torn off, 'erased.' Heads are also blazoned 'wreathed or bandied, as the case may be.

Flowers are blazoned 'jessant, slipped, seeded, &c. When the field of an escutcheon is covered with flowers of the same colour or metal, or any other pattern with flowers, or scroll work intermixed, it is said to be 'diapered; but when it is filled with flowers, crosses, or any other device of another colour or metal, repeated, as the French say, sans nombre, it is then blazoned as 'seme.' An animal so covered with flowers or crosses should be blazoned as 'poudered.

When the field, charge, or supporter is covered with guets, or drops, it is called 'gutté; and if of gold or yellow, 'gutté d'or; or of argent, 'gutté d'eau; of gules, 'gutté de sang; of azure, 'gutté de lames; of vert, 'gutté de veines; and of sable, 'gutté de testes.' When a guete or any other ordinary passes over an animal, it is said to be debondrous.

When the charge is divided by any of the partition lines, and the colours of the field are reversed upon it, it is said to be 'bordure.'

By marshalling of arms we understand the orderly disposition of sunn dry coats, belonging to distinct families, in their proper places within one shield, by impaling or quartering;
and the joining of ensigns of honour and dominion with the paternal arms of the bearer, &c.

When a man marries he impales his wife's paternal arms, by placing them upright on the left side of his own in the same escutcheon, such impalement being also called arms en baron et femme. If that wife should be or become an heiress, the husband may bear her arms on an escutcheon of pretence over his own; Legh says however that this should not be done till he has begotten an heir of that heiress. In Scotland the husband frequently quarter the arms of her own when she is an heiress. In England this is only done by the children of such a marriage. If the mother be no heiress, the children cannot quarter her coat.

Another mode of impalement was by taking only half of each coat, or joining them in one escutcheon. This was called dimidiation; but the practice has long fallen into disuse.

The complete escutcheon of a family should never, according to some authorities, consist of more than six or eight quarterings; others admit of sixteen; and the Germans marshal sometimes twenty and thirty coats in one shield.

The best mode of marshalling so many is to begin by placing the arms of the first heiress who married into the family next to the paternal coat, and next to them the several coats which that heiress brought in; then the arms of the second heiress are by the same principle brought in, and so on in rotation. When the royal arms are brought in by any match, it is usual however to give that match the second quarter next to the paternal coat, and some say it should be the sole arms of the sovereign.

The arms of a widow are composed of her husband's and her father's impaled within a lozenge. Those of a maid are her father's only, borne in a lozenge also, without any difference, except she be of the royal family, in which case a distinction is expressly furnished by the heralds for the individual coat by the command of the sovereign.

If the widow be an heiress, she may wear her paternal coat in an escutcheon of presence over that of her husband, the latter however being in a lozenge, and her daughter, while unmarried, may quarter her mother's arms with her father's in a lozenge; but if the mother be no heiress, then, says Legh, the daughter has no further right to the arms of her mother's family, except to set them up pale-ways in her house to show her descent.

If the husband be a knight of the garter, or of any other order, the arms of the wife must not be impaled, but placed in a separate shield.

Such are the principal rules and terms of the science of heraldry; for further detail we must refer our readers to Waugh's Armorial, Nisbit's, and to them, at the same time, against the Seylla and Charybdis of the heraldic inquirer, the absurd and misguided enthusiasms of the champions of the art, and the undeserved commendations of Byrom. Byrom has been stigmatized as the science of fools with long memories. It should rather be designated as a science which, properly directed, would make fools wise. It is, we repeat, a key to history which may yet unlock stores of information; at present its most learned professors have studied the art itself more than the use which may be made of it. They have wasted their time and their learning upon idle controversies, and still more idle speculations. A mysterious signification has been given to nearly every charge and tincture known in armoury, and a different one by nearly every writer upon the subject. The names of the ordinaries and colours have been derived from every sort of object and through every known language; that we have already said about 2, and on which we can depend. Even the word blazon, the only one we have ventured to hint the origin of, has been holly claimed as Arabic by some disputants, and we will certainly not read this article one line by one attempt to dispute it.

HERAT. [Khorezm.]

HERAULT, a department in France, on the coast of the Mediterranean, which derives its name from the river Herault. The department approximates in form to a parallelogram, having its greatest extension N.E. and S.W.; it is bounded on the N.E. by the department of Gard; on the S.E. by the Languedoc; on the S.W. by the department of Aude; and on the N.W. by the department of Aveyron, and Gard. The greatest length from north-coast to south-west is nearly 60 miles. Its greatest breadth at right angles to the length is about 44 miles. The area of the department is estimated at 2417 square miles; the population in 1836 was 357,846, being about 148 to a square mile, somewhat below the average density of the population of France. The area rather exceeds that of the two English counties of Chester and Salop, but it has less than two-thirds of their population. Montpellier, the capital of the department, is in 43° 36' N. lat. and in 3° 52' or 3° 53' E. long.: 366

The coast of the Mediterranean is low, and lined by etangs, or pools; the chief of these are the Etang de Vendres, near the mouth of the Aude; and the Etang de Stau Mau and Mauguio, which, with the intermediate waters, form one lake 45 miles long, extending 3 miles from the mouth of the Hérault to that of the Vidourle.

The north-western side of the department is occupied by the Espinouques mountains, part of the chain of the Cévennes, and their branches: nearly one-third of the department is of a mountainous or bony character. Towards the Mediterranean the surface becomes more level. Many streams flow from the mountains to the sea. The Vidourle rather belongs to the department of Gard, in which it rises; but in the lower part of its course it separates the departments of Gard and Hérault. The Salazin and the Les, with its feeder, the Mosson (which receives the Caulisaz), are next in size to the Vidourle. By the addition of the Hérault it is larger: it is generally considered to rise near Villeneuve in the department of Gard, but the head of its feeder, the Travezet, which should be regarded as its true source, rises at the latter the west part of the departments of Gard and Aveyron. It flows about 27 miles first eastward, then southward, before entering the department of Hérault, through which it flows about 33 miles in a direction nearly south by west into the Mediterranean, near Aigues Mortes, near April 28. Its outlet is at the foot of the Aigues Mortes, on the lower slopes of the Cévennes into the sea. The Orb rises on the north-western boundary of the department, and flows about 65 miles in a very winding channel to the Mediterranean: it is navigable for about 23 miles. Its tributaries are the Baison, the Vialas, the Jean or Jau, and the Bernasobre, all on the right bank. The Aude forms for a short distance the south-western boundary of the department, and the Cesse and the Biane, which belong to the system of the Aude, with the Agout and the Larn, which belong to the system of the Garonne, water the western part.

The navigable canals of the department are numerous, and some of considerable extent. The Canal du Midi, or Canal du Languedoc, enters the department on the south-west, and runs nearly 40 miles to its termination in the Mediterranean, near the town of Montpellier. The distance of the canal is 17 miles along the coast-waters from the nearest point of the Etang de Mauguio to the town of Cette. The canal which skirts the Etang de Mauguio is about 6 or 7 miles long; and that of Lunel, from the town of Lunel to the Etang de Mauguio, about 8 miles. The Canal de Graves (or the navigation of the Les) with that of the Grau du Les is about 7 miles. That portion of the Canal Radelle (extending from Aigues Mortes to the town of Aigues Mortes) is about 4 miles long; and the Canaux de Robine de Vie and Peyrade are under 2 miles each. A canal has been projected from Montpellier to the Canal des Etangs: its length is about 36 miles, and 185 miles of the canal navigation of the department is about 87 miles.

There are seven 'routes royales,' or government roads, with an aggregate length of 232 miles; but of these about 54 miles are rather in common use, while more than 36 miles are above 36 miles unfinished. The principal government road is that from Paris into Spain by Perpignan; it enters the department between La Cavalerie, in the department of Aude, and through the villages of St. Lodève, Pêcheres, and Béziers to Narbonne in the department of Aude: the other roads lead in various directions from Montpellier and Béziers. There are seventeen 'routes départementales,' with an aggregate length of 300 miles; but not much more than half this extent is in repair. The
HER

chimneys visciarum,' or bye-roads and paths, have an aggregate length of more than 3000 miles. There is a railroad from Montpellier to Perpignan and Céret, 17 miles long, which is much used for passengers.

The greater part of the department is occupied by the strata between the chalk and the new or saliferous red sandstone. About the upper watershed of the Orb are found the formations which intervene between these and the primitive rocks; and in the western extremity of the department, amid the Cévennes, the primitive rocks occur. The mineral wealth of the department is great; there is coal, some iron; there are various marble quarries; and very valuable marble, much valued for ornamental purposes, and a species of lignite which is used, under the name of 'fossil ash,' for manure. There are mineral waters at Béziers, near the Orb; and there are some important salt-pans along the coast. The climate of the department is mild in winter; in summer it is very hot, but on the whole healthy.

Besides a third part of the surface of the department is waste, about one-fourth is arable, one-sixth is devoted to the cultivation of the vine, an eighth is woodland (the forests are chiefly of oaks, cork-trees and pines), and the remainder is divided among the various cultivations of the departments of the étangs, rivers, ponds, and other waters. The quantity of grass-land is very small. Wheat is the grain chiefly cultivated; then rye and oats; barley, and pulse (maize), and maize, or rather corn, which is now raising potatoes much grown. The quantity of grain raised is not beyond what is required for home consumption; the produce of the vineyards, both wine and brandy, the dried fruits (pears), and the honey are the chief articles of export. The olive, fig, and mulberry are cultivated, and some plants used for dyeing are produced. Horned cattle are not numerous, but sheep are; and also poultry. The manufacturers of the department, excepting the chief cities, are considerable; they consist chiefly of cloth, especially for clothing the troops, and other woolen fabrics, cotton yarn and cotton goods, and silk hose: above 17,000 workmen are engaged in these various branches. The fishery on the coast is vastly increased by the culture of sardines.

The department is subdivided into four arrondissements, of which Montpellier, Béziers, Lodève, and St. Pons, are respectively the chief towns: the area and population of the department are thus distributed:

<table>
<thead>
<tr>
<th>Arrondissement</th>
<th>Area</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montpellier</td>
<td>780 sq. miles</td>
<td>123,656</td>
</tr>
<tr>
<td>Béziers</td>
<td>966</td>
<td>126,479</td>
</tr>
<tr>
<td>Lodève</td>
<td>474</td>
<td>27,407</td>
</tr>
<tr>
<td>St. Pons</td>
<td>467</td>
<td>48,311</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5417</strong></td>
<td><strong>347,846</strong></td>
</tr>
</tbody>
</table>

The chief towns of each arrondissement are as follows:

In the arrondissement of Montpellier are Montpellier, near the Léz, population in 1836, 35,506 [Montpellier]; Céret, on the Mediterranean, pop. in 1831, 10,539 [Céret]; Lodève, pop. 27,000, the commercial town, pop. 6050, or 6260 for the whole commune; Mèze, on the Étang de Thau, pop. 4258 for the town, or 4400 for the whole commune; Ganges, on the Hérault, pop. 4173 for the town, 4193 for the whole commune; Marguelettes or Masquiargues on the Vidourle, pop. 3233 for the town, 3292 for the whole commune; Aniane, near the Hérault, pop. 2408 for the town, 2740 for the whole commune; Pouzice near the Étang de Thau, pop. 1850 for the town, 1916 for the whole commune; Pignan, near Montpellier, pop. 1877 for the town, 1889 for the whole commune; Frontignan, on the line of the étangs near Céret, pop. 1656 for the town, 1877 for the whole commune; and St. Baudille de Poutos on the Hérault, pop. 1622: beside the smaller towns of Languerens, Mauguio, Boisseron, Castries, Les Matelles, Celleneuve, Miravaux, and Villeneuve, near Montpellier.

Lunel and Frontignan are well known for the wines produced in their neighbourhood; the former is a place of considerable trade: brandy is sent to the north of France; and in the weekly market much soap is sold. There are some important salt-pans along the mountainous parts of the department. Ganges, a town of considerable business, preserves the remains of an old castle; and at Aniane are the remains of the first monastery built by St. Peter.

In the arrondissement of Béziers, Béziers are on the Orb, population in 1836, 16,233 [Béziers]; Badarieux on the P.C, No. 742.

Orb, pop. 5781 for the whole commune [Badarieux]; Pézéas on the Hérault, pop. 7481 for the whole commune; Montpellier, pop. 25,460 for the commune, pop. 7645 near the Mediterranean, pop. 7965 for the town, 8202for the whole commune; Marseillan, on the Étang de Thau, pop. 3625 for the town, 3687 for the whole commune; Montagnac, near the Orb, pop. 3206 for the whole commune; Florennes, near Marseillan, pop. 3522; Bessan on the Hérault, where the navigation begins, pop. 2210 for the town, 2228 for the whole commune; Sénas, on the Hérault, pop. 1970; Villeneuve-Loubet, pop. 1966 for the town, 1996 for the whole commune; Servian, a few miles north-east of Béziers, pop. 1918 for the town, 2174 for the whole commune; and Viaes, near Agde, pop. 1684 for the town, 1707 for the whole commune: besides the smaller towns of St. Gervais, Nissa, Capestan, Maureillas, and Quaranze.

Pézéas is on the road from Paris to Narbonne, and into Spain through Moulins, Clermont, Mende, and Laroque, not far from the right bank of the river Hérault. Pézéas was known to the Romans by the name Passoone. Pliny notices the excellence of the woolen cloths made there. Pézéas was in the middle ages a châtellenie, which was successively held by the houses of Montmorency and Conti, the latter being the younger branch of the house of Bourbon Condé. The town is neatly built, and is adorned with two fountains, a good quay, and handsome promenades. There are manufactures of woollens, which yield the inhabitants, kerchiefs, leather, soap, verdigris, silk-stickings, and hats. Wool-washing, for which the waters of the Pein are considered to be well adapted, and distilling, are carried on. The wines of the town are very esteemed. Trade is carried on in the manufactured articles above mentioned, and in wine, brandy, almonds, olive-oil, dried fruits and capers, alum and copperas. There is a good market on Saturday, and in the vicinity. There is a theatre and a college founded by Henr IV. Near this town is an old castle, built by Constable Montmorency.

Agde is a town of great antiquity. It is thought to have been a colony of the Greeks of Massilia: it is now called Agde. A bishopric was established here, probably in the fifth century, which continued to the time of the Revolution; the bishop was a suffragan of the archbishop of Narbonne; there was also a celebrated abbey, which had at one period 300 monks. In the middle ages Agde was the capital of a county. The harbour is accessible to small vessels, of which 120 belong to the port: the chief trade is carried on coastwise. There are considerable salt-pans near the town.

In the arrondissement of Lodève, are Lodève, a feeder of the Hérault, population in 1836, 11,268 [Lodève]; Clermont de Lodève, near the Lodève, pop. 5905 for the town, 6037 for the whole commune; Gignac, near the Hérault, pop. 2594 for the town, 2779 for the whole commune; St. André, between Gignac and Clermont de Lodève, pop. 2131; and Montpeyroux, near Gignac, pop. 1675 for the town, 1713 for the whole commune: besides the smaller towns of Joncels and Ceilhes.

In the arrondissement of St. Pons, are St. Pons on the Jean or Jeau, population in 1836, 6955; La Salvetat on the Agout, pop. 2066 for the whole commune; and St. Chianin, between St. Pons and Béziers, pop. 2375 for the town, or 3270 for the whole commune: besides the smaller towns of Orlaques and Olonzac.

St. Pons is situated in a valley amid the Cévennes, on a road leading across the mountains from Béziers to Castres and Alby. The town, which is pleasant, probably derives its origin from a religious house of the Benedictine order founded in the time of the early Franks. The old church, which transported hither the relics of St. Pons, his patron, Saint, martyred at Nice. In A.D. 1317 Pope John XXII, elevated the abbey of this house to episcopal rank, and de- tached thirty-nine parishes from the Diocese of Narbonne to form a new diocese for him. The bishopric was abolished at the Revolution. Woolen cloth, hosiery, leather, and cotton-yarn are manufactured. Marble is quarried in the neighbourhood.

The population of the towns, except the chief towns of arrondissements, is taken from the census of 1831.

The department of Hérault constitutes the diocese of Montpellier, the bishop of which is a suffragan of the archbishop of Avignon. It is in the jurisdiction of the court royale, or high court of justice, of Montpellier, and in the Vol. XII.—U
circuit of the university of the same city. It is included in the ninth military division, the head-quarters of which are at Montpellier. It sends standing members to the Chamber of Deputies. There are four Protestant consistory churches.

The proportion of those who could read and write among the young men enrolled in the military census of 1828–29 was forty-five in every hundred, being above the average of France.

The department is composed of the former dioceses of Montpellier, Lodève, and Béziers, part of the diocese of Narbonne, and part of the diocese of St. Pons, if not all the latter, are in Languedoc.

HERBELOT, BARTHELEMI D’, was born at Paris on the 14th of December, 1625. He commenced the study of the Oriental languages in early life, and acquired an accurate knowledge of the Arabic, Persian, Syrian, and Turkish languages. During his residence in Italy, whither he went with the hope of obtaining instruction from natives of the East, he enjoyed the friendship and patronage of the Cardinals Barberini and Grimani; and on his return to France he received a pension from Fouquet of 1500 livres, which he afterwards lost on the disgrace of that minister. He was subsequently appointed Oriental secretary and interpreter to the king. During a second visit which he made to Italy he was received in the most distinguished manner by Ferdinand II, grand-duke of Tuscany, who presented him with a great number of valuable Oriental MSS., and wished to retain him at his court. But D’Herbelot, induced by his wishes and the solicitations of the minister Colbert to return to Paris, where he was appointed professor of Syriac on the death of Auvergne. He also received a pension from the king. He died 5th of December, 1692.

The work by which D’Herbelot is known to posterity is entitled Bibliotheque Orientale, ou Dictionnaire Universel, contenant generalement tout ce qui regarde la connaissance des peuples de l’Orient, 4 vols. Paris, 1664. This work, which was begun immediately, and upon which he employed the labour of many years, was published after his death by Gaudal. The Bibliotheque Orientale was founded upon the Arabic dictionary of Haü Khalfa, and has been deservedly considered by scholars as a most extraordinary work for the time in which it appeared. D’Herbelot also drew his materials from numerous other works in Arabic, Persian, and Turkish, which are enumerated by Gaudal in his preface to the Bibliotheque. On many subjects connected with Oriental history and antiquities the Bibliotheque Orientale supplies the only information which is available at the present day to a person unacquainted with the languages of the East. But its statements must be received with great caution; for while the learned author appears to have had a most extensive knowledge on all subjects connected with the East, he certainly did not pay sufficient attention to accuracy. It is true he collected that he did not live to complete the work, and that his plan embraced too great a number of subjects to allow any individual to do justice to them all.

Bibliotheque Orientale was reprinted at Maastricht, fol. 1776, and also at the Hague, 4 vols. 1700–1789. The latter edition contains many valuable additions by Schultens and Reiske, and also a supplement by Veldolouf and Galand. An abridgment of the original work was published at Paris, 6 vols. 1762, by Désaixs. A German translation of the Bibliotheque Orientale was published at Halle, by Schulz, 4 vols. 1785–90.

D’Herbelot also wrote several other works, which have never been translated. Amongst them is a remarkable mention of a Turkish and Persian Dictionary, in three volumes folio.

HERBERT, EDWARD, LORD HERBERT OF CHERTUBY, a profound and original thinker, but of a tempestuous and violent temper, was born at Oxford about the year 1581, at Montgomery, in the principality of Wales. After going through the usual course of studies at Oxford, where he was a member of University College, Herbert went to London in 1600, where he proceeded to the Continent with the design of seeing foreign parts, but was induced by an inherent love of enterprise and danger to join the English auxiliaries then serving the Protestants, where lie soon distinguished himself by his reckless daring and intrepidity. Having returned to England, he was upon the accession of James I, created a knight of the bath, and was distinguished at the court of that pedantic monarch by his gallantry and his learning. In 1618 Sir Edward was sent ambassador to France: in this situation the bold independence with which he answered a haughty declaration of the French monarch, brought upon him the displeasure of the French monarch, at whose request he was recalled. The conduct of Herbert met however with the approbation of James, who, upon the death of George Villiers, sent him in a similar capacity to France, where he published his first work, entitled Tractatus de Veritate, prout distinctur a Revelatione, a Verissimi, et a Possibili, et a Falso, 4to, Paris, 1624. The year following he retired to his country seat in England, and was appointed envoy to the kingdom of Ireland.

From this date Lord Herbert does not appear to have held any public office, and his time was divided between the gairties of the court and the pursuits of literature. In 1631 he was elevated to an English peerage, and in 1632 to a Scotch dukedom, under the name of the Tractatus, of which another appeared in 1643, accompanied with the treatise De Religione Gentilium, Errorumque spudous Cosmacci. On the outbreak of the political troubles under Charles I, Lord Herbert at first took the side of the parliament, which however he subsequently abandoned at a great sacrifice of personal interests and fortune. He died in the year 1648. After his death two posthumous works were published, the Expeditio Buckinghami Ducis in Ream Insulam, and the Life and Reign of King Henry VIII., with a dedication to the first Charles. It is by the latter work that Lord Herbert is best known to posterity. His Memoirs, which are the earliest instances of a systematic attempt to record the state of the kingdom at the time, have never been printed. The manuscript until they were printed, in 1764, by Horace Walpole, at his private press at Strawberry Hill.

Herbert of Cherbury was the contemporary of Hobbes, Malmesbury, and the Principes of the Moderns; those principles he was directly opposed, notwithstanding the striking coincidence of many of the results at which they respectively arrived. He maintained the theory of innate ideas, and made a certain instance of a God who was the primary source of all human knowledge. Accordingly, be did not, with Aristotle and the Stoics, compare the mind to a pure tablet, or to a covered book, but to the tabula rasa of the schoolmen, but to a closed volume which opens itself to the express action of outward nature acting upon the senses. Thus acted upon the mind produces out of itself certain general or universal principles (communes notiones), by reference to which all debatable questions in theology and philosophy may be determined, since upon these principles at least all men are unanimous. Consistently with these views, he does not, with Hobbes, make religion to be founded on revelation or testimony. He is an avowed Epicurean, and the religion of God and of divine things. The religion of reason therefore, resting on such grounds, is, he rightly argues, the criterion of every positive religion which claims a foundation in human reason. He is one of the few moderns who have not recanted, and who have been able to deduce, from the fundamental truth of the doctrine of an immediate evidence of the reasonableness of his faith, except those to whom that revelation has been directly given; for all others, the fact of revelation is a matter of mere tradition or testimony. Even the receipt of a revelation may himself be easily deceived, since he possesses no means of convincing himself of the reality or authenticity of his admitted revelation.

Herbert made his own religion of reason to rest upon the following grounds. There is a God whom man ought to honour and reverence: a life of holiness is the most acceptable worship that can be offered him: sinners must repent them of their sins, and strive to become better; and after death the unindulged. Thus, the rewards or penalties befitted the acts of this life.

Lord Herbert is one of the numerous instances on record of the little influence which speculative opinions exercise upon the great mass of mankind; for, born in a family which is credible which is imparted to a portion only of mankind, he nevertheless claims the belief of his hearers when he tells them that his doubts as to the publication of his work were not the fruit of after reflection of the divine will. Notwithstanding the little favour which has been shown to his works, which is partly indeed attributable to the obscurity both of his style and diction, but chiefly to the predominant inclination for the empirical philosophy of Bacon and Locke, which is more in harmony with the aims to which he pursued his researches on a purely rational method are alone sufficient, even had we not a Glanvill and a few others to boast of, to refute the objection which has been
argued against us of a total absence in the national mind of all pure and reflex reasoning. The doctrine that outward objects are but the occasions of educating all general knowledge is the foundation of the fame of Kant; and there is much also in the writings of Jacobi which reminds the reader of the principles and method of the philosopher of Cherbury.

The view of Lord Herbert on innate ideas is opposed generally by Locke (On the Human Understanding, b. i., c. 2), and some special points are called into question by Gassendi, in his *Epistola ad Librum Ed. Herberti Angli,* in the 1st edition of 1696. In 1698, he published a work on office of public orator, a post in those times of considerably more importance than at present. While at Cambridge he made the acquaintance of Lord Bacon, but the pleasures of the court and some hopes of preferment led him to spend much of his time away from that seat of learning. His expectations however failing on the death of James I, he turned his attention to divinity, of which he had before been a laborious student, and in consequence of his good orders, he was made prebendary of Ligniton Bromswold, or Layton Ecclesia, in 1626. He married in 1630, and in the same year accepted the rectory of Hemerton; but the effects of a quotidian aperitum is the only one in the table, themselves again apparent, and he died in 1632. His poetical works are well and deservedly known. They belong to the same school with those of Donne, Quarles, and Herrick, and remind us forcibly of certain points which have lately appeared in the literature of the Christian church, and the same analogy may be traced between that school of discourses to them which poems are owing and our author; there is the same zeal and energy in pastoral duties, the same love of paradox and thoughts, and the same reverence for antiquity and for the ceremonies of the church.

Herbert's chief prose work is 'The Priest to the Temple,' a sequel to his work called 'The Temple; Sacred Poems and Private Ejaculations.' He lays down rules, and very good rules for the life which a country clergyman ought to lead. He also wrote a translation of Cornaro on Temperance, and some Latin poems.

**HERBERT, SIR THOMAS,** was born at York about 1606, and entered Jesus College, Oxford, in 1621, whence he removed to Trinity College, Cambridge. In 1626 he went to the Low Countries, returned to England, and at the expense of his kinsman William Herbert, earl of Pembroke, a man of cultivated and elegant talents, and a generous encourager of learning. He sailed to Surat, thirsted for knowledge of the East, and lived on the Caspian Sea, and returned by Isaphan and Bagdad, down the Tigris; then proceeded to the coast of India, near Surat; visited (or at least described) the straits of Malacca, Java, Pegu, the Moluccas islands, &c.; and returned to England after four years' absence. In 1634 he published his 'Some Voyages Travels into Africa and Asia the Great,' &c. (revised and enlarged by the author in 1638), which is an accurate and trustworthy work, and the best account of Persia anterior to that of Chardin. It contains a great many curious facts which the reader will hardly find anywhere else. The work was translated into Dutch by Van Vilet, and into German by Theophrast Hercoles from the English, this German edition is ornamented with a great many cuts. Herbert espoused the cause of the parliament, and in 1647 was one of the commissioners appointed to sign the charter of the commonwealth. He had so much capacity he attended the king to Holdeney Castle, and was selected by him, on the dismissal of his former attendants, to be about his person. Though, being a Presbyterian, he was not an Eusebius the breach in his disposition between Charles, still the respectful behavior of his behaviour won the regard of the royal prince, towards whom Herbert in his turn appears to have conceived a strong enmity and a determination to ruin him to the last; and after the Restoration his faithful service was acknowledged by the king with the title of baronet. In 1675 he published 'Therenodia Carolina,' an historical account of the two last years of the life of King Charles I, by Sir Thomas Herbert and others, reprinted by Nicol in 1813. He died at York in 1682. (Athenae Oxonienses, where there is an original account of the last days and burial of Charles I, communicated to Wood by Herbert himself.)

**HERBSTIUM.** [Thalamisina.]**

**Herculaneum, or Herculaneum (Cic. ad Att. 7, iii.), a very ancient Italian city, situated on the coast of Campania, near Nuceria. It is said to be of Magian origin, but its history is obscure, and it seems never to have attained any importance. In the time of Titus, A.D. 79, it was overwhelmed by that memorable eruption of Vesuvius, also known Pompeii. (Vascul.

**Vit.**) It appears to have been burnt or swept away by ashes, subsequently overflown by streams of lava, and is stated to be 70 feet below the present surface of the ground. It was re-discovered by the sinking of a well in 1715, when several antiquities were found. This led to further investigation; and after several years, in which little was done, the Neapolitan government undertook the work of excavation. The theatre, a chalcidicum, and two temples, are the chief buildings explored; the private houses are chiefly small, and of one story, like those of Pompeii. The whole excavation is said to have been about 600 yards long by 300; but it being impossible to remove the incumbent soil, in consequence of its thickness, at last one part was thoroughly searched, it was filled up with rubbish from another. A small part of the theatre is all that is now accessible. The chief advantage as yet derived from Her
culaneum is the collection of maps, not only of statues and paintings, and vases, but of domestic implements of every use and description, deposited in the Royal Museum at Portici. These are figured and described in the magnific
test work, 'L'Antichita d'Ercolan,' Nap, 1757, 10 vols. The collection has been abundantly increased from Pompeii.

Great expectations were raised by the discovery of a large number of manuscripts, written on rolls of papyrus. The attempts to unroll them have had but little success; and those of which the subjects have been ascer
tained are of little interest. There seems to be very little hope of recovering any of the lost treasures of antiquity in this quarter. The work entitled 'Herculaneum Volu

minum qua supersunt,' Naples, 3 vols., 1788, 1809, 1827, contains, we believe, all that has yet been deciphered. The University of Oxford published, in 1824-5, two volumes, 6vo., of fragments lithographed from the smilies (euphories) presented to them by George IV.; these have also been published in the Neapolitan work. The bulk of those which have been examined contain the works of Greek philosophers and poets, and treat of philosophy, medicine, criticism, the arts, &c. The papyrus have uniformly been found in a state resembling charcoal, dry, and crumbling, the lime, for the most part, strongly adhering to each other. There is an elaborate account of the several methods to be used; and they are found to be perfectly satisfactory in the last edition of the 'Encycl. Britanni,' art. Herculaneum.

**HERCULES (in Greek, Heracles), a celebrated hero of Greek mythology, the offspring of Zeus by Alcmene, daughter of Electryon, a son of Perseus, and king of Mycenae. His reputed father was Amphitrion (son of Alcmus, another of the children of Perseus), who having accidentally killed his father-in-law Electryon, was compelled to leave Mycenae, and take refuge in Thebes. Here Hercules was born and educated, and here his early feats of strength and valor were done; such as slaying the lion of Cithaeron, delivering the Thebans from the Tyrant, Estratus, or Hippomenes, or the Orichomus, and taking in marriage the daughter of Creon.

Being fitted to serve Eurystheus, king of Mycenae, he performed what are called his labour, in obedience to the commands of his master, and in so great a capacity he attended the king to Holmeyen Castle, and was selected by him, on the dismissal of his former attendants, to be about his person. Though, being a Presbyterian he was not an Eusebius the breach in his disposition between Charles, still the respectful behavior of his behaviour won the regard of the royal prince, towards whom Herbert in his turn appears to have conceived a strong enmity and a determination to ruin him to the last; and after the Restoration his faithful service was acknowledged by the king with the title of baronet. In 1675 he published 'Therenodia Carolina,' an historical account of the two last years of the life of King Charles I, by Sir Thomas Herbert and others,
HERCULES, one of the old constellations, called θησαυρός by Aratus, Hyginus, and Ptolemy, and described by the first as 'a figure like that of a man in sorrow' while the second offers various fabulous significations from the stories of Heracles, Orpheus, Cethus, Thebes, Thamyris, Ixion, Prometheus, &c. The club, lion's skin, and character of Heracles, are not so old as Aratus, who describes this figure as stretching his hands to different quarters, and makes an allusion to the neighbouring dragon, which shows that he was not painting a hero.

The constellation is situated between Draco, Bootes, Lyra, and Cassiopeia, and has no star in it larger than the third magnitude, and there is nothing very remarkable about it. The principal stars α and β lie between the bright stars in the head of Ophiuchus, and in Corona Borealis.

HERCULES, PILLARS OF. (GIBRALTAR, STRAITS.)

HERDER, JOHANN GOTTFRIED VON, was born in 1744, at Morungen in East Prussia, where his father kept a little inn, called the 'Golden Cross.' He was brought up in the school of his father, and at an early age he was removed to the University of Königsberg, where he acquired a knowledge of the Greek language and literature. In 1775 he became theological professor at Göttingen, where he was enabled to pursue his favourite studies under the benign influence of the Duke of Saxe-Weimar and his wife, whom he married in 1797.

The writings of Herder fill about sixty volumes, and are on the greatest variety of subjects. As a theologian he has gained celebrity by his 'Spirit of Hebrew Poetry,' as a philologist by his 'History of Language,' as a historian by his 'History of the History of Man,' a work which has been translated into English. He was not so much a metaphysician as an observer. He strove to discover a point of union where science, history, philosophy, poetry, art, and nature met and mingled, and in order to take one comprehensive view of all the tendencies of men, he made himself acquainted with the literature of a variety of countries, Oriental as well as European, ancient and modern. His collections of popular ballads of all nations has a high reputation, and a poem which he called the 'Cod' has been declared by the Spaniards themselves to be truly Spanish. The great influence which he exercised on German literature, by introducing his countrymen to the knowledge of an infinite variety of subjects, was undoubtedly great; and his name is never mentioned among them but in terms of high respect and admiration.

HERITAGE, mineral which occurs in crystals embedded in flour at Ehrenfriedersdorf in Saxony. It is of primary form a right rhombohedral prism; cleavage parallel to the lateral planes, and in the long diagonal of the prism; fracture macle, conchoidal; hardness 5; colour greyish and yellowish-white, and in thin plates white; lustre vitreous; nearly transparent; specific gravity 2.985.

HEREFORD, an ancient city, and parliamentary and municipal borough, situated upon the left bank of the Wye, about 11 miles from the direct line to Hereford. The name is probably derived from the British Hén-ford, signifying the 'old road.' The city or liberties (these words are used indiscriminately) extend far beyond the limits of the borough, and their own boundaries have not been ascertained. The liberties comprise the parish of All Saints; part of the parish of St. John the Baptist; part of the parish of St. Martin; part of the parish of St. Nicholas; part of the parish of St. Owen; part of the parish of St. Peter;
the township of Huntington in the parish of Holmer; another part of the parish of Holmer; part of the township of Tugley in the parish of Hampton Bishop; and small portions of the parishes of Bilingham and Breinton. The town consists of 2320 statute acres, and a population of 10,250.

The borough council consists of the mayor, six aldermen, and eighteen councillors. The town hall is the Old Grammar School, which may be held within its limits:—the Quarter-Sessions; the Petty Sessions; the Mayor’s Court; View of Frankpledge; and Court of Pie Poudre. The income of the corporation amounts to several property, tolls, and fees: in 1832 it amounted to 1175l.

History and Antiquities. In early times this city was important as a garrison to restrain the Welsh. The principal events of its history are its pillage by the Danes in 1066 under the capture of William, his garrison till 1411; the execution of Owen Tudor, who was beheaded here in 1461; the surrender of the city during the rebellion, in 1462, to the parliamentary troops, headed by Sir Wm. Waller; and the siege of Hereford by the Scots under Lord Lewes.

A house of Grey Friars stood at the southern extremity of the city: a house formerly belonging to the Black Friars, the picturesque arms of which have been engraved in the book of Mr. Grose and other antiquaries, may be seen in the suburb of Widemarsh St.; and adjoining it was a chapel and building belonging to the Knights Hospitalers of Jeru-salem. There was also a Benedictine cell, belonging to the abbey of Gloucester. Hereford is a city of two wards of different dimensions, having a keep within the smaller: the Wye formed its defence on the south side; on other points it was defended by moats. It was taken posses- ed by the Saxons in 1066, and was the residence of William till 1632; but at that time the parliamentary commissioners returned it as ‘ruinous,’ and its materials worth no more than 83l.

Hereford is situated in a broad, fertile, and well-culti-vated valley, and at sufficient elevation above the river Wye to be free from fogs and damp. It has always been esteemed a healthy town. The principal streets are broad and straight, and have all been macadamized. The private houses are mostly large and commodious, and the public buildings are of stone. The shire-house was built after a plan of Sir Robert Smirke, and is remarkable for the unsu- mming beauty of its exterior, as well as the good general arrangement of the interior. Besides the courts and rooms necessary for the transaction of assize and magisterial busi- ness, it contains a large room, which is used at elections and other public meetings, and occasionally as an assembly-room. The town-hall, large and stately building, is supported by oaken pillars, stands in the High Town, and the fruit and vegetable market is held underneath and around it: additional markets have also been built between this time and the present day. There are a number of churches and chapels, the number of the nonconformist churches having increased from sixty in 1759 to ninety in 1841. The Union workhouse, first inhabited in 1838, stands just beyond the north-east limits of the city. In the county gaols, which are in the same neighbourhood, the spike system is in vogue, the rules rigid, and the super- visors of the visiting magistrates is vigilant and discreet.

One of the gateways of the ancient walls has been fitted up as a city prison. There are several hospitals or almshouses. A large monastery, supported by contributions and benefactions, stands south-east of the city, near the Castle-gate. The prin- cipal churches are those of All Saints, St. Peter, St. Nicholas, and St. John. All Saints Church faces Broad-street on the north; the steeple is tall and well-proportioned, but its external appearance is not pleasing, and the brickwork of the south side, which has been added to the original stone wall, greatly disfigures the elevation. The vicarage of St. Martin’s and All Saints, which is in the parish of the town, is supposed to have been built in the time of Edward I. St. John’s Church is on the other side of the town. St. Peter’s Church, founded by Walter de Lucy in 1655, is a plain building, with a spire. The annual value of the vicarage, as returned in 1835, is 8l. 10s. 6d.

The church dedicated to St. Owen, and destroyed during the civil wars, was consolidated with St. Peter’s in the reign of Charles II.; that of St. John the Baptist has probably suffered from an inundation of the river; the annual value of 380l. St. Peter’s Church, founded by Walter de Lucy in 1655, is a plain building, with a spire. The annual value of the vicarage, as returned in 1835, is 60s. 3d. The church of St. Owen was given to the city in 1646, by the corporation.

The church of St. Edward, which was formerly the cathedral, was destroyed by the Dissolution of the Monasteries. The latter is a vicarage, of which the dean and chapter are patrons.

Hereford Cathedral stands on the south side of the city, not very far from the Wye. It is probable that this situation was occupied in very early times by a church of considerable importance. Polydore Virgil mentions that there was a large church (templum magnificum) at Hereford, in the reign of Offa, king of Mercia. Ethelberht, who was murdered at the instigation of Offa (Herefordshire), was buried in this cathedral, and gifts were offered at his shrine, where it was asserted that miraculous appearances had been shown. The church is said to have been built in the time of Egbert, was attracted to the spot, and he deter- mined to erect in honour of St. Ethelbert a new church, which is referred to as 'lapides structura,' a distinction which makes it probable that the edifice was begun before the building. The date of the building is fixed at 825. We are ignorant what were the causes of the rapid decay of this edifice; the whole however, says Grose, was rebuilt by Henry III. Bishop Athis, in the 13th century. This cathedral was entirely demolished in 1655. No remnant was preserved until the latter years of William the Conqueror’s reign, when Bishop Loxing and others commenced the present building in the Saxon style. In 1786 the western portion of the cathedral fell, and alterations were subsequently made, the spire was removed, and a new western end added by Wyatt; either from want of funds or want of taste the architect has sadly marred the beauty of the original structure. The cathedral contains many monuments of great antiquity, some of which are highly ornamented. For a minute description of this cathedral, see Duncombe’s ‘Hist. of Hereford.’ and Britton’s ‘Cathedrals.’

In the chapter-house is a curious map of the world, probably one of the oldest original maps in existence; a copy of it was made, a few years ago, for the London Geo-graphical Society. At the east end of the church is the ‘library,’ which is called the ‘college’ and was originally the ‘private chapel,’ or a quadrangle, which contains the remains of the vicars of the cathedral. At the west end there formerly stood two chapels, the one above the other, and a cloister. These old chapels may be seen in Gough’s edition of Camden. Part of the cloister which remains has lately been rendered more visible by the removal of a school-house which obscured it. Trinomial music-masters, with the remains of the library, are kept in the cathedral, in rotation with those of Gloucester and Worcester.

The members of the cathedral are the bishop, who holds a canonry, and is appointed by the crown; two archdeacons; one golden prebendary, whose office appears to have been that of confessor to the bishop; five other residentiary canons (including the dean), also a lecturer; these are all chosen from the prebendaries of the chapter, the bishop having the casting vote. Besides other dignitaries, there are twenty-eight prebendaries appointed by the bishop, and twelve vicars choral nominated by the dean and chapter. The dean and chapter are called the ‘college,’ a gnomonic building at the east end of the cathedral, which was built for their accommodation in the time of Edward IV.

In addition to the churches belonging to the establish-ment, there are places of worship for the principal denomi-nations of dissenters. A Roman Catholic chapel of con-siderable dimensions is now (1838) erecting in Broad Street. No manufacture or important wholesale trade is carried on here, unless it is the manufacture of gloves, of which a considerable quantity are made. The establishment of an iron-foundry has been consequent upon the reduction of the price of coal caused by the Aberavon railway. Before the opening of this project with the town, the coal was brought to the town in quantities varying from 40s. to 60s. a ton; the price now varies from 17s. to 22s. Gas-works have also been established, so that the streets and shops are well lighted. A literary and scientific society was founded in 1788 by a subscription and a collection for a museum is in progress; this useful institution is well attended, and if sufficient funds can be raised, it is intended to build a museum, library, and suitable apart-ments. A high road from the town to Gloucester was finished in 1867, and makes the city a centre for communication between the towns of the Severn valley; a railway from Hereford to the Severn, and a railway and canal to Oxford and the Thames, have been projected. A railway to London,普通 which the inhabitants of the town have been very anxious for some years. A railway to Shrewsbury is proposed. The town is about equally divided between the two parishes of Saint Mary and Saint Peter.
HER

days are Wednesday and Saturday; the 'Great Market' is on the Wednesday after St. Andrew's day.

HERSFORDSHIRE, an inland county, situated in that part of the west of England which is bordered by South Wales. The counties of Worcester and Gloucester form its boundaries on the east; Shropshire, with a portion of Wor-
cester, on the north; Radnor, Hereford, Monmouth, and a part of Monmouthshire, on the west; Monmouth-
shire and Gloucestershire on the south.

There are four detached portions of this county; the first belonging to Woflyb hundred, situated about 9 miles east-north-east of Hereford, in the western extremity of the county; the second, on the borders of Hereford and Monmouth, lies south of the river Teme, about 2 miles west of Tenbury; these are separated by Shropshire from the main body of the county; the third, a portion of Huntingdon hundred, which is on the borders of Brecknock and Monmouth, lies 3 miles west of Prosteigny; the fourth, a part of Ewyas Lacy, is on the bounds of Brecknock and Monmouthshire, immediately west of Llanthony and the Hatterell range of the Black Mountains.

Its greatest length from the north side of Mocktree Hill to the southern portion of the Lord's Wood is about 40 miles. Its greatest breadth from the western side of the parish of Briley, adjoining Clay Hill, to the foot of the Malvern Hills, in the east of the parish of Cradley, is 34 miles. Its area is 860 square miles, or 550,400 acres. In 1831 the gross population amounted to 111,211 persons; and the average number of inhabiting persons was 122. This distribution of population, compared with that of the neighbouring counties, gives the following results as to the average number of persons to a square mile—Gloucester, 307; Hereford, 125; Monmouth, 198; Shropshire, 160; Worcestershire, 166.

In extent of surface Herefordshire is exceeded by 24 English and Welsh counties, in amount of population by 44 counties in England and one in Wales. Hereford, the county town, is 132 miles distant from London by way of Worcestershire, Oxford, Cheltenham, Tewkesbury, and Ledbury. A more direct line from Cheltenham to Ledbury, avoiding Tewkes-

Surface, &c.—The surface of this county is generally hilly, but the valleys occasionally expand into open plains. The Hatterel range of the Black Mountain, which forms its border on the west-south-west, is the highest land within its limits. Parallel to this range the chain which commences with the Vagar Hill and terminates in Mynded Ferddin forms an important feature in the landscape. Along the north-western townships there are hills extending in the same direction from Midworth to Wormbridge. In the south-west the Sabbeleower and Gar-

canopious; and in the south the hills near Wal-

ford, which on the long northward from Lea northward towards Woolhope and Stoke Edith. The Malvern Hills, and the range stretching northward from Stamasd Bishop to Wollerlow, comprising Bromyard Downs, are the principal heights upon the eastern boundary. On the north are the hills of Downton and Leintwardine, together with the range running in a south-west direction from Ludlow towards Kington, and continuing towards Huntingdon and Bridley Mountain. Near the centre of the county is the small estuary, which is the lower line of hills extending in the same direction from Midworth to Wormbridge. In the south-west the Sabbeleower and Gar-

River.—No large rivers have their sources in these hills; the principal streams which water Herefordshire rise in the higher counties of South Wales. They are, the Wye, the Lugg, the Teme, the Arrow, the Frome, the Dodder, and the Monnow.

The Monnow, which in Cardiganshire, enters Hereford-

shire on its western side, and running at first in a northerly direction, becomes for a short distance its boundary from Radnorshire; near Clifford the bearings of its course are changed; it flows south, then west-north-west, with many windings through a broad and fertile valley until it reaches the city of Hereford. Between that city and the town of Ross its general course is south, but its windings are numerous; two loops which surround King's Capel and Fry are from their length of great inconvenience to the inhabitants of that neighbour. From Ross the Wye runs a general south and then a south-west course, and in forming the boundary of Herefordshire for a few miles, finally leaves it near the Leys. It is imperfectly navigable throughout the whole of this county, when the depth of water has been moderately increased by rains, and the current which it has between the borders of Brecknock,

The immediate vicinity of mountains, and the very large surtace of country which it drains, cause it to be a miserable sheet of water about the ruins of ten feet in the course of 24 hours. For picturesque beauty this river is justly celebrated. In the upper part of its course through Herefordshire, it receives with a few streams the characteris-
tes the features of the country through which it after-
wards flows, nevertheless there are some very striking pros-
pects in the neighbourhhood of its banks. This will be acknowledged by those who are acquainted with the follow-
ing places—the Rhyd Spence Hill, Myrbridge Hill, Brobury Scar, and Lynda. To the majority of tourists these localities are unknown, not because they are not beautiful, but on ac-

flammatory in the lower part of the river the number of salmon has increased, and it appears proba-

able that it will receive further augmentation, owing to the mode of fish when they are not in season. From a defici-
ycy in the protecting laws relating to this river, persons are permitted to destroy the oal fish, whilst in the summer months, when the fish are in the best season, they are legally prohibited from taking them. Nearly the whole of the county of Hereford lies within the basin of the Wye.

The Lugg, rising in Radnorshire, enters Herefordshire near the Grenewyck, and near which place it falls into the Wye. It is sometimes navigated for the space between Mordiford and Lugwardine Bridge. The river is not broad, and its banks are generally steep. Trout are plentiful, but salmon are rarely taken in this stream.

The Teme, rising in Herefordshire, enters Worcestershire near Brampton Bryan, and gives name to the beautiful woods and castle at Downton across the border into Shropshire. At Ludlow it again enters Herefordshire, and forms the eastern boundary of the county, which it follows through the Severn a few miles from Worcester. It is abundantly stocked with excellent trout and greyling.

The Arrow rises in the Radnorshire hills to the west of Rossington, and running through that town takes an easterly direction, until it falls into the Lugg, not far below Leintw-

The Monnow rises in the Hatterell Hills, and after receiv-

ing several tributary brooks falls into the Wye near Mon-

mouth. Trout abound in all these streams, but are seldom of very great weight.

Canals, which to the navigation of the Wye two canals have been formed through portions of this county for the conveyance of coal and other heavy goods. At the end of the last century acts of parliament were ob-

tained for the construction of a canal from Hereford to the Severn near Gloucester, also from Stourport in Worcestershire to the town of Kingston. Want of funds has prevented the completion of both these schemes; the Gloucester canal has been brought no farther than Ledbury. The canal projected from Stourport to Kingston has never reached.
either terminus, but a portion of the intermediate space from Leominster through Tenbury to the neighbourhood of the Abberley Hills has been completed. In both these canals the supply of water is deficient.

Roads.—The principal turnpike roads are, from Hereford to Ross, 14 miles; Hereford to Ledbury, 15; Hereford to Hay, 20; Hereford to Kington, 19; Hereford to Abber- gavenny, 24; Hereford to Monmouth, 20; Hereford to Leominster, 13; Hereford to Ludlow, 24; Hereford to Brom- ley, 24.

Not many years ago the roads in this county were pover-

bially bad; now their surface is generally good, and on the chief lines the ascents have been rendered easier, either by diversions or cutting. The Cheltenham and Aberystwyth main line is very nearly on a level with the road from Hereford to Kington; the Gloucester and Caernarthen mail passes through Ross; and the Worcester mail to Kington travels by way of Bromyard and Leominster. A mail which lately ran from Bristol to Liverpool through Monmouth, Hereford, Leominster, and Ludlow, has lately been discontinued between Hereford and Riverford, passengers and letters from Bristol being more expeditiously carried by way of Birmingham and the Grand Junction canals. The roads in this county are often inexcusably neglected. No railway has yet been constructed in this county on which steam-power is applied. The present amount of traffic and travelling renders such special expenditure for railways not nearly so important as the essential road of coal, &c. have been constructed from Abergavenny to Here- ford, and from Brecknock through Hay and Eardisley to Kington and the neighbouring lime-roads and stone-quarries on the upper old sandstone of the Toy. The benefits derived from both these roads have been very great; the supply of coal from Breck- ford has been rendered certain and its price lowered from about 30 to 18 shillings a ton; an easy transport is also afforded for corn to the Monmouthshire iron-works, whence iron is re- ceived in return. The Brecknock railway has also lowered the price of coal in the district through which it passes, and tended greatly to the improvement of the turnpike roads by conveying to a tract deficient in roadstone an excellent material for the making of good roads and the district, at the foot of which the railway has been carried.

Climate.—The climate of Herefordshire varies greatly, according to the elevation and exposure. The neighbour- hood of Ross and Ledbury, as well as the central portion of the county, enjoys a far superior climate to such portions of the north and west as are in the vicinity of Wales. The air is healthy, and the population long-lived. It is said that Sergeant Hobkins entertained James the First in his progress here with a morrice-dance by ten old men and women, whose united ages exceeded 1000 years. (Gough's Camden.)

To the casual observer the whole of Hereford- shire appears to consist geologically of old red sandstone, a formation of great thickness, which has been subdivided in the following manner:—1, red conglomerate and sandstone without organic remains; 2, cornstone and argillaceous marl, containing crustaceous of undescribed genus, as in the northern and central parts of the county; 3, flaggy highly micaceous limestone, containing a small number of fossils, as seen in the neighbourhood of Downton Castle. This trough of sandstones is neither frequently broken through by igneous rocks, nor materially lifted or curved by their action. On the eastern side, the mean direction of the strata, as determined by the outline of the trap and the course of the rivers, is north-west and south. But there are many aberrations from that direction, and innumerable local disturbances, curvatures, and faults. In the neighbourhood of Kinner Park, three of the gau- way measuring 50 feet above the level of the floor of the valleys and less exposed elevations, crops are raised in the following succession:—wheat, turnips, barley, clover, wheat, and peas or vetches. It is to the wheat crop that the farmer pays his chief attention; the harvest is usually in the first quarter of October or the first in November. The stich in grass growing time; in few counties is the seed more skillfully or neatly put into the ground. The cultivation of turnips is neither so carefully practised nor so well understood; indeed the greater part of the soil is not well suited to this crop; nevertheless it would less frequently fail if the management were more attentive and skilful; the seed is in general sown too late.

Hop-yards are common in the middle and eastern por- tions of the county, the hundreds of Broxash, Radlow, and Grimsworth. The bines here are planted in rows and the land ploughed, a method different from that which is practised in Kent and the eastern counties, where the soil is cultivated with the spade.

Orchards are numerous, and not confined to any particu- lar district. The labour of picking a quantity of apples and converting them into cider is a very profitable occupation. The price varies from 3s. 4d. to 5s. 6d. per ton at from four to seven shillings; these form a hoghead of cider, which is sold at from 3s. to 2s. a gallon, according to the quality and abundance of the crop; in ordinary years, 20 gallons of full-grown trees in good condition will sometimes produce a many as 12 hogheads an acre. Under the article CIDER an account of its manufacture and treatment may be found.

The highest wages paid to agricultural labourers are nine shillings a week; in the northern and western parts of

the prevailing strike of the deposits is from north-east to south-west; but there are minor terraces of elevation, sub- ordinate to the great line of elevatory movements, which are for the most part marked by erupitive ridges of trap rock, which tilt the strata upon their flanks both to the north- west and to the south-east. Limestone has been raised to the surface in many places; for instance, the valley of the Nethersey at Aymestrey, where pentamerosite limestone is seen, and at Ledbury and the foot of the Malvern range, where transition limestones are met with.

The valley of elevation at Woolhope is supposed to be the most symmetrical in Great Britain; the two superior formations of the gewawakee series are incurred around a central dome-shaped mass, composed of the shelly sand- stones of the old sandstone at Ledbury, from which it is carried away on all sides at angles varying from 15° to 70°. The harder strata of each formation having resisted destruction, whilst the shales have been worn away, the former consti- tutes the higher encircling ridges, the latter deep trenches of intercalation. The outer zone contains all the fossils characteristic of the Ludlow rocks, and passes beneath the old red sandstone; the inner zone, those of the coraline formations of Wenlock and both these are wrapped round a nucleus of the third formation. The outer zone is broken by an almost transversal gorge throughout two-thirds of its circumference, but at Mordiford it is vio- lently divided by the Huel. The second and third strata, upon which and by two minor fissures the valley is entirely eroded, with the whole of the valley is stated to be one of clean denudation, being entirely free from any fragments even of the old red sandstone; the inferior and denuded strata must have been raised to those strata by which the

[See Trans., vol. ii., p. 15.] Mr. Murchison, from whose paper, as reported in the 'Proceedings of the Geological Society,' these observations have been extracted, has, in the press a detailed account of the geology of this and the neighbouring counties.

Soil and Agriculture.—The soil of this county consists principally of a deep heavy loam, which varies in its degree of tenacity and the texture of the surface, in a stratum of clay; in others gravel approaches nearer to the surface. The whole is extremely favourable to the growth of trees, especially the apple and the oak. In the neighbourhood of the towns the land here, as in most other counties, is cul- tivated chiefly either as meadow or pasture; in the rural parishes the quantity of land in tillage is greater, but scarcely equal to that of grass land, and the management of the land depends upon the climate and nature of the soil. The high lands, for the most part, are occupied by oak cop- pics, which are numerous and extensive; these are felled at periods of sixteen to twenty years, and fetch a price of 15s. per ton. In areas, the northern valleys where the hills and the valleys and less exposed elevations, crops are raised in the following succession:—wheat, turnips, barley, clover, wheat, and peas or vetches. It is to the wheat crop that the farmer pays his chief attention; the harvest is usually in the first quarter of October or the first in November. The stich in grass growing time; in few counties is the seed more skillfully or neatly put into the ground. The cultivation of turnips is neither so carefully practised nor so well understood; indeed the greater part of the soil is not well suited to this crop; nevertheless it would less frequently fail if the management were more attentive and skilful; the seed is in general sown too late.

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the county eight and seven, and in winter as little as six
shillings a week are given; the addition of cider is allowed
by all landlords in the summer, and by a large portion during
the winter; the labourer prefers receiving a portion of his
earnings in "drink" to being paid wholly in money. The
wives and families suffer from the practices, but are not
generally averse to it; they think the old luxury due to
the farmer for his exertion, and are ignorant of the injury they
sustain. From two to four quarters of cider is the usual daily
allowance; in harvest time the quantity is unlimited, and
food is added to it, but the money wages are not raised; some
landlords, however, in the season will drink ten or even twelve
quarters of cider in a day.

The prevalent breed of cattle is that for which this county is
justly celebrated; their colour is red with white or mot-
tled patches, their heads are loudly while they walk along the
legs. Good milkers are occasionally found among the cows,
and it is possible that a race might be reared from this stock
that would be useful for the past, but dairy farm-
ing is never practised here, and the milk of the cows, which
are kept only for the purpose of breeding, is given to the
calves. It was formerly the custom to work the oxen at
three and four years old, and to feed and send them to market
at five, but their insufficiency as beasts of draught,
the quantity of fodder consumed by the older oxen, and the
slow return of capital, have caused a complete change of
system: the oxen are no longer worked, but are commonly
fed when they are two, three, or four years old, and taken to
market before they are three: their early maturity and the readiness
with which they fatten make them suited for this system of
farming. Graziers from the south and the middle of Eng-
land drive a large number of this popular stock from the
Hobart and Devon counties to Lancashire, and a few from Hereford
do more readily than the Devon (see 'Cattle,' 'Library of
Useful Knowledge,' p. 32); and in proportion to the quantity
of food consumed lays on a greater weight of flesh than a
Durham ox; the result of a trial upon this latter point may be
seen in 'Cattle,' p. 34. That the flesh of the Hereford is
of a finer quality than the Durhams, is proved by the
superior price per stone which it obtains in Smithfield
market.

The usual breed of sheep is a cross between the Leicester
and the Ryeland, which is found to succeed better than the
pure Leicester or Southdown; the pure Ryeland are extinct.
Wool is mutton may be procured in most of the county
towns. Agricultural horses of average quality are bred in
considerable number. The northern part of the county
bordering upon Radnorshire and Shropshire produces many
useful riding and coach horses, which have lately, (1838)
been much sought after by London and other dealers: they
are highly bred, compact and active; an inferior race, fine
in the bone, long in the joints, and generally with bad action,
is found throughout the rest of the district. Pigs are
numerous; these from Wales, from whence a large supply
of eggs and excellent poultry is sent to the market in
Kington, and sold to dealers who forward them to Chelten-
ham, Gloucester, and other large towns.

Political Divisions.—Herefordshire is divided into the
eleven following hundreds:—Bromyard, Grimesworth, Greyst-
tree, Ewyas Lacy, Huntingdon, Radlow, Stretford, Web-
tree, Wormitow, Wigmore, and Wolphy. These contain
221 parishes, and seven market-towns. 1. The town of
Bromyard, situated in the north-east of the county, is in
the hundred of Bromyard, the market-day is Monday,
the distance from Worcester 14 miles, from London 128; 2. He-
rope, which is here occasionally described, is
profitably on the banks of the Wye, 14 miles below Hereford,
in the hundred of Greystree, the distance from Gloucester
is 17 miles, from London 190; the market-day is Thursday;
4. Ludlow is in the hundred of Radnor; the distance
from Hereford, 15 from Gloucester, and 16 from Worcester;
the town has lately been improved by the removal of some
houses which impeded the thoroughfare of the principal
street; the market-day is Tuesday; 5. Abergavenny, the
river Lug, is situated in Wolphy hundred, 13 miles from
Hereford, 26 from Worcester, and 128 from London.
It is a borough and corporate town, returning two
members to parliament, which is not to be confused with the
market place old, but in an inconvenient situation; the market-
day is Friday. Several considerable cattle-fairs are held,
and an agricultural society has lately been established here.
The following statement respecting this borough is extracted
from the population returns —

6. Kingston stands upon the Arrow is the hundred of Hunt-
ington, 19 miles north-west of Hereford, 49 miles from
Worcester, and 152 from London. The market, which is
largely supplied with poultry and eggs, and which is
Wales, is held on Wednesday; 7. Welshpool, in Stretford
hundred, is situated 13 miles from Hereford. The town has
declined, and no weekly market is held. Many of the
houses are of a very picturesque effect and the church has con-
siderable beauty. It was formerly a borough in the power
of the marquis of Bath, and returned two members to parlia-
ment; no charter of incorporation is known, neither does
the borough appear to have been governed by any municipal
officer.

The principal villages are Eardisland, Eardisley, Pemb-
bridge, Shobdon, Wigmore, Leintwardine, Orleton, Brim-
field, Cradley, Mordiford, Abbey Dore, Madley, Letton, and
Lynnhall. The principal benefits are—

<table>
<thead>
<tr>
<th>Patron</th>
<th>Net annual value</th>
<th>without deducting for expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bishop of Hereford</td>
<td>£533</td>
<td></td>
</tr>
<tr>
<td>do.</td>
<td>937</td>
<td></td>
</tr>
<tr>
<td>Bishop of Hereford</td>
<td>£566</td>
<td></td>
</tr>
<tr>
<td>do.</td>
<td>1284</td>
<td></td>
</tr>
<tr>
<td>do.</td>
<td>533</td>
<td></td>
</tr>
<tr>
<td>Dean and Chapter</td>
<td>299</td>
<td></td>
</tr>
<tr>
<td>do.</td>
<td>644</td>
<td></td>
</tr>
<tr>
<td>Upton Bishop</td>
<td>708</td>
<td></td>
</tr>
<tr>
<td>Lord Bute man</td>
<td>764</td>
<td></td>
</tr>
<tr>
<td>Wm. Evans</td>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>

The churches of Kilpeck and Moccas are accounted the
oldest in the county; the most distinguished for architec-
tural beauty are Leominster, Ledbury, Ludlow, Monmouth,
Pembroke, Madley, Burghill, Abbey-Dore, and Kilpeck.
The principal gentlemen's residences are, Eastnor Castle,
a modern building of great size, and of considerable beauty,
situated near Ledbury; Hom Lacy, which belonged to the
late duke of Norfolk, now the property of Sir Edwin Stan-
hope; Hampton-Court, which was sold by the present earl
of Essex to Mr. Arkwright, who is making extensive alter-
ations under the direction of Mr. Hanbury Trimmer, Stuke
Edith, Berrington, Shobdon, Croft Castle, Kemble, Moccas,
Foxley, Garnstone, Downton Castle, Kemplechurch, Good-
rich Court, Harewood, and Whittington. Kimmerley Castle,
situated in the parish of the same name, is one of the oldest
inhabited houses that we are acquainted with; it is supposed
that it was built before the conquest. Altnymirs near
Lawton, on the borders of Monmouthshire, was formerly
the residence of the family of Cersil, from which Lord
Burghley descended. There is at Brinocks a curious for-
tified house, now occupied as a farm-house.

In Herefordshire industry is occupied, with little exception,
in agriculture and retail trade. The manufacture of
gloves employs a considerable number of women in the
central and western parts of the county; some coarse hats
are also made. No coal or productive ore has been dis-
covered here, and not a single steam-engine is at work.
Limestone is burnt at Westbury, Ledbury, Asyard, &c.

Ecclesiastical and Legal Divisions.—With the exception of
the parishes of Ewyas Harold, Walterston, Dewlas, Mi-
chaelchurch Eseq, St. Margaret's, Rowlston, Llanmillo, and
Godley, which are in the diocese of St. Davids, the whole
county is comprised in the diocese of Hereford. The dio-
cese is in the ecclesiastical province of Canterbury. Here-
fordshire is included in the Oxford circuit; the assizes
and quarter-sessions are held in Hereford. Three members
are returned to parliament for the county, two for the city,
and two for the borough of Leominster. Ledbury, Ross, and
Bromyard antiently sent members to parliament, but were
never at any time sent to the mother church, the whole
number of the expense then attached to those who exercised
the privilege of electors. The polling-places for the county
are Hereford, Ross, Ledbury, Bromyard, Kingdon, Leonmi-
ster, and Peterchurch.

Poor Law Unions have been formed, and workhouses
been altered or newly erected at Hereford, Bromyard, Almeley, Abergavenny, Hay, Knighton, Ludlow, Monmouth, Newent, Presteigne and Tenbury. Parishes belonging to this county have been included in the following unions, of which the centres are in other counties:—Abergavenny, Hay, Knighton, Ludlow, Monmouth, Newent, Presteigne and Tenbury.

History and Antiquities.—The greater part, if not the whole, of Herefordshire was, in the early part of the Silures, and was conquered by the Roman general Julius Frontinus, about A.D. 57. The Roman remains of Montillac may be traced from the Malvern Hills to Whitchurch, Thornbury, Croft, Brandon (near Leintwardine), and Cowlall Knoll (near Brampton Bryan). There are also traces of a camp on the hill near Leintwardine, near the church of Eardisland, near the church of Ross-on-Wye, and near the church of St. Mary's, the ruin of the priory, and the ruins of the church of Ross; and to the westward, in the adjoining parts of Herefordshire, in the parishes of Much Marcle and Whitchurch, are the remains of a Roman camp.

The civil administration of the county seems to have been divided into three districts, the one comprising the north and east, the other the centre and the third the south. The first two districts are those of Hereford and Monmouth, and the third district is that of Worcestershire. The modern names of such districts, as far as they can be ascertained, are:—Abergavenny, Hay, Knighton, Ludlow, Monmouth, Newent, Presteigne and Tenbury.

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Leominster, Lynmouth, Monkland, Shobdon, Titley, Wigmore, and Wormsley. The statement of Tanner is slightly at variance with that of Mr. Duncomb: in his "Notitia Montanarum," many of these religious houses may be referred to. After the death of Henry VIII, no event of immediate local importance occurred in the district that we are treating of until the period of the civil wars; at this time, notwithstanding the great complaints that the tax of ship-money had raised in this inland county, the greater number of the principal families engaged on the part of the king; on the side of the parliament were those of Harley, Birch, Hereford, Westfaling, Hardwicke, &c. The city of Hereford was garrisoned for the king, but was surrendered without resistance to the parliamentary army under Sir William Waller. It was soon evacuated and again garrisoned in the royal cause under the command of Lord Stamford, by whom it was resolutely defended. After the battle of Naseby the king marched to the relief of Hereford, and the Scotch army raised the siege. In the course of the year 1646, the city was taken by surprise, and the whole county was reduced by detachments in the interest of the parliament, under the command of Sir William Waller and Colonel Birch. Colonel Birch was appointed governor, and his regiment increased to 1200 men. During the period of his concealment, Charles II. more than once passed through different portions of this county. The castle, which was greatly out of repair, was soon afterwards sold by order of the parliament. The keep has since been levelled, and no part of the walls remains: the site of these walls enclosed the larger court is now converted into a public walk.

The following is an alphabetical list of the castles which have existed in this county; in some instances the ruins are still visible, in other the demolition has been complete—Brampton Bryan, Bredwardine, Clifford, Dorstone, Eardisley, Ewias Harold, Goodrich, Hereford, Huntingdon, Kilpeck, Longtown, Lynhales, Pembridge, Penyard, Snowdell, Staple, Orchard, Urchay Hay, Welsh Newton, Weobley, Wigmore, Wilton.

The only druidical remains is a pile of stones called Arthur's Stone, situated in the parish of Dorstone. About a mile north of Hereford, on the Hay road, a monument commemo rates the removal of the markets to this spot during the prevalence of an infectious disorder which raged in the city. Dr. Charlton, Bishop of Hereford, is said to have erected the White Cross in 1347.

There existed in the ancient territory of Archenfield, which was probably so extensive with the present rural deanery of the same name, many privileges, usages, and customs which would form interesting subjects for antiquarian research. The custom of Gavelkind long continued in force there.

Many persons of celebrity were born in this county: we may enumerate, among them, Roger Mortimer, earl of March; Robert Devereux, earl of Essex; Hakluyt; Gerrick; and John Kyley, the Man of Ross.

STATISTICS.

Population.—Herefordshire may be considered as entirely an agricultural county. In 1811 it ranked the second on the list of agricultural counties, in 1821 the third, and in 1831 the fourth. No manufacture worth notice exists in the county. Of 29,342 males, twenty years of age and upwards, 20,649, or 70 per cent., were employed in manufactures, about 40 of whom were engaged in making hats and gloves in Leominster; and 16,397 were occupied in agricultural pursuits.

The population of Herefordshire at each of the four enumerations made in the present century was:

<table>
<thead>
<tr>
<th>Year</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
<th>Increase percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1801</td>
<td>43,955</td>
<td>45,236</td>
<td>89,191</td>
<td></td>
</tr>
<tr>
<td>1811</td>
<td>46,695</td>
<td>47,655</td>
<td>94,350</td>
<td>5.77</td>
</tr>
<tr>
<td>1821</td>
<td>51,532</td>
<td>51,691</td>
<td>103,223</td>
<td>7.94</td>
</tr>
<tr>
<td>1831</td>
<td>55,838</td>
<td>55,373</td>
<td>111,211</td>
<td>7.49</td>
</tr>
</tbody>
</table>

showing an increase between the first and last periods of 22,026, or not quite 25 per cent., which is 32 per cent. below the whole rate of increase throughout England.

The following table contains a summary of the population, &c., of every hundred, as taken in 1831—

### Summary of the County of Hereford.

<table>
<thead>
<tr>
<th>HOUSES.</th>
<th>OCCUPATIONS.</th>
<th>PERSONS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUNDREDS, CITIES, OR BOROUGHS</td>
<td>Families employed in Agriculture</td>
<td>Families not employed in Agriculture</td>
</tr>
<tr>
<td>Inhabitants</td>
<td>Families employed in Agriculture</td>
<td>Families not employed in Agriculture</td>
</tr>
<tr>
<td>Broxash, Hundred</td>
<td>2,315</td>
<td>1,702</td>
</tr>
<tr>
<td>Ewys-Lacy</td>
<td>672</td>
<td>523</td>
</tr>
<tr>
<td>Greytree</td>
<td>2,374</td>
<td>1,302</td>
</tr>
<tr>
<td>Grimshwa</td>
<td>1,430</td>
<td>792</td>
</tr>
<tr>
<td>Huntingdon</td>
<td>1,172</td>
<td>621</td>
</tr>
<tr>
<td>Radlow</td>
<td>2,540</td>
<td>1,421</td>
</tr>
<tr>
<td>Strefford</td>
<td>1,076</td>
<td>1,256</td>
</tr>
<tr>
<td>Webtree</td>
<td>1,779</td>
<td>1,312</td>
</tr>
<tr>
<td>Wigmere</td>
<td>1,101</td>
<td>801</td>
</tr>
<tr>
<td>Wolphy</td>
<td>2,644</td>
<td>1,429</td>
</tr>
<tr>
<td>Wormelow</td>
<td>2,107</td>
<td>1,339</td>
</tr>
<tr>
<td>Hereford City</td>
<td>2,069</td>
<td>70</td>
</tr>
<tr>
<td>Militia under Training</td>
<td>21,907</td>
<td>21,907</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23,065</strong></td>
<td><strong>23,065</strong></td>
</tr>
</tbody>
</table>

**Counties Expenses, Crime, &c.—** The sums expended for the relief of the poor at the four dates of—

**£. t. d.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1801</td>
<td>46,471</td>
</tr>
<tr>
<td>1811</td>
<td>82,291</td>
</tr>
<tr>
<td>1831</td>
<td>62,622</td>
</tr>
</tbody>
</table>

The sum expended for the same purpose for the year ending March, 1837, was 39,218; and assuming that the population had increased at the same rate of progression as in the previous ten years, this sum gives an average of **£. 448. 15s. 4d.** for each inhabitant. These averages are above those for the whole of England and Wales.

The sum raised in Herefordshire for poor-rate, county-rate, and other local purposes, in the year ending the 5th of March, 1833, was 70,287l. 16s., and was levied upon the various descriptions of property as follows:

- On land.
- Dwelling-houses.
- Mill, factories, &c.
- Manorial profits, navigation, &c.

The amount expended was:

- For the relief of the poor—**£69,572. 6sd.**
- In suits of law, removal of paupers, &c.—**£1,775. 6sd.**
- For other purposes—**£9,061. 19s. 7d.**

The returns made up for subsequent years, the descriptions of property assessed are not specified. In the years 1834, 1835, 1836, and 1837, there were raised 87,266l.
HER

HER

of depositors and amount of deposits on the 20th of No

vember in each of the following years were—

1832.

1833.

1834.

1835.

1836.

Number of de-

positors

3,875

4,087

4,562

4,793

5,197

Amount of de-

positors £117,127 £118,484 £129,104 £132,773 £145,242

The various sums placed in the savings' banks in 1833 and

1836 were distributed as under—

1833.

1836.

Depositors

2,753

2,937

Deposits £19,975 £21,527

Not exceeding £20

100

125

150

Above

200

200

70

90

113,308

9,044

143

570

27

570

40

80

136,30

1,452,77

Education.—The following summary is taken from the Parliamentary Returns on Education, made in the session of 1833:

Schools. Scholars. Total.

Infant schools

7

0

1

2

3

7

Number of infants at such schools; ages from 2 to 7 years:

Males

Females

Sex not specified

Daily schools

397

2,948

2,924

2,823

392

Number of children at such schools; ages from 4 to 14 years:

Males

Females

Sex not specified

334

8,513

335

144

3,335

2,727

2,592

7,594

If we assume that the whole population has increased since 1831 in the same ratio as it did the 10 years proceeding that date, and also that the population between the ages of 2 and 15 has preserved the same relative proportion to the whole population as it did when ascertained in 1821, then we obtain 37,903 as the approximate number of children between the ages of 2 and 13 in this county in 1834, when the educational inquiry was made. Thirteen Sunday schools are returned from places where no other school exists, and the children (437 in number) who are instructed therein cannot be supposed to attend any other school; at all other places Sunday-school children have opportunity of resorting to other schools also; but in what number or in what proportion duplicate entry of the same children is thus produced must remain uncertain. Thirty-nine schools (containing 1937 children) which are both daily and Sunday schools, are returned from various places, and duplicate entry is therefore known to have been thus far created. Allowing for a number of children having thus been entered twice as under instruction, it may perhaps be fairly estimated that little more than one-third of the children between the ages of 2 and 15 are receiving instruction in this county.

Maintenance of Schools.

Description of Schools.

By endowment. By subscription. By payments from school funds. By bequests and endowments.

Schools

Scholars.

Schools.

Scholars.

Schools.

Scholars.

Schools.

Scholars.

Inland Schools—Daily Schools. Inland Schools—Sunday Schools. Total.

85

3416

163

8,217

206

3,700

94

985

The schools established by dissenters, included in the above statement, are—
HERESY. HERETICS.

The word 'heresy' (from a. hseresiosmz) was originally used to express any opinion which a man adopted. Thus it was applied to the philosophic sects of Greece and Rome. (Cicero, Paradox. Proem.) In the New Testament the term often simply denotes a religious party, without implying any censures (Acts, v. 17; xvy. 5; xxvi. 5; xxvii. 22). Josephus calls the three great Jewish sects 'heresies.' (Antiq. Jud., xiiii, c. 5, s. 9.) But it is also used in the New Testament as a term for an opinion. Thus it was used by the Jews and Christians. (Acta, iv. 14, and by the Apostles to those who held such opinions, though some of the fathers draw a distinction between heresy, as a wilful rejection of the doctrines of Scripture, and errors arising from ignorance or weak judgment. When the creed of the church began to be settled by ecclesiastical councils, all who refused to submit to their decisions were denounced as heretics. They were also called heterodox, while those who were in communion with the orthodox were called orthodox, or catholica. Heretics were distinguished from unbelievers, inasmuch as they professed Christianity. Heresy must not be confounded with schism: the former relates to doctrine; the latter to division on points of discipline. The number of heresies mentioned by early ecclesiastical writers is from 80 to 150; but Lardner (Hist. of Heretics, i. 5) has shown that many of these ought to be excluded from the list; nor have we any evidence that many of them had numerous followers.

Most of the heresies of the first two centuries related to the creation of the world, the origin of evil, the person of Christ and the relation of Jewish and Christian doctrine, and nearly all may be included under two great division.

1. The Ebionites and Nazarenes, who, upon embracing Christianity, adhered to many Jewish opinions and ceremonies, who subordinated the Christian religion to the Jewish, and the opinions of the Greek and Oriental philosophy. Some however regard the Ebionites as a sect of Gnostics.

2. These heresies are supposed to have commenced in the Apostolic age, and to have referred to in the writings of St. Paul and St. John. [EBIONITES; GNOSTICS.]

The Gnostics appear to have been very early divided among themselves concerning the respect which ought to be paid to the Mosaic law, and a new sect was formed by a Jewish Gnostic named Cerinthus. [CERINTHUS.] The Nicolaitans mentioned in the 'Apocalypse' (6. 14) are supposed to have been a sect of Gnostics, and some identify them with the Cerinthians. About a.d. 121, Valentine, an Egyptian, engrafted some opinions of his own upon Gnosticism, and founded a new sect. His party was strongly opposed by Irenaeus and Tertullian. Another sect which took its rise from the opinions of the Gnostics was that of the Montanists, and the more celebrated Marcion, who began to propagate their tenets at Rome about a.d. 130. The principal feature of this heresy was the adoption of the Oriental belief in a personal god and a personal devil. The principal followers of Marcion were Lucian, or Leucius, and Apelles. About a.d. 172, Bardsanes and Tatian gave rise to a new sect of Gnostics, which was chiefly distinguished by the practice of an ascetic discipline. These people were women, from their habits of abstaining, encoragement, Hydroparasites, and Apotactics. The Docetae were a sect of Gnostics who sprang up very early. They held that the body of Christ was immaterial, and therefore did not suffer on the cross, but only appeared to die. Several minor sects of Gnostics are mentioned by antient writers, such as the Adamites, the Cainites, the Sethians, and the Ophians, an account of which is given in the lapse of the Church.

HERETICS. He doubts the existence of such sects as the Adamites and Cainites. The sect of Eclecists, or New Platonists, was founded at Alexandria in the second century; but though its tenets were embraced by many Christians, it is rather considered as a philosophical than a Christian sect. [ECLLECTICS.]

We now come to the heresies which existed from a very early age respecting the divinity of Christ. This doctrine was denied by the Ebionites, and by some of the Gnostics. [EBIONITES.] About the end of that century Praxedis founded a new sect. Denying the doctrine of the Trinity, he held that the divine nature was intimately united with the person of Christ, whom he considered to be a mere man, but born of a virgin. His followers were called Monarchists, from their rejecting the doctrine of the Trinity; and Patrapiasians, because they were supposed to believe that the Father suffered on the cross; this opinion however they seem to have disclaimed. In the opinions of Praxedis ecclesiastical historians trace the germ of the Sabellian heresy. His chief antagonist was Tertullian. His opinions were held by the Roman church, and are called Pistis Artenem and Thelotus. Among the heresies of this age respecting the creation of the world was that of Hermogenes, who believed in the eternity of matter.

The Montanists, who arose in Phrygia about the year 170 (some say 150), and were afterwards called upon as fanatic like than heretics. Their leader Montanus claimed the character of a prophet: he appears to have differed from the orthodox in no leading doctrine, but only in some points of discipline. His doctrine was perhaps the germination of the Cerinthis, or Catholica, and perhaps in the circumstances that they were embraced by Tertullian. [TERTULLIAN.] We find traces of this heresy down to the time of Augustin and Jerome. Some incommensurable with the ceremonies of the church, such as the Artyotrites and others. [COMMUNION.]

In the third century Gnosticism still had adherents, though it was fast falling into disrepute. But a new heresy arose out of the Oriental philosophy, headed by Manes, who attempted to unite the doctrines of the Persian Maim with those of the Apostles. [MANICHÆANS.] The controversy on the Trinity and the person of Christ continued with increased bitterness. About the middle of the century the doctrines of Praxedis were revived, with slight variations, by Noetus of Smyrna, Sabellius, an African bishop, and Berylius, an Arab. The last two were opposed by the council of severa. [SEVERA.] Another heresy relating to the same subject was established by Paul of Samosata, bishop of Antioch. A new sect of Ebionites, or Jewish Christians, appeared about the middle of the third century, but it lasted only for a short time. They were called Eclesiates, from their founder Eliazi. The Novatians, followers of Novatian, a presbyter of Rome, are reckoned, perhaps erroneously, among the heresies of this century. They held no doctrine different from those of the Catholic church, but maintained a greater severity of discipline; and hence they were called Puritans (καθαροι). By some historians they are regarded as austere and turbulent. The Gnostics were considered as the earliest sect of reformers in church discipline.

In the fourth century the attention of the church was chiefly occupied with the Arian controversy [ABIAN; ARIUS]. About a.d. 311, Maximianus was made bishop of Cappadocia, and the person of Christ continued to be regarded as good and as God. The principal followers of Cerinthus were Marcion, Leucius, or Apelles. About a.d. 172, Bardsanes and Tatian gave rise to a new sect of Gnostics, which was chiefly distinguished by the practice of an ascetic discipline. These people were women, from their habits of abstaining, encoragement, Hydroparasites, and Apotactics. The Docetae were a sect of Gnostics who sprang up very early. They held that the body of Christ was immaterial, and therefore did not suffer on the cross, but only appeared to die. Several minor sects of Gnostics are mentioned by antient writers, such as the Adamites, the Cainites, the Sethians, and the Ophians, an account of which is given in the lapse of the Church.

[PELAGIAN.] At the beginning of the fifth century the Pelagian controversy arose. The disputes concerning the Trinity and the person of Christ continued to rise to new sects, the chief of which were the Nestorians and their opponents the Eutychians, or Monophysites. [BARYU-]
The rapid spread of the monastic system in this century was warmly resisted by Vigilantius, who thus incurred the enmity of Jerome, and has been ranked among the heretics.

In the sixth century the Monophysites continued to bristle at the question whether the body of Christ was corruptible or incorruptible. Other minor sects are mentioned by Mosheim.

(Ecc. Hist., vol. ii.) After this time most of the antient sects remained in existence in different parts of the Christian world; the only sect which requires a distinct notice is that of the Paulicians, which was formed in Armenia and Cappadocia in the seventh century. After suffering severe persecutions they were dispersed over Europe, in various parts of which they formed settlements about the eleventh century. The origin of the Albigeenses is traced to a body of Paulicians which settled in France. [ALBIGENSES] The doctrines of the Paulicians have been identified by some with those of the Manichæans, while others regard them as reformers of the corruptions of the church. (Vaughan's Life of Wycliffe, Intro. c. ii.) The history of later sects merges in that of the Reformation.

(Epiphanius, De Haeresiis; Lardner's History of Heresies; Gibbon's Roman Empire; Mosheim's Ecclesiastical History; Nander's Kirchengeschichte.)

Swept away by the great parasitic insects of the sect Melitensia (Latrille), and family Apiæ. Distinguishing characters—body elongated, slender, almost cylindrical, that of the males with a small cavity beneath the apex; mandibles triangular; maxillary palpi two-jointed.

The little bees belonging to this genus, we are informed by Latrille, make their nests in holes in old trees; we presume that, as in the genus Chiloëtoma, the holes are made by the cicada Hervia Campanulare, a species very common in various parts of England, is about a quarter of an inch in length, of a black colour, and sparingly covered with greyish hairs. This little bee is by far the smallest British species known of the family to which it belongs; it is common during the summer and autumnal months in the flowers of the various species of Campanula, and apparently is never found in the flowers of other genera of plants. The males are often taken asleep in these flowers; their abdomen is then doubled, so that the tubercle with which its base is armed fits into the cavity near the anus. (See Kirby's Monographiap Apum Anglic. vol. ii., p. 236-7. For details of the structure and classification see Genera Crustaceorum et Insectorum, Paris, 1806, 1807.)

HERIOT is a feudal service consisting in a chattel rendered to the lord on the death of a tenant, and in some places upon alienation by a tenant. It is stated to have originated in a voluntary gift made by the dying tenant to his lord and chieftain of his horse and armour. (Glanville.) This custom became first usual, then compulsory; and at an early period we find the ancient military gift sinking into the tenure of the best animal (at the election of the lord) possessed by the tenant, and sometimes a dead chattel, or a commutation in money. (Bracton; Fleet; Coke-Littleton.)

Heriots are either heriots-custom or heriots-service. Where a heriot is due from the dying tenant by reason of his filling the character or relation of tenant sustained by the party within the seignory, &c., in which the custom is found to exist, and not, as in the case of heriots-service, in respect of the land held by the heriot. As the selection of the best animal is however with the lord, he may determine his choice by an actual seizure, upon which the property in the animal will vest in the lord by the mere act of seizing it.

But for heriot-service the lord may either seize or dis
Hermaphroditus. (Monster.)

Hermas, a Christian writer of the first century; who is said by Eusebius (Hist. Eccl., iii. c. 3) and Jerome (De Illustr. Vir., c. 10) to have been the same individual whom St. Paul salutes in his epistle to the Ephesians (vii. 14). He was the author of a work entitled 'The Shepherd,' which is called by this name because the angel who bears the principal part in it is represented in the form of a shepherd. This work is divided into three books; of which the first contains the number of visions which the Shepherd, in his ten similitudes. Du Pin remarks (Eccles. Hist., vol. i., p. 27, Eng. Transl.) that 'these three books comprehend very many moral instructions concerning the practice of Christian virtues. The similitudes and similitudes make them tedious; and all these moral truths would have been more useful if the author had pronounced them simply, as the apostles have done in their epistles.' But Hermas appears to have followed the plan of the Apocalypse; which he has imitated in many parts of his work. Lardner in his 'Credibility of the Gospel History' (Works, vol. ii., p. 69—72) has given many instances of such imitations. Mosheim (Eccles. Hist., vol. i., p. 100—1, ed. of 1826) and many other critics have maintained that 'The Shepherd' was written by Hermas, who was a brother of Pius, bishop of Rome, in the year 141.

The 'Shepherd' of Hermas is frequently quoted with the greatest respect by the most approved Christian writers. We learn from Eusebius (Hist. Eccl., iii. c. 3, 5) and other writers that it was received by many churches as a canonical work. It is quoted by Irenæus and Clement of Alexandria as a part of the New Testament. See Schlesinger's Church History of the Second Century, by a Montanist (see the passages in Lardner's Works, vol. ii., pp. 186, 249, 303, 304). Origen also considered it of divine authority; but informs us that it was rejected by some churches. After the time of Origen its canonical authority appears to have been generally denied. Eusebius, Jerome, Athanasius, Ruffinus, Gelsi, and Prosper expressly declare that it should not be included in the canon.

The 'Shepherd' contains no express citations of any books of the New Testament, which were not originally written in Greek; but there is only an ancient Latin version of it extant. There is an English translation by Wake, London, 1653 and 1716.


Hermes, an ancient Greek deity, known to the Romans as Mercurius, was, according to Herodotus (Theog., 942), the son of Zeus and Maia, the daughter of Atlas. The attributes of this deity are numerous and of opposite kinds; but it appears probable that he was originally considered as the patron of merchants and of merchants. He is said to have been born in Arcadia (Pausan., x. 3, 4; v. 27, 5; ix. 32, 2; See also Hdt., i. 29.) The phases of his character, which we are told of Hermes at Athens (Herod., ii. 51), also appears to indicate that this god was considered to increase the fruitfulness of the fields and cattle. Herodotus informs us (ii. 51) that the Athenians were taught by the Pelasgians this manner of representing the statues of Hermes; and that the reasons for this custom are explained in the Samothracian mysteries. Hermes was represented in a similar manner at Cyllene in Elis. (Pausan., ii. 27, 3.) He was also maintained by Ciceron (De Nat. Deor., ii. 22) and Macrobius (Saturni., i. 19.) According to some traditions, Hermes is said to have been born in Arcadia (Pausan., viii. 16, 1), and to have been the founder of the city of Athens; according to another tradition, he was born at Tanagra in Boiotia. (Pausan., ix. 20, 3.) He was worshipped by the Thessalians above all other deities. (Herod., v. 7.)

In Homer, this one of his deities is usually Hermaeus. He is represented as the messenger of Zeus and the gods, and he conducts the souls of the departed to Hades. In later times he was regarded as the god of eloquence; the inventor of the lyre and weights and measures; the patron of merchants and of merchants; and the protector of heralds, poets, musicians, and wrestlers. Statues of Hermes, which were originally square blocks with a carved head upon them, were placed in the doorways of houses and temples. (Theoc., vi. 27.) They were also erected where several lands...
of twenty-five Homergenes is reported to have entirely lost his memory, and to have lived to an advanced age in a state bordering on idiocy. (Philolaus, Lives of the Sophists; Suidas; Fabricius, Bibliotheca Graeca; Schol. History of Greek Literature.)

HOMERGONES, or HOMEROGNIANUS. [Corpus Juris.]

HERMUND, or HEMEND. [AFGHANISTAN.]

HERMUS. [Cic. Trog. I. 44.]

HERNAN. [FERREDO DE PULGAR. [PULGAR.]

HERNIA (from ἵρνης, ἵρνη, a branch), signifies the protrusion of any organ from its natural position in the body; as hernia cerebri, hernia pulmonis, when the brain or lung protrudes through an aperture in the skull or chest. But when used alone, this term means what is commonly called a rupture, that is, the protrusion of any portion of the intestinal canal from the cavity of the abdomen. Hernia sometimes form without any evident cause, the intestine being gradually protruded; but more frequently they result from some violent bodily exertion, as lifting heavy weights, excessive coughing or straining; or from sudden jarring or shocks, as in jumping or falling; or from blows on the abdomen.

The general character distinguishing a hernia are, a tumour, neither red nor hot, and often not painful, situated at some part of the abdomen, most frequently in or near the groin; large, soft, and pulsating, and vanishing and disappearing entirely when he lies down; distended by coughing or other violent expiration, and liable to variation in size by exercise or rest, by abstinence or taking food; often producing disorders of the digestive canal, as flatulence, colic, &c. In the cases in which the hernia forms suddenly, as in consequence of a great exertion, the patient feels as if something had given way at the groin or other part of the abdomen, and on putting his hand there he feels a tumour which may vary in size from that of a nut to that of his fist, is elastic, hard, and tense, and soon after the accident becomes painful and tender. In the other class of hernia, which are called indirect, the hernia is almost imperceptibly to the patient, and grows larger regularly but slowly; it is attended with no pain, but merely a sense of weakness about the part; and decreases greatly or entirely disappears in the recumbent posture. If a hernia can be returned into the abdomen at pleasure, it is not by itself a dangerous disease; but if it becomes strangulated, that is, if the intestine is so constricted by the parts through which it has passed that its contents cannot pass through it, and its vessels are so much compressed that active inflammation is excited, it constitutes one of the most serious accidents to which the human body is liable. The symptoms indicating strangulation of the intestine are obliterative constipation, vomiting of frothy and bloody fluid, and the intervals of the tumour, and spreading from it over the whole surface of the abdomen; extreme restlessness and languor; nausea and vomiting; a hard, small, and rapid pulse; thirst and coldness of the extremities. In the case of the hernia symptoms will regularly increase, till mortification of the intestine ensues, and (except in some most rare cases) death rapidly follows.

The above symptoms and other circumstances are common to all hernia wherever situated, and are only modified slightly by the part of the abdominal contents protruded, the narrowness of the part through which it is forced, and the constitution of the patient. There are some local circumstances which do not correspond to each, according to which part of the intestine is involved, which the intestine is protruded, which require to be noticed in connexion with the mode of returning each into the abdomen and of retaining it there.

The most frequent condition of rupture is the Inguinal, and it is far more common in males than in females. It forms a tumour, occupying either the groin alone, or extending thence more or less obliquely downwards between the inguinal ligament. To remove this, an incision is made in his back with his loins lower than either his shoulders or his hips, and the knee of the side on which the hernia has formed should be raised and turned a little inwards. The incision is made through the external oblique muscle with his right hand, should press it in the direction contrary to that in which it has protruded, and then retain it, while with his left finger and thumb placed at the narrowest part of the swelling he moves the intestine from side to side, alternately pressing it inwards with one hand, retaining a small portion of its contents, and force it into the abdomen. If any portion
be pressed through, a slight gurgling noise will be heard, and by continued efforts the whole will most probably follow.

An inguinal hernia may attain the size of an adult's head or more; but a Femoral hernia, which is the kind most common in females and rarely more than two inches in diameter, and generally much less. It is usually of a rounded form, situated just below the groin, about two inches from the middle line of the body, and always feels hard under the skin. The only principal cause of inguinal hernia is deep in the thigh, directly under the tumour, which tends to pass upwards over the groin. In reducing it the position of the patient should be the same as for inguinal hernia: if the tumour is large enough to be pressed directly backwards, as if to force it deeper into the thigh; if it cannot be grasped, it should be pressed in the same direction, with the balls of the thumbs placed side by side upon it.

In umbilical and ventral herniae, which come straight out from the front of the abdomen, the oblong and pendant tumours which they form, and which often attain a considerable size, should be grasped with one hand, and pressed leaving the intestine from the pressure of the muscles, which hand, as in inguinal hernia, guides the respective portions through the aperture.

Whatever be the situation or condition of a hernia, it should act as quickly as possible, reduce. The patient should go to bed, and, after lying a short time on his back, with his knees raised, the intestine will often of itself recede into the abdomen, especially if it have been frequently protruded; when this has been done, operations on the abdomen, or any exertion or labour described should be employed. The force used in it should never be so violent as to give much pain, and in old hernias little or none should be caused; nor should the manipulation be continued more than an hour at a time, nor so long as to bruise the tumour or make it tender. If it fail, there are several auxiliary means that may be employed, of which a selection must be made according to the circumstances of each individual case. The warm bath should be first tried in all cases; the patient should be placed up to the neck in water at a temperature of from 94° to 106°, and remain there till he becomes quite faint. Any pain or irritation that previous attempts at reduction may have produced will be greatly relieved by these means, and the state brought on by the bath is peculiarly favourable for the return of a hernia, both by relaxing all the tissues surrounding it, and, when faintness occurs, by relaxing the intestine from the pressure of the muscles, which are often present the chief obstacle to its return, but which in that state become powerless. As soon therefore as the patient complains of faintness, or after he has been in the bath, if he be not already in bed, or a chair, an attempt should be made to reduce the hernia by manipulating it as already directed under water. In strong and robust men, and especially in cases where the hernia has recently formed, but has been long enough for a while in the front of the abdomen should be employed, and the same opportunity taken to try to replace the intestine. The abstraction of blood will be useful, not only by the faintness which it produces being a favourable state for reducing the hernia, but by its relieving the inflammation which always arises when the intestine is strangulated, and by checking it in its fatal progress. If the warm bath and bleeding fail, the patient should be placed between warm blankets to recover from their depressing effects, and no more manual attempts should be made for some time. The next means employed should be the continued application of cold by ice or a rapidly evaporating lotion laid over the tumour, and kept there, until it produces a sufficient shock to all those parts and to the intestine, and by the diminution of its volume, that reduction is sometimes thus effected, even without manipulation; the men much worse, with the strangulation increasing, the only means left before resorting to operation is the tobacco enema. Great caution is necessary in employing it; it should never be used except in otherwise hopeless cases, and even then it is not to be attempted unless all other means have failed. A dram of tobacco being steeped in a pint of boiling water for ten minutes, half the infusion thus made should be used first; and if it produce no evidently depressing effect, half may be repeated in half an hour afterwards. The usual consequence is an extreme degree of languor and sinking, a kind of deadly coldness and paleness, and the last stage of depression: in this state a last attempt at reduction should be made; and if still unsuccessful, an operation must be resorted to. The tobacco enema should not be employed unless the symptoms of strangulation be quite evident. If the hernia seems merely irreducible, but is not hurtful, and if cold, and warm baths and bleeding (if deemed advisable), have failed, the patient should be left, and an active dose of aperient medicine given him, for sometimes the bowels will, under the operation of the enema, be opened, and the tumour, which the pad is riveted into the spring, which is a narrow band of highly tempered and very elastic steel, forming when extended somewhat more than a semicircle.

When a hernia has been completely reduced, its recurrence must be prevented by the wearing of a truss. A truss consists of a circular pad, having one side convex and the other concave, and the two should be pressed directly backwards, as if to force it deeper into the thigh; and if it cannot be grasped, it should be pressed in the same direction, with the balls of the thumbs placed side by side upon it. In applying a truss, the soft convex surface of the pad should be placed up against the front of the abdomen, carrying the skin and subjacent tissues before it. The pad being held there, the spring should be made to pass round the haunch to the back, so as to reach just beyond the spine; and the elastic cord, which is fastened to the back of the pad, will thus act so as to press with a certain force upon the ring or the canal through which the hernia was protruded, and thus supply the defect of weakness at that part of the abdominal wall, while the weight of the body is applied near the spine there is affixed, in what are called common trusses, a leathern band, which is to pass round the opposite haunch, and buckled or buttoned on the pad, so as to prevent its loosening on the short work during exertion. In applying this, one pad must be placed on the ring, the spring must pass round the opposite haunch, and the hinder pad must rest on the spine, just below the loins, where it is least movable. In cases of hernia on each side, a double truss, that is, one with a pad for each side, and one or two springs long enough to reach quite round the body, must be worn: if there be two springs, they should be equal in pressure, or a great strain will be put on the hernia, so that they may be tightened or loosened behind, and another band should pass from one pad to the other to maintain them in their proper position. To determine the necessary pressure, let the patient be brought up to the ring by a string fixed at one end over the centre of the ring, at the part where, when the patient coughs, the intestine may be felt endeavouring to protrude, and thence carried round in an oblique direction between the most prominent part of the hip and the top of the haunch-bone to an inch behind the spine. The pad should be of a size proportioned to that of the ring, and the spring should be strong enough to make firmly, not merely fastened; and in addition, to press inward and upward.

HERO, HEROIC, HEROISM, are used, in their common English sense, to denote an unusual, and, as it were, superhuman degree of bravery and virtue. This meaning flows directly from the original Greek word, which denoted at least a hero in the strictest sense of the word, a person intermediate between gods and men, and usually of divine descent on at least one side. Such were worshipped with divine honours by those cities and races of men who came the nearest to the ideal. This divine original however was not essential: thus Philippos of Crotona, who fell in battle against the Phnicans and Egestians, was made a hero for his beauty; and Heronius, the gladiator, who was buried, and sacrifices were offered to him. (Herol., v. 47.) At a later-age Aratus and Brasidas were worshipped as heroes at Sicyon and Amphipolis; and the Athenians slain by the Mies at Marathon, when it is related in holy books that their last, legends were current which show that a supernatural and mythological character was really ascribed to them, and they probably were the latest of the Greeks to whom
HER

such a character was attributed. The Herod’s age, properly so called, appears however to have terminated with the immediate descendants of the Greeks who returned from Troy, and to have extended backwards for an uncertain length, estimated by Mr. Thirlwall at six generations, or about 200 years. This is the fourth or Herod’s age, in which Zeus, as the breaker of heros, better and braver than the third or brazen race (Days and Weeks, 157), the princes and warriors of mythological history, such as Theseus, Perseus, and those who fought in the siege of Troy; and after them successively, as the ancients frequently, but in quite a different sense: it is applied collectively to the whole body of fighters, Argai, Dami, and Achai, without reference to individuals of peculiar merit; and indeed often appears to be used for little more than an expiatory, or, as it were, a soldier, would have done equally well. Indeed the application of the word is not even limited to warriors; it is applied to heroes, wise counsellors, kings, &c. It has been superseded in the age succeeding the Homeric era, that the word originally denoted the members of those roving bands who in the earliest times overran Greece, issuing forth from the south of Thessaly and giving extension to the name, first of Achaeans, and afterwards of Hellenes, as we learn from the legends in Pausania and Thucydides; so that in the same sense the Normans who colonized Italy, or the Saxons who settled in England, might justly be called heroes. In Homer, however, the Latin and German forms of heros and hero (master), here, herths, heracles, vrs, virtus, &c. The same root seems to exist in the word Arian, which denotes a practical geomancer, a combattant of the combats, or existing at the time of the establishment of their empire after the Lombard conquests. There seems little doubt that this class originated in the warrior caste of the Lombard invaders; and that the Homeric fable to the theory suggested above as to the origin of the Homeric use of the word hero. Even the name of German, and the meaning of brother attached to the word in Latin, may originate in the same sense of a member of the hero, or say it was the same hero that was to involve the notion of might or mystery. The Sanscrit word siri appears to contain the same element as heroes.

The promiscuous (or Homeric) use of the word hero disappeared, but it admitted the name to a share of the divine nature and enjoyments after death; and the love of magnifying past ages, common to all nations, will sufficiently explain the change of earthly leaders in protecting genii or demons, who were believed immortal, invisible, though frequenting the earth, and afterwards, in the Greek who returned to furnish one, among other reasons, for believing him to have lived after the Homeric age. (Thirlwall’s History of Greece, ch. v.; Philog. Mus., No. 4. On the Homeric use of the word hero. In Homer, the Greek who returned to furnish one, among other reasons, for believing him to have lived after the Homeric age.)

HERO, or HERON. There are two of this name, both writers on mechanical subjects. Heron, the elder, was the pupil of Ctesibius, and lived at Alexandria about a.c. 160. The country of the younger Hero is uncertain; in a work attributed to him (on geology) he states that the procession of the sun through the twelve months is produced by degrees of heat since the time of Ptolemy, so that he must have been about 500 years later than Ptolemy: he is generally placed under the reign of Heracleus, a.d. 619–641.

Herod the elder must have enjoyed great reputation, since he is mentioned, by Gregory Nazianzen, with Euclid and Ptolemy: but he is now principally known by some fragments of his writings on mechanics, which are to be found in the ‘Mathematica’ of Voss, Paris, 1616. His extant writings are: 1. ‘On the mechanical caloric of China’; which is in the ‘Math. Vet.’ already cited. 2. ‘Baruelle,’ a treatise on the raising of heavy weights, which is mentioned by Pappus. The second work has been lost, but the first has not yet been printed. 3. ‘Belopoeica’ or mechanical manufactures of darts, published by Baldi, with an account of Hero, at Augsburg, in 1616, and also in the ‘Math. Vet.’ 4. ‘Pneumatics,’ published by Commandine, Urbino, 1573, and Amsterdam in 1618, under the additions of Aeleotti, who had previously published an Italian version, Bologna, 1542, and Ferrara, 1549. 5. ‘On the Construction of Automata,’ which is in the ‘Math. Vet.’, and was translated into Italian by Bernardino Baldi, with an account of the rise and progress of mechanics, Venice, 1589, 1601, 1661. 6. ‘On Dioptries,’ a work said by Lambecius to exist in manuscript in the Vienna library. Other works of Hero, now lost, are mentioned by Plutarch, Eutocius, Heliodorus of Larissa, &c., for which see Helbronn, who is the authority for the preceding summary (see also J. A. Schmidt, ‘Heronis Alexandrini Vita Scripta at hanc usque codicibus conservata,’ 1744, 1746.

The writings of Hero the younger are: 1. a book ‘On Machines of War,’ edited in Latin by Baroccius, Venice, 1572; together with 2. a book of ‘Geodesy,’ a term then meaning ‘the practical geometry of combats, or existing at the time of the establishment of their empire after the Lombard conquests. There seems little doubt that this class originated in the warrior caste of the Lombard invaders; and that the Homeric fable to the theory suggested above as to the origin of the Homeric use of the word hero. Even the name of German, and the meaning of brother attached to the word in Latin, may originate in the same sense of a member of the hero, or say it was the same hero that was to involve the notion of might or mystery. The Sanscrit word siri appears to contain the same element as heroes.

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HEROD, HERODES, the name of several Jewish princes.

1. HEROD THE GREAT was the second son of Antipater, by whom he was appointed governor of Galilee at the age of twenty-five. In a.c. 43 he obtained from Sextus Caesar the government of all Coile-Syria. From this time he became, with his brother Phasael, the chief supporter of Hyrcanus II. against the attempts of Antigonus, the son of Aristobulus. By large presents he obtained the friendship of Antiochus, who appointed him and Phasael tetrarchs of Judaea and Samaria. In a.c. 40, when Antipater was killed by a party of Jews, he was appointed king of the Jews; but the Senate in Rome was not satisfied, and it was not till the end of the year 38 B.C. that Jerusalem was taken by Sossus. The commencement of Herod’s reign dates from the following year. In the year 38 he had married Mariamne, the grand-daughter of Hyrcanus, hoping to strengthen his power by this match with the Asmonaean family, which was very popular in Judea. On ascending the throne Herod appointed Anaxil of Babylon high-priest, to the exclusion of Aristobulus, the brother of Mariamne. But he soon found himself looked upon as a rival, and Herod, the latter, and undertook, at his command, a campaign against the Arabs, whom he defeated. After the battle of Actium he went to meet Octavianus at Rhodes; having first paid a visit to Hyrcanus, who had been released by the Parthians, and had placed

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himself under Herod's protection some years before. He also imprisoned Mariamne and Alexander, commanding their keepers to kill them upon receiving intelligence of his death. Octavianus received him kindly, and re-instated him in his kingdom. On his return Mariamne reproached him with his intentions towards her, which she had again discovered. This led to an estrangement between Herod and his wife, which was artfully increased by his sister Salome; till on one occasion, enraged at a new affront he had received from Mariamne, he stoned his vicious which he feared to prove fatal. In the year 26 B.C. he put to death the sons of Babas, the last princes of the Aesmaonian family. He now openly disregarded the Jewish law, and introduced Roman customs, a conduct which increased the hatred of the people towards him, and conspired against his life, but were detected and executed with the greatest cruelty. To secure himself against rebellion he fortified Samaria, which he named Sebastos, and built Caesarea, and other cities and fortresses.

In the year 17 B.C. he began to rebuild the temple at Jerusalem. The work was completed in eight years, but the decorations were not finished for many years after. (John, ii. 20.) Herod's power and territories continued to increase, but the conduct of his reign was marked by many violent dissensions in his family, of which a minute account is given by Josephus. He died in March, B.C. 4, in the thirty-fourth year of his reign and the seventeenth of his age. Josephus speaks shortly before his death of many of the principal men of the Jewish nation in the Hippodrome, commanding his sister Salome to put them to death as soon as he expired, that he might not want ministers to receive him; they were released however by Salome upon Herod's death.

The birth of Jesus Christ took place in the last year of Herod's reign, four years earlier than the era from which the Jews chronologize the years (Clinton's Fasti Hellenici.)

II. HEROD ANTIPAS, son of Herod the Great, was appointed by his father's will tetrarch of Galilee and Perea.  He was tried in Jerusalem for complaints against his government, and married his sister-in-law Herodias. John the Baptist, having renounced his marriage, was imprisoned in the castle of Machærus, and afterwards put to death. (Luke, x. 19, 20; Mark, vi. 17—20.) About the same time Aretas marched against Antipas and defeated him. In A.D. 39 Antipás was accused by Agrippa, king of Judea, of a secret understanding with the Parthians, and was banished to Lyons.

III. HEROD AGrippa, son of Aristobulus and grandson of Herod the Great, after experiencing many vicissitudes in early life, was appointed, upon the accession of Caligula, king of Egypt, by his brother-in-law,降至, Galunitis, Batanaea, and Trachonitis, to which Galilæa added the tetrarchy of Lycaonia; and afterwards, when Antipas was banished, the tetrarchy of Galilee and Perea. Claudius added Judea and Samaria to his dominions. His government was popular with the Jews, to please whom he persecuted the Christians. (Acts, xii. 1—3.) He died of a loathsome disease at Cæsarea, in the third year of his reign over all Palestine, A.D. 44. (Acts, xii. 20—23.)

Agrippa, son of the former Agrippa, was seventeen years old at the time of his father's death. Upon the death of Herod, king of Chalcis, four years afterwards, Claudius bestowed that kingdom upon Agrippa. He did not leave Rome till A.D. 63, when Claudius gave him the tetrarchies of Galilæa, Batanaea, and Trachonitis. His dominions were enlarged by Nero. It was in A.D. 60 that the trial of Paul before Agrippa took place. (Acts, xxvii.) Agrippa exalted himself too far to keep up the spirit of revolt which was now constantly increasing among the Jews. When war broke out, Agrippa joined the Romans. After the taking of Jerusalem he retired with his sister Berenice to Rome, where he died at the age of about seventy years.

(Josephus, Antiquities of the Jews, and Jewish War; John's Hebrew Commentary; vocalist's Conjugation.)

HEROD'S DIANS (Hermiones, Matt. xxii. 16; Mark, iii. 6;
HERODIUS, a Greek author, who wrote a history, in eight books, of the Roman emperors who reigned successively in his lifetime, beginning with the death of Marcus Aurelius, d. 180, and ending with the accession of the younger Gordianus, d. 238. This history comprehends a period of little more than half a century, but it is in most eventful one in the history of the empire, on account of the numerous and violent events, any of the civil war, and also with respect to the domestic and foreign wars, the depravity of manners, and the public calamities which characterized that age. The story of emperors which the history of Herodianus embraces comprises Commodus, Pertinax, Julianus, Nicer and Albinus, Severus, Caracalla and Geta, Macrinus, Elagabalus, Alexander Severus, Maximinus, the two Gordiani, and Balbinus. The style of Herodianus is plain and unadorned, and his style is characterized by the spirit of sincerity, but it has no claims to philosophy or critical art. (F. A. Wolf, Narratio de Herodianio et libris ejus, prefixed to his edition of Herodianus, Halle, 1792.) Of the private history of the emperors, Herodianus tells very little; and even of their public acts he has lived at Rome, and to have been well acquainted not only with the political events, but also with the court intrigues and scandal of his time. He is the last of the Greek historians of antiquity who lived before the partition of the Roman empire. Among the editions of his history that of Imisch, in 5 vols. 8vo, Leipzig, 1759—1805, in Greek and Latin, contains numerous notes, chronological and genealogical tables, and several copious indexes. The last edition is that of Schröder, Berolin, 1838, and numerous 8vo. There are several German translations of Herodianus.

HERODOTUS. (Heródotos) [Hódóteos], a native of Halicarnassus, a Dio. 1. 17. 17. and became the best known member of the confraternity called the Hexapoli, or Six Cities, was born about b.c. 495. If the passages in his own History (i. 130; i. 15) were written by himself, he was probably alive in aec. 498. The facts of his life are few and doubtful, except so far as we can collect them from his own works. He was the son of Lykus and Dryo, and of an illustrious family in his native state. Not liking the government of Lygdamis (the grandson of the heroic Artemisia) who was tyrant of Halicarnassus, he retired for a time to Samos, where he is said to have cultivated the Ionic dialect of the Greek, which was the language of that island. Before he was thirty years of age he joined in an attempt, which proved successful, to expel Lygdamis. But the banishment of the tyrant did not give tranquility to

60.) Herodotus presents himself to our consideration in two points of view; as a traveller and observer, and as an historian. The extent of his travels may be uncertain, but pretty clearly from his History, but the order in which he visited each place and the time cannot be determined. The story of his travels at the Olympic games, which he has found its way into most modern narratives, has been well discussed by Dahlmann, and we may perhaps say disproved. (Herodot. Aus seinem Buche sein Leben. Altona.) The story is founded on a small piece by Lucan (Ed. Reis., pp. 531, ed. 1692.) The main point of his travels seems to have been to write, but it was not intended by the writer himself as an historical fact; and in addition to this, Herodotus was only about twenty-eight years old (Suidas, Θωμαδόδης) when he is said to have read the assembled Greeks at Olympia a work which was composed of his travels, research and bear s in every part of it evident marks of the hand of a man of mature age. The Olympic recitation is not even alluded to by Plutarch in his treatise on the Ma-

lignity of Herodotus (v., p. 531, ed. Wyttenbach). The arguments derived from this circumstance, as to the truth or falsehood of the story, are considered by Dahlmann (p. 32). Heyse endeavours to maintain the story of the Olympic recitation, and to relieve it from some of its difficulties; but, in our opinion, not successfully. Another recitation at Athens is mentioned by Plutarch and Eusebius. With a simplicity which characterizes his whole work, Herodotus makes the display of his travels. He frequently avoids saying in express terms that he was at a place, but he uses words which are as conclusive as any positive statement. He describes a thing as standing behind the door (i. 182), or on the right hand, (v. 242. 243) or according to the report of a person in a particular place (i. 28), or he uses other words equally significant. In Africa he visited Egypt, from the coast of the Mediterranean to Elephantine, the southern boundary of the country (ii. 29); and he travelled westward as far as Cyrene (ii. 32, 181), and probably farther. In Asia he visited Tyre, Babylon, Ecbatana (i. 98), and probably Susa (v. 52-54; vi. 119). He also visited Babylon and the garden of the Parthians, Colchis (ii. 104). In Europe he visited a large part of the country along the Black Sea, between the mouths of the Danube and the Crimea, and went some distance into the interior. He seems to have examined the legend of the march of Xerxes from the Hellespont into Attica, and no doubt had seen numerous places on this route. He was well acquainted with Athens (i. 98; v. 77, &c.). Delphi, Dodona, Olympia (iv. 81), Tegea (i. 66), Thasos, Delos, Zancus (iv. 15), and numerous places in the Peloponnesus and some parts of South Italy is clear from his work (iv. 99; v. 44, 45). The mention of these places is sufficient to show that he must have seen many more. So wide and varied a field of observation can be accurately and still more rarely to any historian, either of ancient or modern times; and if we cannot affirm that the author undertook his travels with a view to collect materials for his great work, a supposition which is far from improbable, it is certain that without such advantages he could never have written it, and that his travels must have suggested much inquiry, and supplied many valuable facts which afterwards found a place in his History.

The Nine Books of Herodotus contain a great variety of matter, the unity of which is not perceived till the whole work has been thoroughly examined; and for this reason, on a first perusal the History is seldom well understood. Historians have differed about the subject of his history, but both clearly and comprehensively. The object of the inquiries (for so we may render the word ierogyn) of Herodotus is that the acts of men may not be forgotten through lapse of time, and that great and won- drous achievements, performed partly by Greeks and partly by Barbarians, may not be without their fame; and also how it came to pass that Greeks and Barbarians waged war together. His object is to give a general history of the Greeks and the Barbarians (that is those not Greeks) with the history of the wars of the Greeks and Persians. Accordingly, in execution of his purpose, he begins from the time when the Lydian kingdom of Croesus fell before the armi (n.c. 546) of Cyrus, the founder of the Persian monarchy, to the capture of Sestos (n.c. 478), an event which crowned the triumph of the Greeks over the Persians.

V2
There is no translation of Herodotus which has yet done justice to his style, and no commentary has yet exhausted one-tenth of the matter which admits and requires illustration.

The first edition of Herodotus was the Latin translation of L. Valla, Venice, 1474, fol. The first Greek edition was printed by K. Koehler at Athens in 1555, fol., and by J. V. Harsdorff, Bremen, 1615, fol., under the superintendence of Camerarius. The edition of Harsdorff is very correct and useful. The most complete edition of Herodotus is that of J. Droysen, 8 vols., Berlin, 1854-72, fol., reprinted in 1874 by Professor Gaisford has also collated the Sancroft manuscript (one of the best manuscripts of Herodotus) for his edition of Herodotus, Oxford, 1824, but the result of his labours is not the work of the historian (for such, in the proper sense of the term, he could not well possess), but that happy power of bringing together and arranging his materials which was the result of his fulness of information, the distinctness of his knowledge, and the clear conception of his subject. These numerous digressions are among the most valuable parts of his work, and if they had been omitted or lost, barren indeed would have been our investigation into the field of antient history, over which the labour of one man now throws a clear and steady light. It would be difficult to mention any single writer, antient or modern, whose personal knowledge forms so large a part of the materials of his work. Herodotus is not one whose exactness of observation and felicity of description were accompanied with such singleness and rectitude of purpose. Of modern travellers Carsten Niebuhr is the only one whom we have any right to mention. His worthy, in the highest degree, to be noted, by the side of the Historian of Halicarnassus. But we know no complete parallel to a writer whose mere digressions elevate him to the rank of an intelligent traveller, and who could combine the interest in form with a great historical work, designed to perpetuate the glories of his own nation, so endless a variety of matter collected from the general history of mankind. His predecessors in historical composition generally refer to subjects of limited nature, partaking chiefly of the character of local annals. Herodotus chose for his subject a series of events which concerned the universal Greek nation, and not them only, but the whole civilized world; and by the way in which he executed his great undertaking he has earned the honourable and well-merited appellation of the Father of History.

This was not duly appreciated by all his countrymen, and that in modern times his wonderful stories have been the subject of merriment to the half-witted, who measure his experience by their own ignorance, we merely notice, without thinking it necessary to say more. The incidental consequences of his own accuracy which have accumulated of late years on all sides, and our more exact knowledge of the countries which he visited, enable us to appreciate him better than many of the Greeks themselves could do; and it cannot now be denied that a sound and comprehensive study of antiquity must be based upon a thorough knowledge of the Father of History.

The style of Herodotus is simple, pleasing, and generally perspicuous; often highly poetical both in expression and in sentiment. But it bears evident marks of belonging to a period when prose composition had not yet become a subject of art. His sentences are often ill-constructed and hang loosely together; but his clear apprehension of his own meaning, and the sterling worth of his matter, have saved him from the reproach of diffuseness and incoherence. His acquirements were apparently the result of his own study, and the information he had certainly had behind the science of his day. He had no doubt reflected on political questions; but he seems to have formed his opinions mainly from what he had himself observed. To pure philosophical speculation he had no inclination, and there is not a trace of it in his writings. He had a strong religious feeling, bordering on superstition, though even here he could clearly distinguish the gross and absurd from that which was antient (p. 29). He seems to have viewed the manners and customs of all nations with more interest in a philosophical way than many so-called philosophers, considering them as various forms of social existence under which happiness must be found. His book is full with decent respect for the religious observances of every nation, a decisive proof, if any were wanting, of his good sense.

There are a few passages in Herodotus which have a peculiar interest to the lover of nature, and no commentary has yet exhausted one-tenth of the matter which admits and requires illustration.

The first section of these consists of the 'Maxime singulars et sui generis,' contains the Cranes (Grus, including the Grus Indicus and Grus Galerius, the Cacus, the Carinhas, and the Ambita). Then come the 'Grus acutirostris;' 'Aves acutirostris;' 'Aves acutirostris;'<br>\textbf{HEROIC AGE. [HERO]}

\textbf{HEROIC VERSE in its antient sense means that which was the vehicle of Greek, and subsequently of Latin epic poetry, by which the actions of the heroes were the appropriate subject. [EXAMETR.]}

There are ten-syllable couplets under this name, chiefly, it should be seen, because it is the measure into which the epics of antiquity have been most frequently translated. The Alexandrians and the Latin epic poets also used one for elder writers for this purpose, as by Chapman in his translation of the 'Iliad.'

\textbf{HERON.} Under this head it is our purpose to treat of the Cranes (Grus) as well as the Herons (Ardea), including the Storks, &c.

\textbf{Willughby} thus generally defines his section of \textit{Cloon-footed Diggerous Water-fowl}. These have very long necks; their bills also are long, strong, ending in a sharp point, to strike fish, and fetch them from under stones or brinks: long legs to wade in rivers and pools of water: very long toes, especially the hind toe, to stand more firmly in rivers: large crooked talons, and the middle serrat on the inside, to hold eels and other slippery fishes the faster, or because they sit on trees; lean and carrion bodies, because of their great fear and watchfulness. He makes the section to consist of the Herons, Bitterns, &c., Storks, the Ibis of Bellonius (Belon), and the Spoonbills.

\textbf{Ray} places at the head of the \textit{Aves Aquaticas}, the 'Fisipedes' (cloven-footed), 'qua circa suas versantis, fere tamen non inantis (they do not swim in them). The first section of these, consisting of the 'Maxime, singulares et sui generis,' contains the Cranes (Grus, including the Grus Indicus and Grus Galerius, the Cacus, the Carinhas, and the Ambita). Then come the 'Grus acutirostris;' 'Aves acutirostris;' 'Aves acutirostris;'<br>\textbf{The Stork, the Heron, the Spoonbill, &c., with a hetero-
The genus Ardea, in the 12th edition of the Systema Naturae, embraces the Herons, the Bitterns, and the Cranes (including the Balaearic Crane and the Demoiselle, Anthropoides): the Jabiru, Boatbill, and Spoonbills are generally distinguished under the names of Mycteria, Cancrum, and Platæa. They form part of Linnaeus's fourth order, Ciconiæ.

Dr. Latham's seventh order, Grallæ, embraces the Ardeidae and Gruidæ among the rest of the wading-birds.

The same families are scattered through M. Lecépéd's Clé des Oiseaux (Birds), both here and in Latham.

M. De Blainville's fifth order of Birds, Échassiers (Waders), contains hisbirds, 16th, 17th, 18th, and 19th families. The Oyster-catcher is included in the 16th (Presstistres, or Rhamphothææ); the open-beak, Bec-ouvert, (Anastomus of Linnaeus), the Heron, the Stork, the Crane, the Jabiru, the Ibis (Tantale), form the 17th family, the Culturistes, or Ramphicopes. The Spoonbill and Boatbill belong to his 18th family, the Latratoræ, or Ramphibates.

Among the Grallatoræ the Heron and the Herodæ contain the genera Grus, Ciconia, Ardea, Eurypygus, Scopus, Concrina, and Anastomus. The genera Tantalus and Ibis form the Falcins, and Platalea is placed among the Hygrocoræas.

Cuvier's Échassiers comprehend the Brevipesæ, the Presstistres, the Culturistes, the Longirostræ, and the Microcroptiles.

Grallatoræ consist of the Cranes, the Boatbills, the Herons, the Storks, the Jabiru, the Ömbréstæ, the Openbeaks, the Tantali, and the Spoonbills.

M. Vieillot's Échassiers are divided into two tribes: the 1st, the Ardeides; and the 2nd, the Ömbréstæ. The 6th family of these last (Ömbréstæ) consists of the Spoonbills and Boatbills; the 7th (Herodians) comprehends the Ömbréstæ, the Open-beak, the Heron, the Stork, and the Jabiru, &c.; and the 8th (Erophones), the Cranes (Grus, Ciconia, Ardea, Adramantes, Aramus).

The Ardeidae and Gruidæ are placed by M. Temminck under his 2nd family of Grallæes (waders).

In M. De Blainville's method the Ardeidae and Gruidæ are comprised under the Ciconiæ, his 12th family of Grallatoræ, and in the same method as further developed by M. Lherminier, the 23rd family (first subclass or Normal birds), consists of the Cranes (Grus of Pallus); and the 24th family (second subclass) of the Herodæ (Ibis).

Mr. Vigors considers that the Grallai are naturally divided into these five families:—Gruidæ, Ardeidae, Scopoliæ, Rallidae, Charadriæ; and he places the Ardeidae in the first group, and the Charadriæ in the Aberrant group. He remarks that the species that enter into the family of Gruidæ, most of which were originally comprised in the genus Ardea of Linnæus, are separated from the rest by that group by their food, their mode of feeding, their mode of breathing, and their mode of locomotion. It is evident, then, that there is a greater number of land-birds, and by the formation of their bills and feet, the former of which are more obtuse at the end, and the latter shorter than is observable in the true Ardeæ. In these characters, Mr. Vigors observes, as well as in their general appearance, more particularly with respect to their plumage, they have a near alliance with the Struthionidae. Phorhæ (Agassiz; vol. i.) of Linnæus is the first genus of this family to which Mr. Vigors calls our attention. This genus, in the comparative shortness of the bill, is considered by Mr. Vigors to be connected with the Anthropoidæ of M. Vieillot, the Numidian Demosoleila; while he regards the Balaerics, the Crane, and the Demoiselle, as the descendants of the Crane of authors, Ardea pavonina of Linnæus) as uniting this genus to the true Grus of the present day. If the genus Ichidolopha of M. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anthropophus, and Anthropoidæ of Mr. Illiger, continues Mr. Vigors, and Anth
their long and sharp bill. Some of these birds are of a gigantic size; others are very small, but have all a very long neck, covered more or less by strong and loose feathers. The tiger-bittern (Tigriornis, etc.) are exclusively found in South America, but the true bitters are confined to different parts of the world. The boat-bill (Cancora, L.)... They show a different but a no less singular form of beak, from which their name has been derived. The storks (Ciconia) are among the largest of the heron family; one species (Ciconia gigantea) measuring, when standing erect, near five feet and a half: they are social and useful birds, and from destroying vast numbers of reptiles and other vermin, are encouraged in many countries to build on the habitations of man: the chin and eyes are bare of feathers; but in Merytsea, which possibly enters into this family, the greatest part of the head and neck is entirely bare: one species inhabits America, one Asia, and one Australia. The tufted uhu forms the African genus Scoops, and is the only species known; the plumage is particularly soft, and the back of the head furnished with a lux tuft of feathers: this is obviously allied to the open-bills (Anatomaetus, Ill.),... These are the principal genera which appear to enter this family, of which the herons and cranes form the two most typical groups.

In the Synopsis (same vol.) Mr. Swainson places the 'Ardeidae' as the first family of the Grallatidae, or Waders, with the following definition:—'Size large. Bill long, conic, very hard, straight, and compressed. Hind leg moderate, and placed on the same level as the others.' The family, according to this author, includes the following genera and subgenera:—Ardea = Ardea, Egretta, Butor (Bitterns), Tigriornis (Tiger-Bitterns), Nycticorax, Sw. (Night-Herons); Platalea; Ciconia (including Merytsea as a subgenus); Henannusop; and Scoops.

Geographical Distribution of the Ardeidae and Gruidae. The birds of this group are to be found in all the four quarters of the globe. They seldom occur in the very cold regions.

HERONS.

M. Temminck thus defines the Herons properly so called:—Bill much longer than the head, as large as it is high, or larger, at the base; upper mandible nearly straight; a great portion of the tibia naked. Fish, fish principally.

As our limits will not permit us to give more than a sketch of the leading forms of the group, we proceed to illustrate M. Temminck's first section of the True Herons by the Common Heron, which most authors consider as the type.

The Common Heron then is, in the opinion of Belon and some others, the 'Eurhoda' (Erdius) of Aristotle, but we do not consider this as certain: the term 'Eurhoda' is doubtless applied by Aristotle to the form (Hist. Anim., b. viii., e. 3), but what species is meant by him is not so clear; for he says (b. ix., c. 1), 'Των ψαργίων λιτη τρια γλυκα δε τη πελος, και δι αετος και δι αστερως καλομενως ('There are three kinds of Ertu, the black swalow, and the white, and that called Asterias'); the latter being most probably the Bittern. Now the term πελος is hardly applicable to the plumage of the Common Heron, Ardea cinerea. But the bird is, with some doubt, the Ardea of the ancient Italians, and the Beccafasse, Ayron, Ora cinerea, and Garza, of the modern Italians; Garza of the Spaniards; Ruger and Rheter of the Germans; Heron of the French; Lyons' little of the ancient British; and Common Heron, or Heronsnaive, of the modern British.

Description.—Plumage bluish-ash; middle toe, the nail included, very short, beneath the tarsus.

Male and Female after the third year.—Long, loose black feathers (plumes effilées) on the back of the head, similar plumages of a lustrous white depend from the lower part of the neck; the equally elongated and subulate scapulars are of a silvery ash. Forehead, neck, middle of the belly, border of the wings and thighs, pure white; occiput, sides of the breast, and flanks, deep black. On the front of the neck are large longitudinal black and ash spots. Back and wings very pure bluish-ash; bill deep yellow; iris yellow; naked skin of the eye bluish-purple; feet brown; but of a lively red towards the feathered part. Length three feet and upwards. In this state M. Temminck, whose description we have given, states the bird to be the Ardea cinerea (Mas.) of Latham (Ind.); Ardea Major of Medelin; Le Heron Huppé de Buffon; Heron commun of Gérad; Common Heron (male) of Latham (Syn.); Pennant (Brit. Zool.); and Albin; Astheraux Rheter of Meyer and others; and Sgarza cinereina of the Stor. degl. Ucc.

Common Heron.

Young up to the age of three years.—No crest, or, at most, the plumage composing it very short; no long loose feathers at the lower part of the neck, nor above the wings; forehead and top of the head ash colour; throat white; neck clear ash, with numerous spots of a deeper colour than the ground; back and wings bluish-ash, mingled with brown and whitish; breast marked with longitudinal spots; upper mandible of the bill blackish-brown, with yellowish spots; lower mandible yellow; iris yellow; skin round the eyes greenish-yellow; feet blackish-ash, but yellowish towards the feathered part. In this state M. Temminck considers the bird to be the Ardea cinerea (Femina) of Latham (Ind.); Ardea Rhenana of Sander; Le Heron, Buff.; Common Heron (fem.), Lath. Syn.; Sgarza marina; 'Stor. degl. Ucc.' and De Blaauw Reiger (being the young in the first year) of Sepp.

The edge of the bill is serrated near the point, and the nail of the middle toe projected, as in the Herons generally.

Variety.—Nearly perfectly white. A variety of this description is figured by Frisch (t. 204): but it is very rare.

Habit, Food, Reproduction, &c.—The solitary habits of the Common Heron, excepting at the season of reproduction, are well known. At that period they congregate at their breeding stations, or heronries, for which the lowest trees are generally chosen. Pennant says that at Creswell Hall, near Gosberton, in Lincolnshire, he counted more than eighty nests in one tree. Montagu notices a heronry on a small island in a lake in the north of Scotland, whereon there was only one scrubby oak. This being too small to contain all the nests, the herons, rather than abandon their society and a favourite station, had many of them placed their nests on the ground. In the south and west of England the heronries at Brockley, in Sussex, and at Waverley Castle, in Devonshire, are worthy of notice. The nest is built of sticks, and is large and flat. It is lined with
wool or other soft materials, and on this lining are deposited four or five bluish-green lustreless eggs. The young are less prepossessing in appearance than the nestlings in general, but few of which are pleasant to look upon, and they remain in the nest for five or six weeks, during which time the old birds uncannily supply them with fish, &c. There are sometimes deadly feuds between the herons and the rooks, originating in a dispute for the possession of the nest-trees. Dr. Hey'sham's account of one of these battles at Dallam Tower, in Westmoreland, originating in the falling of the fine plumage of a heron by the rook, and their consequent attempt upon the Grove in the tenure of the rooks, is well worth perusal. The herons had the best of the fray for two successive seasons, and at length a sort of peace was patched up between the combatants; the rooks and the heron were wined by Coldingham Muir in autumn, 1821, when a young bird, and given to me in 1822 by Mr. John Wilson, of the College, has since resided in my garden at Canonsmills, and is now so tame that he often follows me, expecting a piece of cheese, which he relishes. Four years ago Mr. Allan, of Lauriston, sent me a young female which had been taken during a severe storm. She soon associated with the older bird. In summer, 1828, she laid three, four, or even five eggs on the top of a wall, next to the mill-pond. She then laid one or two on the flower-border below the wall, and close by the box-edging: here some eggs were broken by the birds suddenly starting off when alarmed by strangers walking in the garden. We supplied their place by some hantum eggs, and only one heron egg at last remained. Alas! the poor hen, having strayed to the margin of the mill-pond, was shot by some thoughtless young man with a flaying-piece. The cock continued for several years, after the death of the hen, but at last expired. He used to sit when she went off for food. During the whole time of pairing the cock was very bold, raising his feathers and snapping his bill whenever any one approached.

Mr. Neil further adds a fact, showing that the bird can swim upon occasion. 'A large old willow-tree,' writes Mr. Neil, in continuation, 'had fallen down into the pond, and at the extremity, which is partly sunk in the sludge, and continues to vegetate, water-hens breed. The old cock heron swims out to the nest, and takes the young, if he can. He has to swim ten or twelve feet, where the water is between two and three feet deep. His motion through the water is slow, but he can swim easily. I have seen him kill a rat by one blow on the back of the head, when the rat was munching at his dish of fish.'

Geographical Distribution.—Very extensive, and embroils the greater part of the old world. (Syl.) It is permanent in England. Dr. Latham says, 'In England, and the milder climates, this species of heron is stationary; migratory in the colder, according to the season: is rarely seen nor inhabits the warmer parts of Asia and Africa, the Cape of Good Hope, Caleutta, and other parts of India and is found in America from Carolina to New York.' With regard to the American locality, Dr. Latham appears to have been misled by the Heron, Ardea Herodias, Linn., for the Common Heron, which last is represented by any of the ornithologists who have made the birds of America their study, as an inhabitant of the New World. Dr. Von Siebold mentions this our European species among the birds which he saw in Japan.

Utility to Man.—In days of old, when the Heron was a principal feature in the noble sport of hunting, and when the destruction of its eggs was visited with a penalty of twenty shillings, it seems to have held as high a place at the tables of the great as it did in the field. Thus, at the 'intrusion' of George Nevell, archbishop of York, in the reign of Edward IV., we find in the bill of fare 400 Heronshawes and 200 Pessantes (pheasants); and it seems, at one period, to have been valued as a dish at the same price as the latter bird, for from the prices in the household-book of the fifth earl of Northumberland, we find Heron-sawes (Herons) marked at twenty pence, and pheasants at the same rate to a penny. At a marriage-feast in the time of Henry VIII., we find Heron-sawes noted at the same price, and at another marriage-feast in the same year two dozen Heron-sawes marked at twenty-four shillings.* In the first of these records no mention is made of pheasants, but in the second they appear at an earlier time to have been rather more highly valued than Herons, for eighteen pheasants are priced at twenty-four shillings, the amount placed against the two dozen Herons. And in the charges of Sir John Nevile of Chote (the knight in whose family the marriages above alluded to took place), at Larmesess, in the twentieth year of the reign of king Henry VIII., the pheasants appear to have cost somewhat more than the Heronessawes, thirty of which are priced at thirty shillings, while twelve pheasants cost twenty shillings. The heron-plume, made up of the fine large depending feathers, especially those above the wings, was highly valued. In the present day the bird seems to have sunk into comparative insignificance. Mr. Selby however considers that 'the low estimation in which the flesh of the heron is now held would seem to be in a great degree the effect of prejudice, or the fashion of taste, as under proper treatment and good cookery the Heron, when fat and in fine condition, is but little inferior to some of our most approved wild-fowl.'

The well-known adage expressive of ignorance, 'He does not know a hawk from a hand-saw,' is a corruption of 'He does not know a hawk from a heron-saw.'

Tennimick's second section of Herons consists of the Bitterns, including the Night Herons. As an illustration of this section we must refer to Bittern, vol. iv., and Nycticorax.

Next to the Bittern we may notice the Boat-bills, the form of the bill is indeed widely different; but the habits and food of the bird approach very nearly to those of the Herons and Bittern. [Boat-Bill.]

Spooneills.

Another extraordinary form of the bill, joined to the general appearances of the Heron tribe, and decided piscivorous habits, is to be found in the Spoonbills, genus Platalea, Linn.

* Marriage in the family of Sir John Nevile, of Chote, Knight.
simple and ordinary, but the young bird does not take the confirmed livery of the adult till the third year; the bill is gradually developed, and appears covered with a membrane. The crest makes its appearance at the second year.

The species is therefore of the common White Spoonbill, 

*Platalea leucorodia.* Linn.

This species is more can be little doubt, the *leucoerodos* (Leucorodia) of Aristotle (Hist. Anim., book viii, c. 3), of which he says that it haunts περὶ τῆς λιμνὸς καὶ τῶν ποταμῶν ("about the lakes and rivers"); and which he thus describes:—"In size, it is less than the other; the 'beak' of the Herons, perhaps Ardea cinerea, 'has a broad and long bill,' a description which, when coupled with the white colour indicated by the name, can hardly be deemed intended literally; nor can the term 'beak' be with any propriety referred to the bill of any of the true Herons. It is the *Bucephargia* (Belon) and Cucullaria (Bona partis) of the modern Italians; Pala, Poche, Cuyler, Truble (Belon), and Speultus of the French; Wissier Laffors and Laffel Guns of the Germans; Lepelaar of the Netherlaunders; Y Lydon big of the Antient Britis; and Spoonbill and White Spoonbill of the Modern British."


**Very old Maes.**—All the plumage pure white, with the exception of that of the breast, where there is a large patch of reddish yellow; the extremities of this patch lessen into bands which unite the upper part of the back. No skin about the eyes and throat pale yellow; but slightly tinged with red on the lower part of the throat. *Bill black,* but bluish in the hollow of the furrows; apex oxen yellow; *iris* ash-coloured; naked parts tarnished white. The yellow Marginal patch does not begin to appear till the second or third year. (Temminck.)

Mr. Selby observes that in its anatomy it shows an affinity to the Cranes in the form of the windpipe, which, previous to entering the thorax, undergoes a double flexure to the extent of about two inches, and a convolution similar to the figure 8. The flexures touch, but do not cross each other, the points of contact being united by fine membranes. This double flexure, according to Willughby and Temminck, implies pectoral muscles to the males, but Mr. Selby remarks that Montagu disproves that idea, as the specimen he dissected was a female, and yet possessed the flexure to the extent above described; and this indiscriminate characterization was corroborated by the dissection of the specimens which Mr. Selby obtained.

*Poec.*—Very small fish, spawn, testaceous mollusks, insects and aquatic worms, small reptiles, and the roots of some weeds and grasses.

**Habits, Reproduction, &c.**—The Common Spoonbill haunts the mouths of rivers. Its nest is built sometimes on lofty trees, sometimes in rushes and reeds, according to circumstances; the eggs are from two to four in number, generally three, sometimes two, and often white, but most frequently white marked with obscure red spots. They breed annually in the time of Ray in a wood at Seven-huys, not far from London, but the wood has been long destroyed.

**Environmental Distribution.**—Europe generally. Holophus appears to be a principal place for their summer meetings; and Temminck states that it has two periods of passage along the Mediterranean coasts, and that it journeys with the storks. As winter approaches it migrates white, but most of the southern regions till the milder weather reclaims it. Mr. Bennett states that in winter it takes up its quarters in various parts of Africa, but never southwards even to the Cape of Good Hope. It is a bird of passage, rarely met with in inland countries except on the banks of the larger rivers; but it is by no means uncommon during the season on the coasts of the great extent of country which it embraces in its visits, in England it only appears occasionally; Pennant mentions a large flight which arrived in the marshes near York in April, 1774. Montagu records it as having been sometimes seen during winter on the coast of South Devon, and mentions the receipt of two specimens from that part of the country, one in November, 1804, and a second in 1807. Mr. Yarrell records two specimens which were shot in Lincolnshire in 1823, and Mr. Selby, when in London in 1839, obtained a male and female, in fine adult plumage, from Norfolk. Dr. Latham states an instance of its occurrence on the Kentish coast. The old quatrains in the "Portraits d'Oyeaux," speaks of the Spoonbill under the name of *Paie,* as living "aux marches de Bretagne."

**Utility to Man.**—The flesh of the Spoonbill, when well fed and fat, is said nearly to resemble that of the goose in flavour.

**STORKS. (Ciconia, Brisson.)**

**Generic Character.**—Bill long, straight, subeyelindrical, in form of an elongated cone, pointed, trenchant, butt (arête) rounded of equal height with the head; lower mandible a little curved upwards. *Natria* slit longitudinally in the horny substance of the bill, placed near the base. *Eyes* surrounded with a naked space, which does not communicate with the bill; the *face,* the space round the eyes, or a part of the neck, often naked. Feet long; three toes forward, united by a membrane up to the first joint, the posterior toe articulated on the same level with the others; *nails* short, depressed, without dentilations. *Wings* moderate; the first quill shorter than the second, which is rather shorter than the third, fourth, and fifth, which are the longest. (Temminck.)

Mr. Temminck observes that the Storks live in marshes, and feed principally on reptiles, frogs and their spawn, as well as fishes, small mammiferous animals, and young birds. They are, in all the countries of the world where they are, a privileged race, on account of their utility and of the havoc they make among noxious animals. Their migration takes place in great flocks; they are easily tamed. The moult is autumnal. The sexes do not differ. All the species make a clattering noise with their bills.

The species best known are the White Stork, *Ciconia alba,* and the Black Stork, *Ciconia nigra.* We select the former as an example of that part of the genus which consists of the Storks properly so called.

The White or Common Stork is the *Hérons* of Aristotle and the Greeks; *Ciconia* of the Antient Italians;
Cicogna, Cicogna Bianca and Zigognia of the Modern Italians; Cicogne and Cigogne Blanche of the French; and Winter Stork of the Germans.

Description.—Bill straight, smooth naked skin of the cheeks very small, and not communicating with the bill; plumage white. Head, neck, and all the parts of the body pure white; scapulars and wings black; bill and face red. Naked skin around the eyes black; iris brown. Length 3 feet 5 or 6 inches. Young.—The tarnished black of the wings is tinged with brown in the young birds, and the bill all of it black.

Habits, Food, Reproduction, &c.—Assured by the kindness with which it is treated in requital for its services in clearing the land of dead as well as living nuisances, the White Stork approaches the dwellings of man without fear. In Holland and Germany especially the bird is treated as a welcome guest, and there, as indeed elsewhere, it annually returns to the nest which has cradled many generations on the steeple, on the turret, on the false chimney that the Hollander has erected for its site, in the box, or on the platform which the German has placed for its use. The stump of a decayed tree is sometimes chosen by the bird, and the nest is made of sticks and twigs, on which are laid from three to five cream-coloured or yellowish eggs, about the size of those of a goose. The incubation continues for a month, at the expiration of which period the young are hatched and carefully attended to by the parents until they are fully feathered and able to procure food for themselves. Frogs, lizards, snakes, and other reptiles, mice, moles, worms, insects, the young of ducks and other waterfowl occasionally, and even partridges, according to M. Temminck, are devoured by these birds. In the Continental towns domesticated Storks which have been taken from the nest when young may be often seen parading about the markets, where they are kept as scavengers to clear the place of the entrails of fish and other offal, which they do to the satisfaction of their employers.

Geographical Distribution.—The arrival of the Stork in Europe takes place in the spring. In Seville it is very common; but, according to the Prince of Musignano, it is very rare and only an accidental visitor near Rome. Though so common in Holland, it very rarely arrives in Britain. The general drainage of our marshes may have something to do with this, but is hardly sufficient to account for so striking a difference in the migratory distribution of the bird, more especially as it proceeds to higher latitudes; for it regularly visits Sweden and the north of Russia, and breeds there. The winter is passed by the Prince of Musignano in the plains of Asia, and in the northern part of Africa, Egypt especially. Those who have seen these birds in the act of migration, speak of their numbers as very large: thus Belon remarks that they are never seen in flocks, except when they are in the air; and he relates how, being at Aby-

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ing, as Mr. Vigors had previously done, in the appendix to Major Denham's "Travels in Africa," the name of Argaia to the Indian, and that of Marabou to the African species.

We shall illustrate this group by Cicemia Marabou, Vigors.

**Description of the African Marabou, and differences between that species and the Indian Argaia.**—M. Temminck has clearly pointed out the differences between these two species. The *African Marabou* is less in size than the *Indian Argaia*, the latter sometimes reaching six or even seven feet in height, while the former seldom exceeds five, even when the neck is elongated. The bill of the *Argaia* is enlarged in the middle, the culmen of the upper mandible and the edges of the lower form a curved line from the base to the apex; in the *Marabou* the lines are straight and the bill is regularly conical; the nostrils of the Indian bird are ovate; those of the African species are oblong. The iris of the former approaches to pure white; that of the latter is dull brown. The cervical or sternal pouch often hangs down more than a foot in the *Argaia*; in the *Marabou* it is much shorter. The back and wings of the *Argaia* are dull black; in the *Marabou* there is a greenish tinge on the back of the black, with the exception of the larger wing-coverts and secondaries, which are of a more decided black, edged more or less broadly and distinctly, according to the age of the individual, with pure white bands. In the young birds these last distinctions are imperceptible. In both species the bill is inclined to livery yellow in colour, and is more or less spotted with black towards the base, as is the head, which is dusky. When the bird is at rest the pouch as well as the neck are of a pale flesh-colour, but when it is excited they acquire a redder tinge. These parts are sparingly covered with a few scattered brownish hairs, most numerous in the young birds, and resembling down in the early stages of its growth. The tail is black; the under parts pure white, more especially the under tail coverts, which afford the beautiful plumage. These are sometimes of a greenish-almond colour in the Indian species; but the white of the African feathers is not so clear and brilliant as that of the Indian plumage, to which a decided and just preference is given. The natural colour of the legs is dusky-back, but in living birds these limbs are generally whitened by the dust shaken out of the plumage.

**Geographical Distribution of the African species, or Marabou.**—Nearly the whole of Tropical Africa to the Cape of Good Hope, where it is not uncommon. (Temminck.) Banks of the Nile. (Roode.) Neighbourhood of the large towns of the interior. (Douglas.) Western coast. (Smeathman.)

**Habits, Food, &c.**—Nearly resembling those of the White Stork, like which, it is privileged on account of its utility as a scavenger in freeing the villages and towns of offensive substances. Its omnivorous voracity is well described by Denham. Where carrion and fish are scarce, reptiles, small birds, and small quadrupeds fall victims to its appetite. These are usually swallowed entire. Smeathman gave to Dr. Latham an account of a domesticated individual which roosted very high among the silk-cotton trees and would descry the servants bringing the dishes to the dinner-table from a distance of two or three miles from its perch. It stood behind its master's chair waiting to be fed, and occasionally helped itself, notwithstanding the guardianship of the servants who carried switches to prevent its matching the meat, which it nevertheless sometimes contrived to do; in this way it had been known to swallow a boiled fowl at a single mouthful. Besides the pouch the skin at the back of the neck can be inflated so as to have somewhat the appearance of a counterpane. When singing, the bird, we have observed this latter pouch, if pouch it may be called, very prominent, apparently from the rarefaction of the air. The bird flies high and roosts high, probably for the purpose of being seen in a large area to enable it to perceive those objects on which its feeds. May not these pouches assist, balloon-like, in supporting or balancing the great head and bill?

**Cranes.**

We now come to a subfamily whose food is much more vegetable than that of any of the others which we have noticed; and there is, as might be expected, a conformable change in the structure of the bill and stomach.

**Gruus (Pallas).**

**Generic Character.**—Bill of the length of the head or rather longer, strong, straight, compressed, the point in the form of an elongated cone, obtuse towards the end; lateral base of the mandible deeply channelled; base of the bill elevated. *Nostris* in the middle of the bill, pierced through and through in the groove, and closed backwards by a membrane. *Region of the eyes* and base of the bill often naked, or covered with the bill furnished with three anterior toes, the middle one united to the external by a rudiment of a membrane, interior too divided, posterior toe articulated. Higher on the tarsus is an ex-point shorter than the second, which last is nearly as long as the third, and that is the longest; secondaries nearest to the body archcd, or very long and subulate in some foreign species.

**Bill of Common Crane.**

In the greater part of the species the trachea of the male forms circumvolutions upon itself; in the other similar sinuosities occur in both sexes, when they differ from the external appearance. Moults once in the year. (Temminck.)

**Example, Grus Cinerca.**

**Description.**—General plumage ashy grey; throat, front of the neck, and occiput very deep blackish grey. Forehead and space between the eye and bill furnished with black hairs; top of the head naked and red. Some of the secondaries arched, longer, and loose-barbed. *Bill* greenish black, horn-coloured towards the point, and reddish at the base; iris red brown. *Feet* black. Length from the bill to the end of the tail, 3 feet 8 or 10 inches.

**Old Birds.**—These have a large whitish space behind the eyes and on the lateral part of the upper portion of the neck.
Young Birds before their second annual moult.—No nakedness on the top of the head, or the space hardly visible. The blackish ash colour of the front of the neck and occiput non-existent or only indicated by longitudinal spots.

This is the Pigeon (Columba) of the Greeks; Grua of the Antient Italians; Grus of the Modern Italians; Grue of the French; Grulla of the Spanish; Kranchik and Ancragera Kranchik of the Germans; Crane of the Danes; Goran of the Antient British; and Crane and Common Crane of the Moderns.

Habits, Food, Reproduction, &c.—The habits of the Crane are migratory and gregarious. Mr. Selby remarks that in its contour and gait it bears a considerable resemblance to some of the Struthionidae, and that we are reminded of the ostrich by the long flowing plumes that overhang the tail. He is of opinion that through this and other families its affinity to the Rousorial birds is readily traced; and he observes that in its internal conformation it differs very essentially from the more typical families of the Gruiformes, and that its strong and muscular stomach indicates a different general economy from that of the Ardeidae. This is quite true: but whilst the Crane frequents open and cultivated lands for the sake of the newly sown corn and seeds be found in such tracts, it is far from averse to small testaceous mollusks, worms, frogs, and other reptiles. Temminck says that the nest is placed among the rushes, &c., and sometimes on the walls of isolated houses. The pale bluish-green eggs, marked with brown, are two in number.

H. VIII., c. 11, confirmed by 3 & 4 Edw. VI., c. 7, twenty pence was the forfeiture for each of the egg of the crane taken and destroyed. Willughby says, 'They come often to us in England; and are seen in many counties of Cambridgehire there are great flocks of them; but whether or no they breed in England (as Aldrovandus writes he was told by a certain Englishman, who said he had often seen their young goslings) I cannot certify. Crane having an appropriate name with from my own knowledge or from the relation of any credible person.' In Pennant’s time he had come to the conclusion that the Cranes had forsaken our island. 'A single bird,' says he, 'was brought by the Cambridge clergyman, Dr. Latham, and is the only instance I ever knew of the Crane being seen in this island in our time.' Dr. Latham mentions only four instances as occurring within his memory of the crane having a nest in England, with the addition of the Zoologist, 1815, p. 297.) Montagu and Dr. Fleming mention a small flock that visited Zeeland in 1807, and Mr. Selby received information of one killed in Oxfordshire, in December, 1830. The Crane can now be only regarded as an accidental and rare visitant to our islands.

Utility to Man.—The flesh is very savoury and well tasted, not to say delicate' (Willughby), and indeed it seems to have been highly prized in former times. At the intronization of George Nevell, the archbishop above alluded to, 204 Cranes were served, and in the Northumberland Household-book the price of the Crane (Crany) is marked sixteen pence. At the herd of 1807, there were also mentioned, one of the items in the first is '9 Cranes, every Crane three shillings and four pence;' and in the second we find 'Item for a Standart, Cranes 2 of a dish' for the second course; and in the expenses we find 'Item, in Cranes 9... £2 30s. od.' The long drooping feathers are valuable as plumes.

Anthropides. (Vieillot.)

Mr. Bennett remarks (Gardens and Menagerie of the Zoological Society) that the name of Anthropides, conferred upon this genus by its founder, M. Vieillot, owes its origin to a mistaken reading of a passage in Athenæus, which the French academicians of the seventeenth century improperly applied to the Demoiselle, regarding the resemblance to man implied by the term Anthropoidea as a convincing proof that the Ousus of the Greeks was a synonym of the bird, which they themselves describing under the name of Anthroideus, from its elegant attitudes. 'It is difficult however,' says Mr. Ben- nett, 'to conceive how these learned men, with Mr. Perrault at their head, could have stumbled on so gross a misappre- hension; for the passages cited by them from the Greek and Roman authors do not go beyond the Scops and Ousus of the former and the Aisus of the latter were in truth nothing else than owls, and had consequently no connexion with the Numidian Crane. M. Savigny, on the other hand, is nearer to the latter opinion as, according to Aristotle and other classical authors; but we must confess that we entertain considerable doubt of this opinion also. The scattered notices of the ancient Ousus appear to us by far too scanty and indefinite to admit of their positive appropriation; and they combine moreover several traits which are quite irreconcilable with the identity of the two animals. With the exception of this distinguished naturalist, almost all the modern authors who have spoken of the Demoiselle have merely copied Buffon, who with singular inconsistency, at the same time that he corrects the error of synonymy into which the academicians had fallen, adopts all their quotations founded upon the mischievous term. The truth is, that the real history of the bird cannot be traced with certainty beyond the period of M. Perrault's memoirs, in which it was for the first time described under the fanciful denomination which it has since attained. We have given this reason for our hesitation, for certain species of Anthropoidea may never be made without the clearest evidence of the identity of the species. But however right Mr. Bennett may be, the term Anthropides is now generally received by ornitho- logists as the name of the Demoiselle, for certain species of cranes, and must be retained, the only question being what species should be arranged under it. The Demoiselle and the Balsacrine were the only two species of Anthropides (Vieillot), till a third and most elegant species, Anthropoidea...
Stanleyanus (Vigors), Anthropoides Paradisiacus (Bechstein), was added. Mr. Vigors would include the whole of these three species in the genus; but Mr. Bennett remarks, that the discovery of that species, closely allied as it is to the Demoiselle, seems to determine the existence of that form as a distinct type, and to render it more necessary to isolate the Crowned or Balearic Crane, Balearica pavonina, Ardea pavonina, Linnaeus, under another generic name, Balearica (Brisson).

The Demoiselle (Anthropoides Virgo, Ardea Virgo of Linnaeus) is about 3 feet 6 inches high, measured to the top of the head; from the point of the bill to the tip of the tail it is about 3 feet in length. Upper part of the head light grey; sides of the head, neck, and depending breast feathers, blackish; head and neck fully feathered. A tuft of pure white loose-barbed feathers, three or four inches long, directed backwards with a curvature downwards behind each eye. General tint silty-grey; outer portions of all the quill-feathers dingy-black. Secondary longer than the primaries, forming when the wings are folded dependent downward-curved plumes. Bill yellowish or flesh-coloured; iris reddish-brown.

Habits. Food, &c.—The habits of the Demoiselle are migratory, and its food consists in great measure of grain and seeds, though it occasionally takes small fishes, mollusks, and insects. Gizzard muscular. The Demoiselle produced young in the menagerie at Versailles, and one which was hatched and bred there lived twenty-four years.

Geographical Distribution.—Africa. It has been observed in the north, along the Mediterranean, the west from Egypt to Guinea, in the interior, and in the south near the Cape of Good Hope. It has been killed in Nepal, according to Mr. Gould; is found on the southern coasts of the Black Sea and Caspian, and has been observed at Lake Baikal. It is occasionally seen in Europe, and appears about Constantinople in October. At the inundation of the Nile great numbers arrive in Egypt.

The Stanley Crane, Anthropoides Stanleyanus (so named by Mr. Vigors in honour of the earl of Derby, then Lord Stanley, President of the Zoological Society of London), Anthropoides Paradisiacus of Bechstein, is in its general plumage bluish-grey, the top of the tumid head, which is well covered with soft feathers, is whitish, and there is a brownish post-ocular band; the irides are chestnut-black, and the points of the quills, tail, &c., are brownish-black. Length from the tip of the bill to the end of the tail 3 feet 6 inches. Mr. Lear mentions particularly the greater length and development of the hallux in this species, in which character, he observes, the bird seems to be intermediate between Anthropoides Virgo and the more typical Grus. He considers the Balearic Crane as according with this species in this particular, and by the additional character of the naked cheeks and caruncle under the chin, as exhibiting a still nearer approach to the true Grus Anthropoides Virgo, on the other hand, by the slight development of the hallux, appears to him to possess the nearest affinity of all the birds in the group to the Charadrius.

Habits, &c.—'In manners and gestures,' says Mr. Vigors, 'the Anthropoides Stanleyanus appears to conform most intimately with the Demoiselle, displaying the same delicacy and elegance of attitude, and the same majesty, together with the same graceful peculiarities in all its movements. I once had the good fortune to see it when released from the place of its confinement and set at liberty into an adjoining yard; and it was scarcely possible to witness a scene of more grace and animation. The bird, when after a few movements it felt itself free, bounded into the air, and traversed the yard with singular velocity, and a peculiarity of motion which could neither be termed running nor flying with its wings expanded, and its long quill-feathers streaming just above the ground, it sailed and swept along the open space, without regard to the numerous spectators who watched its movements, luxuriating in all the buoyancy and exuberance of new-felt liberty. I understand that it is particularly eager in its pursuit after insects, which it takes when they are upon the wing; and that they seem to be its natural and most acceptable food. We may readily conceive what myriads of winged creatures it would encircle within its wings as it swept along its native marshes, in the manner observed above, and which it would thus bring within the compass of its prey.' (Zool. Jour., vpl. ii.)

Locality.—East Indies.

The Balearic or Crowned Crane (Anthropoides pavonina of Vieillot and others; Balearica pavonina of Brisson and others; Ardea pavonina of Linnaeus) received its English and French common name from its being supposed to be the Balearic Crane of the ancients. Its height when full grown is about four feet. We select Mr. Bennett's description: 'Its plumage is of a bluish-slate colour on the neck and on both surfaces of the body; the quill-feathers of the tail and the primaries of the wings are of a beautiful black; the secondaries, which extend beyond the base of the tail, of a bright and glossy brown; and the wing-covers pure white. The cheeks and temples are entirely naked, and are coloured of a bright rosy red, which sometimes over spreads the whole of the naked surface, and sometimes is confined to a portion of it, the remainder in this latter case becoming perfectly colourless and of a dull white. Beneath the upper part of the throat a similar naked space is gradually developed, which terminates in a dependent fold of the skin, like the wattle of a turkey, but more uniform on its surface, and of a brilliant red. As this prolongation is not always met with, it has been considered by some writers as a mark of sex; but of the two birds examined by the
French academicians, the one possessed it and the other not, and yet both were females; it may therefore with greater probability be considered as the result of age. The fore part of the head is covered by a close tuft of very velvety feathers of a deep black; and behind these rise a very remarkable crest, consisting of a large number of flat yellowish filaments, each twisted spirally on itself, fringed along its edges with a series of black-pointed elongated and slender points resembling those of a black-pencilled pencil. These filaments are of nearly uniform length, and measure four or five inches from base to tip. They take their origin from a roundish space on the back of the head, and expand equally into a circle of considerably larger diameter than the head itself. The bill, legs, and feet are of a dusky black; and the iris is remarkable for being almost destitute of colour. As in most of the birds of this family, the feathers of the lower part of the neck are long, narrow, and gracefully dependent over the breast.

This description is so good in the main that we have given it in the author's own words; but his observations into the species will be obtained from the Society's museum, of Cape Town, and from the collection of the Royal Society of London, and from the view of illustrating the characters which distinguish as species the birds from those several localities. Their specific distinction, he stated, on the authority of Professor Lichtenstein, had been pointed out, nearly thirty years from that time, by the Professor's father, who gave to the Cape bird the name of Grus Regulator. This distinction had not however, Mr. Bennett remarks, been generally known among ornithologists, although those connected with the Society it had for some time been familiar, from observation both of numerous skins and of living individuals. In the bird of North Africa, for which the specific name of Pavonius will be retained, the wattle is small, and there is much more occupying the lower two-thirds of the naked cheeks: in that of South Africa the wattle is large, and the cheeks are white, except in a small space at their upper part; this is also the case with the other species of that of the North African species. Mr. Bennett added that the latter characters had been observed to be permanent in an individual presented to the Society in April, 1832, from the collection of the late Mr. Littledyke, then living at the Gardens. They existed also in both the individuals presented by Sir Lowry Cole.

Mr. Grey at the same time took occasion to remark that the iridescent green of the wattle in the Crowned Crane, added to other distinguishing characters which had frequently been pointed out, might be regarded as indicating a generic difference between them and the Demoiselle and Anthropoides, in that of the former the wattle is green, and in that of the latter dark purple in the males, and in the females a different hue from the males. For the group including the Crowned Crane the name of Balaenica might, he thought, be retained, and that of Anthropoides be appropriated to the one comprehending Anthropoides Virgo, Viell., and Anth. Paradisaeus, Bechst. (Zool. Proc., 1833.).

The species with the large wattle, &c., will stand as Balaenica Regulator: Locality, Northern and Western Africa. The species with the large wattle, &c., will stand as Balaenica Regulator: Locality, Southern Africa. (Proc. Zool. Soc., 1838.).

Herophilus, &c.—Presumed to be migratory; but little is known of them, except in captivity, to which the birds are easily reconciled, living in friendship with the domestic poultry, and other captive, and intermingling with the other captives, and indifferent to vegetable substances. They run with the wings expanded, and with great rapidity. The note is loud, trumpet-like, and hoarse. In the catalogue of the African Museum, now (June, 1838) just coming to the hammer, one of the species, there called the Kafr Crane, is said to be held reserved by the Kaffirs, because it resembles them in the shape of the head, and if one should happen to be killed, even by accident, a calf or young cow must be slaughtered as an atonement. Mr. Swainson (Classification of Birds) notices specimens of Ardea pavonina, Lam., as having been brought to him when in Malta, from the little island of Lampidossa, where, he says, they are by no means scarce.

Our English readers will find most of the birds above described in the collection of the Zoological Society in the Regent's Park, together with many others of this great family. Among them there is a fine specimen of the gigantic Indian or Saurus Crane, Grus Antigone of Linnaeus.

HEROPHILUS, a native of Chaledon, was one of the most celebrated physicians of the Alexandrian school, and lived in the reign of the first Ptolemy of Egypt. Of his works, which appear to have been very voluminous, nothing now remains except the extracts made from them by Galen and Caelius Aurelianus, in which they are so interwoven with those of his contemporary Erasistratus, that it is impossible to say what portion of the progress which medicine made in their time was owing to the labours of each.

The chief feature which marks the time of Herophilus in the history of medicine is the commencement of the study of anatomy from dissections of the human body, for which purpose the heads of all malefactors were appropriated by the government. With such zeal did Herophilus pursue this science, that he is said to have dissected 700 subjects, and it was against him and Erasistratus that the very improbable charge was first made of having frequently opened living criminals that they might discover the secret springs of life. (Cellus, Prefat.) From the peculiar advantages which the school of Alexandria presented by this authorised dissection of the human body, it gained, and for many centuries preserved, the first reputation for medical education, so that Ammianus Marcellinus, who lived about 650 years after its establishment, says that it was sufficient to secure credit to any physician if he could say that he had studied at Alexandria.

By the labours of Herophilus and Erasistratus nearly every part of the anatomy of the human body was rendered clearer, and many most important discoveries were made. They first determined that the nerves are not connected with the membranes which cover the brain, but with the brain itself, though as yet the distinction of the nerves from the tendons and other white tissues had not been made out. The description which Herophilus gave of the brain itself was far superior to those of previous authors: he discovered the arachnoid membrane, and showed that it lined the ventricles, which he supposed to be the seat of the soul; and the chief means of the sinuses into which the veins of the brain pour their blood still bears the name of Torcular Herophili. He noticed the lachrymal, though he was not aware of their use; he pointed out that the first division of the intestinal canal is never more than the breadth of
twelve fingers in length, and from this fact proposed for it
the name (duodenum) by which it is still called.

Herophilus practised surgery as well as medicine, but it
is probable that very soon after his time the division of sur-
gery and medicine did not exist. Prominent changes took place.

By his knowledge of medical practice there is not sufficient
evidence in the extracts which Galen makes from his works
which enabled us to form an accurate idea, and his fame must
rest on the reputation afforded him by his anatomical re-
searches, than on any immediate addition to the means of
curing disease. He does not appear to have drawn
many pathological conclusions from his knowledge of the
body, but his observations of which his master Praxagoras had taught him some of the
value as a means of discriminating diseases, were important
and interesting; and it was he who first showed that
paralysis is the result of a vitiated state of the humours, as
was previously imagined, but of an affection of the
ejectory system. Herophilus seems to have founded a school which
took from its name. According to Strabo (xii. p. 580)
there was a great school (basseasia) of Herophilists in his
time established in a temple between Loindia and Creusa
in Phrygia.

HERPES. The word herpes was employed in a
very vague sense, and applied to many eruptions of different
kinds. Herpes is a word derived from the Greek, and means
the bursting forth of the skin, characterised by the eruption of clusters of trans-
parent globular vesicles, situated on a red and inflamed
base extending some lines beyond them. The vesicles of each cluster vary in size, the smallest
very small pea; the clusters themselves are distinct, being
separated by portions of perfectly healthy skin, and
they generally rise in quick succession.

This eruption is tender, and accompanied by a degree
of constitutional disturbance which generally varies with the
extent of the local affection, being often slight and attract-
ing no notice, when this is limited and consists of a few clusters
only; but when the eruption is more extensive, and the fever,
when the clusters are numerous and spread over an
extensive surface in a young and plethoric subject.

The local affection is announced by a sensation of heat
and tingling in the part, and first appears as a
small bright red spot, having in its centre a very minute
vesicle. These vesicles, which contain a transparent colour-
less fluid, rapidly enlarge, and, in the course of some hours,
take the size and present the form and aspect of very
small pearly: in the thickest part of the cluster two or three
of the vesicles coalesce, forming one of irregular figure
and larger size. There is a sensation of prickling and smarting
pain experienced in the part. The vesicles gradually be-
come tense, and assume a more spherical figure, and are
finally succeeded by brownish scabs; the heat and irritation of the
portion of skin on which they are situated subsides; and the
scabs fall off, leaving a tender and reddened state of the skin
on the site of the eruption. In the latter stages of the dual clusters, from their first appearance to the falling off
of the scabs, varies from one to two weeks. When there is
a succession of clusters, they all follow the same march; the
febrile state persists as long as fresh vesicles continue to
rise, and the affection may be prolonged to three or four
weeks. In some cases the fluid is absorbed, the vesicles
shriveled, and, at the end of four or five days the affection
terminates in desquamation; in others, the fluid in the
vesicles becomes purulent, and they are succeeded, espe-
cially when seated on the back, by superficial ulcers,
which prolong considerably the duration of the disease.

HERPES VESICOSUS. In all cases the
same characters, and follow nearly the same march, are
sometimes confined to a particular locality, justifying the
designation, H. labialis, H. preputialis, or assume a particu-
lar arrangement, giving rise to the varieties. Herpes zoster,
when they are situated on one half of the body and extend
in a line or band; H. phlyctenodes, when they are dissemi-
nated; and H. circumscriptus, when they occur in circles or
rings.

In H. labialis the clusters are disposed irregularly about
the mouth, generally on the external surface of the lips, in
some cases extending to the cheeks and also nose, and in
rare instances occurring also in the pharynx. It occasion-
ally comes on in the intima of the external and internal
ears, giving rise to intense pain, which is often in-
secure to cold winds, or to the atmosphere, as in travelling;
at the termination of the hot stage, in summer; and during the
course of scarlatinal fever and pneumonia. It is always

a slight affection in itself, requiring no treatment beyond
that of the disorder which it accompanies.

Herpes preputialis. In this variety there are one or
more small clusters of vesicles, either on the external or
internal surface of the prepuce; they do not infect the
bath and are situated externally, and they follow the ordinary march or terminate in desqua-
mination, and require no treatment, with the exception of the
application of lint soaked in the lotion of acentise of lead,
for the purpose of preventing the rupture of the vesicles and the consequent formation of an
ulcer. When they occur on the internal surface of the pro-
grade, the vesicles are kept continually moist, break at the
end of four or five days, and give rise to the formation of
ulceration or superficial ulceration, which by an instuctive
observer may be mistaken for a syphilitic sore. It soon
heals under the influence of cleanliness, the local applica-
tion of the lead lotion; and the administration of a few alter-
atives.

In Herpes zoster, familiarly known by the name of
shingles, there is a succession of clusters of white silvery
vesicles, forming an oblique line or band, limited to one
half of the body, and consisting of a moderate and
subacute affection. It is generally ushered in by severe febrile symptoms, and
by smarting or deeply-seated pains, which indicate the future
course of the eruption. Each cluster follows the march of the
nerve it is related to, and terminates in exfoliation, leaving a scar.

In Herpes zoster, the eruptions are commonly
occasionally followed by gangrenous and sloughy sores. In
young and healthy persons, the disease terminates in
bleeding, saline purgatives, diet, and the application to the
part of a sedative lotion. This treatment alleviates the
sufferings of the patient, but has very little influence on the
permanence of the cure. Mr. Plumbs says, if care be taken
to puncture each vesicle early, so as to allow the free escape of
the fluid, the pain is much diminished, and the irritation
sooner subsides. In old persons, care should be taken that
they do not allow the serous exudate to assume a high degree
of turbidity.

Herpes phlyctenodes differs from the preceding variety
in the arrangement of the clusters, which are disseminated,
and have no particular seat. When occurring extensively,
the vesicles do not attain the size common to more limited
forms of the eruption. It is often met with in children
during dition.

In Herpes circumscriptus, or herpetic ringworm, the
erup-
tion is limited in extent, frequently of a circular form, and
consists of an extremely small affection. It terminates in exfoliation, leaving a scar.

The form of Herpes zoster is seldom met with in children
and in women of de-
licate complexion, and is often confounded with a disease entirely different in character, and
represented by the popular language, denominate ringworm. This form of Herpes soon disappears under the influence of the local
application of almost any astringent solution.

None of the clusters of vesicles are contagious, and all
occur most frequently in the young, during spring and
summer, and in warm climates.

The existence of distinct groups of vesicles on red and
inflamed bases is sufficient to distinguish Herpes from every other cutaneous affection.

HERPETES. [Ichneumon.] HERPETOLOGY, that branch of science which treats of the
organisation, natural history, and arrangement of reptiles. The term, literally construed, means a discourse
upon reptiles, from ἱχνευτός (Herpeton) a reptile, and ἱχνος (Logos) a discourse.

HERRETA, FRANCISCO DE, the Younger (E-
Mose), painter and architect, son of the preceding, inherited his father's talents. The father being a man of a tyrannical disposition, his son left him, and went to Rome to pursue his studies. After his father's death he returned to Sevilla, and prepared for the churches. An academy being established in 1660, he was made sub-director; but being too proud to brook the superior authority of Murillo, he went to Madrid, where he rallied the most eminent artists. He painted a picture which in the chapel of St. Philip so pleased King Philip IV., that he commissioned him to paint the chapel of the Madonna de Atocha, where he painted the Assumption of the Virgin. This and other works of his were ordered by the king, and his reputation spread far and wide. He died in 1685, aged 63.

HERRAÑA, ANTONIO, Comisario mayor de las Indias y Castilla, born at Coñsur, 1498, died at Madrid on the 19th March, 1625. He is extolled by Robertson (Hist. of Amer., b. v., note 70), and many other distinguished writers. Quintana (Vida de Pizarro, appendice vii.) points out some inaccuracies, which however he extenuates as unavoidable in that work, the chief and still the best source of information which Herrera left for subsequent writers on American history from 1492 to 1554. The first and now only edition of that of Antwerp, 4 vols. fol., Madrid, 1601. A second edition, that of Antwerp, 4 vols. fol., in which it has its original pagination, with corrections and additions, is entitled 'Descripción de las Indias Occidentales,' 4 vols. fol., Madrid, 1730. Barleus published this history in his 'Novus Orbis,' 1622; and Nicolo Caro in his Historia Générale des Voyages des Espagnols,' 1619, and Carlevaries, in his 'History of America,' 1725. The rarest perhaps of several other politico-historical works of Herrera is entitled 'Historia de la Sucesion en Escocia y Inglaterra en 4 años que vivió María Estuarda,' 1774, lavo ivto., Lisbon, 1590. (Nicolas Antonio, Bibloth. Hispa. Nova; Allgemeine Encyclopädie, von Hassel und Hoffmann; and Brunet, Manuel du Libraire).

Herrnhut, born the Hernunt, native of Sevilla, lived in the sixteenth century, the golden age of Spanish poetry, among the reformers of which he was prominent. He won the admiration of his contemporaries, who prefixed to his name the epithet of Divine. Inspired by Pindar, he became the first classic ode writer in modern Europe: and however severely he may be judged by Bouterwek, the Allgemeine Encyclopädie, in Lantzer's Cyclopedia, or by any other critic, his ode on the labors of Lepanto be worthy of his Greek model, and equal to those of Horace. Indeed Bouterwek himself acknowledges this, and moreover bestows just and high commendation on his 'Ode to Sleep.' An analysis of the admiration and aspirations of Herrera's aspirations, and to those of his age—that of elevated mind, of nature, of the level of the Greek and Roman—led Herrera to overstrain the powers of his own language by the adoption of antique modes of expression, which the learned of that age endeavored to establish as the sole expressions of the beautiful and the sublime.

It was chiefly to inculcate these principles, or to foster a corresponding taste, that Herrera commented on Garcilaso, a practical way of developing his theory, which has been followed by a host of commentators.

An edition, now rare, of his poetical works appeared after his death under the title 'Obras en Verso de Hernando de Herran, 2 vols. fol., Madrid, 1572, and of Cervantes de Herran, 2 vols., 1789, and 'Vida y Muerte de Thomas Moro,' (translated from the Latin of Stapleton), Sevilla, 1593, and Madrid, 1625, 4to.

HERNÁNDEZ, GABRIEL ALONSO, a native of Tlaxcala, called the New Coolumata, lived in the second half of the fifteenth and the beginning of the next century. He was a professor at the university of Salamanca, and had from an early age a readership for rural economy. According to he collected the best information on the antients, as well as from his travels at home and abroad, in a treatise which he published under the patronage of Cardinal Cisneros, with the title of 'Obra de Agricultura copilada de Diversos Autores,' Alcina, 1613, fol. (black letter).

None of its 28 subsequent editions presented, according to Juan Friarte, the original text; but this was restored at last by the Sociedad Económica Matritense, in their Agricultura General, corregida y adicionada, Madrid, 1816, 4to.

Herrick, Robert, was born in the year 1591. Of his life few or no particulars are known, except that he was vicar of a parish and Dean Prior in Devonshire for the space of twenty years, was deeply interested in gardening, and restored by Charles I., and long held in remembrance by his parishioners as a poet. His poems are of two very different kinds, sacred and love poems; the latter often disfigured by indecorous and obscenity, but the former rich in fancy mingled with the quaintness of the age in which he lived, such as to render him worthy of one of the highest places in the scale of British lyrical poets. His poems were published in 1642 in the title of 'Hesperides,' or 'Poetical Works, both Human and Divine, of Robert Herrick,' Esq. The 'Hesperides' have been reprinted in 2 vols. 4to. and 2 vols. sm. 8vo.; 'Select Poems,' 1 vol. sm. 8vo.; 'Poetical Works,' 2 vols. sm. 8vo.

(Herstine Review, vol. v.; Quarterly Review, 4th ser. 1831.)

HERRING. [Clupridae]

HERRING FISHERY [Fisheries.]

HERRNUTH, a small town in the Saxony province of Upper Lusatia, the original and principal seat of the Moravian brethren. It lies between Zittau and Lobau, on the southern declivity of the Hrubec, from which it is called Voss, and is famous for its wine. It is situated between the hills of Zinzendorf. The situation is pleasant, and the buildings especially the house of the Brothers, and that of the Sisters, very neat. The inhabitants, about 1500 in number, are very simple and pious, and order and cleanliness prevail even among the poor. 

Herschel, William, brother of the second, a musician at Hanover, and was born November 15, 1738. His father brought him up to his own profession, with four other of his sons, giving them at the same time a good education in other respects. At the age of fourteen, he was placed, it is said, in the band of the Hanoverian regiment of guards, which regiment he accompanied to England at a period which is variously stated from 1757 to 1759. Another account states that he came to England alone. After his arrival, he was for some time at Durham, where he is said to have superintended the formation of a band for the militia, and afterwards was for several years organist at Halifax, where he employed himself in composing new church-music and concert-music.

There is a mass of stories relating to his musical occupations, none of which have any certain foundation, as that he played in the Pump-room band at Bath—that upon the occasion of being a candidate for the situation of organist, he helped his performance by little bits of music placed upon holding notes, which he dexterously removed in time—that in Italy, to procure money to pay his passage home, he gave a concert, at which he played at once upon the harp and two horns, and was fastened to each shoulder—&c. The last story must be incorrect, as he never was in Italy; and, though much given to music, he never (latterly at least) played the French horn, or any other military instrument. There is no doubt of his being a man of great talent, and as the vagueness of the accounts, it may be doubted whether his professional talents were ever employed in a band.

About 1766 he was organist of the Octagon chapel at Bath; in which he was in competition, but outdone equally, and on 'Versos de Hernando de Herran, emendados y divididos por el in libros,' Sevilla, 1619, 4to.

Of his prose writings those remaining are, 'Relacion de la muerte de Hernando de Herreñ,' 8vo., Madrid, 1572, and of 'Vida y Muerte de Thomas Moro,' (translated from the Latin of Stapleton), Sevilla, 1592, and Madrid, 1623, 4to.

HERRON, C. T., who published 'Ladies' Diary' for 1779, proposed by Peter Puzleum (a name which the celebrated Landen always adopted in his contributions to that work), namely 'The length, tension,
and weight of a musical string being given, it is required to find how many vibrations it will make in a given time, when the same given weight is fastened to its middle and vibrated with it.

His astronomical pursuits led him to desire a telescope, and the purchase of a good reflector was 'fortuitously' attended to. He received a telescope a few years after. After many trials he succeeded in making a Newtonian telescope of five feet focal length, and we find him before long not only in possession of adequate means, the work of his own hands, but also with a true and correct conception of the field in which his services were wanted, and a persevering determination to throw light upon our knowledge of the organization of the universe.

We branch off to astronomy; the first consisting of those investigations, theoretical and practical, by which the mighty clockwork of the heavens is made our measure of time, and our means of settling the relative position of the heavenly bodies, by fixing the one from another; the second consisting of inquiries, theoretical and practical, into those phenomena which guide us to such knowledge as we can obtain of the constitution of the universe. The study of the science of optics, the improvement of telescopes, the application of sound to reason to the collective phenomena pointed out by such instruments, and subordinate to the last, a knowledge of the past history of observation, are the keys to the advance of the science. Here the author, in his manifold labours, so profitably to every part of this task, and the consequence was success such as the world had never seen before, and a reputation of twofold splendour, appreciable in its different phases, for no man of the lowest as well as of the highest order of cultivation.

Herschel began to contribute to the Philosophical Transactions in 1780, and in 1781 announced to the world his discovery of a supposed comet, which soon turned out to be a new planet. [Uranus]. We have not here to describe the details of this discovery, the merit of which in itself is small. It is the method which gave rise to it on which this part of Herschel's fame must rest. Perceiving how much depended upon an exact knowledge of telescopic phenomena, and a perfect acquaintance with the effect produced by differences of instrumental construction, he commenced a regular examination of telescopes, taking the stars systematically in series, and using one telescope throughout. If an indifferent person were by accident to pick up a manuscript out of a large number lying in a library, and were to find it on examination to be a lost classic author, he would be entitled to praise, since it is not every one who would know what he had got hold of, even when the writing was in his hands; but if the same person were to find a discovery accidentally engendered in the formation and classification of an immense catalogue requiring knowledge of antient and modern languages and literature, the credit due to the discovery would be very much increased. Such is the case with the planets of Herschel, who was not a mere dilettante star-gazer, but a volunteer carrying on with no great pecuniary means a laborious and useful train of investigation.

The announcement of this comet or (as it turned out) planet drew Herschel immediately into the full blaze of fame; and George III. honoured his reign by immediately attaching the new astronomer to his court under the title of private astronomer to the king, and with a salary of 400L a year. Herschel fixed his residence first at Datchet, and afterwards at Slough, near Windsor, and his abode became, as Fourier remarks, one of the remarkable spots of the civilized world. His family consisted at first of one of his brothers, and his sister, Miss Caroline Herschel, who was his confidante and assistant in his computations and reductions, and also actively employed in observation, having, among other things, the discoverer of more than one comet. This lady died suddenly of consumption a few years after the death of her brother, and is still alive, though much past eighty years of age.

Herschel married a widow lady, Mrs. Mary Pitt, and left one son, whose name has long been known to the public as one of the most active and successful adherents of science that our day has produced. We write this on the eve of the public dinner given to Sir John Herschel on his return from his Government mission. Hope and cheer have been for the last four years engaged in making a survey of the southern hemisphere similar to those which his father made of the northern. Amidst the gratification with which all who are interested in the progress of astronomy will regard this truly remarkable feat, it does not suggest itself to me that the clear and powerful results of William Herschel's mind lie buried in the Philosophical Transactions, inaccessible to the larger portion of those who might learn them; or that it is not the right and a true notion of the state of our knowledge of the fabric of the universe. A public subscription to defray the expense of reprinting all those writings would be a compulsion to every writer upon that subject. The sentiments with which the whole community regards the recent expedition of the one in continuation of the labours of the other.

The deficiency of authentic information leaves us little more to say on the private life of Herschel. He was knighted, and received the degree of doctor of laws from the university of Oxford, but we cannot find the dates of either. He was soon in affluent circumstances, partly by the earnings of Mr. Halley's telescope, and partly by the jointure of his wife, which was considerable, and he died wealthy. His death took place on the 23rd of August, 1822.

In a detailed account of Herschel's labours, we have preferred to extract the titles of his papers in the Philosophical Transactions, both because no words could give so good an idea of the unexhausted activity of their author, and also because it is desirable that the reader should have a list well described by titles. It may also be useful to the astronomical reader to know in what volume and in what year the several communications were made. A few words may, therefore, be given here. The list below will be all which its length will allow us to give.

Herschel must be remembered by the number of bodies which he added to the Solar system, making that number double as himself as of the ancients, and by one, Neptune, the four satellites of Jupiter and five of Saturn, the number previously known was eighteen; to which he added nine, namely, Uranus and six satellites, and two satellites of Pluto. His measurement of Saturn's ring, his measurements of the rotation of Saturn and Venus, his observations of the belts of the former, and his conjectural theory, derived from observation, of the rotation of Jupiter's satellites, with a large number of minor observations, prove that no one individual ever reflecting telescopes, and partly by the jointure of his wife, which was considerable, he died wealthy. His death took place on the 23rd of August, 1822.

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List of Sir William Herschel's Papers in the Philosophical Transactions, specifying the year and volume in which each appeared.

1780, vol. 70. Astronomical observations on the Periodical Star in Collis Ceti. In his abridgment of the Phil. Trans., Dr. Hutton adds the following note to this title of Herschel's first memoir: 'See some authentic memoirs of this extraordinary character in the European Magazine for January, 1785.'

1780, vol. 70. Astronomical observations relating to the Mountains of the Moon.

1781, vol. 71. Astronomical observations on the rotation of the planets round their axes, made with a view to determine whether the earth's rotation is perfectly equal.

1781, vol. 71. Account of a Comet. This supposed comet was afterwards found to be the planet now called Uranus [Uranus], discovered on Tuesday the 13th of March, between 10 and 11 in the evening.

1781, vol. 71. Description of a Micrometer for taking the angle of position.


1783, vol. 72. A paper to obviate some doubts concerning the great magnifying powers used.

1783, vol. 73. On the name of the new Planet. Herschel called it Georgium Sidus, 'as an appellation which will conveniently convey the time and country where and when it was brought to view.'

1783, vol. 73. On the diameter and magnitude of the Georgium Sidus, with a description of the dark and lucid disco and periphery micrometers.

1785, vol. 73. On the proper motion of the Sun and Solar system, with an account of several changes that have happened among the fixed stars since the time of Mr. Flamsteed.

1784, vol. 74. On the remarkable appearances at the polar regions of the planet Mars, the inclination of its axis, the position of its poles, and its spheroidal figure; with a few hints relating to its real diameter and atmosphere.

1784, vol. 74. On some observations tending to investigate the construction of the heavens.


1785, vol. 75. On the construction of the heavens.


1786, vol. 76. Investigation of the cause of that indistinctness of vision which has been ascribed to the smallness of the optic pencil.


1787, vol. 77. Discovery of two satellites revolving round the Georgian planet.


1788, vol. 78. Of the Georgian planet and its satellites.


1790, vol. 80. Discovery of a sixth and seventh satellite of the planet Saturn; with remarks on the construction of its ring, its atmosphere, its rotation on an axis, and its spheroidal figure.

1790, vol. 80. On the satellites of the planet Saturn, and the rotation of its ring on an axis.

1791, vol. 81. On nebulous Stars, properly so called.

1791, vol. 81. On the ring of Saturn and the rotation of the fifth satellite on its axis.


1794, vol. 84. Discovery of a Comet, by Miss Caroline Herschel.

1794, vol. 84. Observations of a quintuple belt on the planet Saturn.

1794, vol. 84. On some particulars observed during the late eclipse of the Sun.

1794, vol. 84. On the rotation of the planet Saturn on its axis.


1795, vol. 85. Description of a 40-feet reflecting telescope.

1796, vol. 86. Discovery of a new Comet, by Miss Caroline Herschel, with remarks by Sir W. Herschel.

1796, vol. 86. On the method of observing the changes that happen to the fixed Stars; with some remarks on the stability of the light of our Sun: to which is added a catalogue of the comparative brightness, for ascertaining the permanency of the lustre of Stars.

1796, vol. 86. On the periodical star a Herculis, with remarks tending to establish the Rotatory Motion of the Stars on their axes. To which is added a second catalogue of the comparative brightness of the Stars.

1797, vol. 87. A third catalogue of the comparative brightness of the Stars; with an introductory account of an index to Mr. Flamsteed's observations of the fixed stars contained in the second volume of Historia Caelestis; to which are added several useful results derived from that index.

P. C., No. 746.
HERSCHELITE, a mineral which occurs in attached hexagonal crystals, associated with Phillipsite, in the cavities of trap, and also in granular olivine. Primary form a rhombohedron; cleavage not ascertained; fracture conchoidal; hardness 4 to 4.5; specific gravity 2.11; translucent or opaque; colour white. Found at Acì Reale in Sicily.

HERSFELD. [Fulda.]

HERTFORD. [Hertfordshire.]

HERTFORD COLLEGE, one of the colleges of Oxford. As a college this foundation was comparatively recent, but as a hall it had been of much greater antiquity. Exeter, as at least the third Hall, has been easier to visit. Hert or Hart Hall, appears to have obtained its name from Elias de Hertford, who, in the reign of Edward I., left it to clerks. Chalmers, in his 'History of the University of Oxford,' traces the conveyance of the building back through several hands, and assigns it to the property of De Hertford. * Its situation was then nearly on the site of the hall of the college, in New College Lane. In A.D. 1315 it was conveyed to Walter Stapledon, bishop of Exeter, and founder of the old Hall. In 1347, after the death of Esger, the licentia from the king to grant this and another messuage, called 'Arthur Hall,' to twelve scholars studying in Oxford. The scholars of these halls, which appear to have been incorporated as such before the foundation of the new Hall, were, with their rector, removed to Exeter College, of which the college became a dependency. The principals were appointed by the authorities of Exeter College, except during a short period, when the scholars of New College, which was then building, were admitted, and the society was governed by the wardens of that college.

In 1719 Dr. Richard Newton was inducted as principal. This gentleman, having conceived the project of raising Hart Hall to the rank of a college, settled a yearly annuity as an endowment for four senior fellows, at the rate of 13l. 6s. 8d. each per annum. He also expended about 1500l. in building a new chapel and in adding to the previous works by the variously esteemed Hall angles, and by distinguishing the real from the spurious diameters of Celestial and Terrestrial objects; with an application to Mr. Harding's lately discovered star (Juno). This society was successful in both enterprises, rising to the usual college foundation of six fellows, and consisting of a principal; four senior fellows or tutors, whose allowance has been mentioned above; eight junior fellows or assistants, who were to have 26l. 13s. 4d. each; twenty-four actual students, with an allowance of 6l. 13s. 4d. each; twenty-four actual students, with an allowance of 13l. 6s. 8d. each, which might be augmented by an allowance of sixpence per diem for commons; and four scholars.

The statutes of Dr. Newton appear to have been ingeniously framed on the model of the university. One clause, which led him to fix the maximum of remuneration was inconsistent with a consideration of the rise of markets; and the benefactions which were added subsequent to the foundation of the college were insufficient for its requirements.

The society subsisted for some years on its scanty funds; but upon the death of the principal, Dr. Bernard Hodgson, A.D. 1775, the office was not filled up. The foundation was immediately dissolved. A certain sum of 500l., set apart as funds, reserved for the use of the then only surviving Fellow, was, on his death, appropriated to the establishment of a university scholarship for the encouragement of Latin literature. The election is yearly. The greatest problem...
the Latin language among the candidates is elected, and no scholar is admissible for re-election.

Among the eminent men who were scholars of Hart Hall may be enumerated Lord Buckhurst, Selden, Dr. Donne (Archbishop of Canterbury), Sir Richard Baker, author of the well-known 'Chronicle.' Among those who were scholars of Hertford College are Edward Lye, the Saxo lexicographer; Thomas Hutchinson, the editor of Xenophon; Dr. Thomas Hunt, professor of Arabic; Dr. Smith, lecturer at Cambridge; Nathaniel Wollaston, and Charles James Fox. Dr. Newcome, archbishop of Armagh, translator of Bezeekli, the Minor Prophets, and the New Testament, is also claimed by this college.

Hertfordshire, a rich and fertile county, containing two hundred and sixty parishes, and divided by the county-town of Hertford into two towns, north and south. The population, in 1831, was 143,341, being about 228 to a square mile. It is in point of size the thirty-fifth of the English counties, in number of inhabitants the thirty-fourth, and in density of population the forty-sixth. It consists of five towns, viz.: Hertford, with 20 miles due north of St. Paul's, London, in a straight line, or 21 miles from Shoreditch Church, London, by the road through Cheshunt, Hoddesdon, and Ware.

Cheshunt and Hoddesdon are both market towns. To the north and north-west of Hertfordshire lies Middlesex, the southern part of which is called the Chalk. The Chalk is the chief source of the stream. The Rhee, which rises at Ashwell, a few miles from Baldock, is a feeder of the Cam.

The New River, which is brought to London from springs in the neighbourhood of Ware, has a feeder from the Lea near that town. A part of its course is in Hertfordshire: it is carried along the valley of the Lea, and nearly paralleled by the course of that stream. The New River was begun A.D. 1608.

The only navigable canal in Hertfordshire is the Grand Junction, which enters the county near Tring, and runs first south-east along the valley of the Quin, then south along that of the Gade, and finally south-west along the valley of the Colne, till it enters Middlesex. It passes by or near the towns of Tring, Rickmansworth, Watford, and Rickmansworth. Near Rickmansworth it passes through a small tunnel. There are cuts from the main line of this canal in the neighbourhood of Tring, one to Aylesbury, and another to Wendover; and one in the neighbourhood of Watford to the town of Watford.

The Wendover Cut is a feeder rendered navigable.

The high North road runs through this county, through Chipping Barnet, Hatfield, Welwyn, Stevenage, and Baldock: the Liverpool road from the North road, and runs through St. Albans's to Dunstable; the Cambridge road runs by Waltham Cross, Hoddesdon, Ware, and Puckeridge, where it divides into two branches, one of which passes to Spalding, and another to Cheshunt.

The London and Birmingham railroad runs through this county, nearly in the line of the Grand Junction Canal.

Geological Character.—This county is comprehended in the chalk plateau. The Crediton Clay is not found in Hertfordshire, and the southern part of the county belong to the system of the Ouse. The Lea rises in Lugavice or Leavage Marsh, near Luton, in Bedfordshire; and flowing first east and then south-east for ten miles, enters Hertfordshire on the north-west side of the county, and flows 9 miles south-east to the neighbourhood of Hatfield: from thence it flows east-north-east 9 miles by Hertford to Ware. At Hertford it rises; and at Ware the Hertford and the Sheep and the Bean, and between Hertford and Ware the Rib; all on the left bank. From Ware, just below which it receives the Ash on the left bank, it flows 4 miles to the border of Hertford and Hatfield, and then to the Sois on the left bank. From the junction of the Stort the Lea flows south 6 miles to Waltham Cross, where it quits Hertfordshire altogether. Its whole length, from the source of its junction with the Thames at Bromley, near London, is above 50 miles. The navigation commences at Hertford.

Of the feeders of the Lea mentioned above, the Stort, which rises in Essex and flows on near the border of Essex and Hertford, is 31 miles long, and is navigable for about half its length, namely, to Bishop Stortford.

The Colne, a feeder of the Thames, rises between Idles-tree, or Eistree, and Barnet, and flows through a projecting part of the county, into the river Lea above Hertford. It has a very circuitous course of 13 miles to the junction of the Verlam, or Muse, on its right bank, near St. Alban's: from this point it flows 13 miles south-west by Watford and Rickmansworth, partly through, and partly on the border of the county, till it quits it to form the boundary of Buckinghamshire and Middlesex. Its whole length is about 40 miles. It receives, between the junction of the Verlam and Rickmansworth, the Gade and the Chess, both on the right bank.

Some of the feeders of the Thames, another affluent of the Thames, have their source in the north-western part of the county, near Tring.

The streams which belong to the system of the Ouse have but a small part of their course in this county. They rise on the northern slopes of the Chalk Downs. They are the Oughton, the Hiz Proper, and the Pirral, which are connected with the Oughton, and take their source in the level [Barnsmonde]-shire, but are rather the sources of the Hiz, a feeder of that stream. The Rhee, which rises at Ashwell, a few miles from Baldock, is a feeder of the Cam.

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The London and Birmingham railroad runs through this county, nearly in the line of the Grand Junction Canal.
ess in quantity than might be desired, and by no means so clean as it ought to be. Draining has been resorted to by some spirited proprietors and lessees; but where farms are let at rack-rent, and from year to year, as is often the case, no permanent improvement can be expected. Even if the landlord is liberal, and offers to furnish draining tiles, the tenant has not a sufficient interest to avail himself of the offer, or to put them down in the most advantages manner. Every ninth county in Hertfordshire tends to introduce a high state of cultivation around their immediate residences; but, as the mansions are generally erected in the driest and best situations, the cold wet clays are not so well managed and are not so close as the fences are not so well kept; and a more slovenly husbandry is observed. The old heavy plough with four horses in a line may still be seen; and in some places the heavy long drawn plough, in which flints and stones can scarcely be met with less power: but a great improvement might be made in the construction of the plough; and effectual draining, with the use of the subsoil plough, would greatly lighten the husbandry in Hertfordshire. Every system may be occasionally met with. The resident proprietors, many of whom hold considerable farms in their own hands, employ bailiffs, who come from various parts of the county, and introduce the system which I have mentioned: some are from Norfolk, others from Northumberland or Scotland. Before the common fields were enclosed, as they are now almost universally, a fixed rotation was unavoidable, as there was a measure over the whole of the field in what was called the fallow year; but as soon as the fields were freed from this impediment to good cultivation, each proprietor introduced his own method, whether good or bad. The corn has seen a very great difference in the crops of adjoining farms, according as they have fallen into the hands of industrious men with science and capital, or remained with those who follow the example of their fathers. The crops are reapd as close to the ground as possible, in order that the straw may be sold in London and manure brought back in return. The corn is threshed chiefly by hand, the straw thus produced being of greater value for horse litter. Fewer cattle are fed in winter than in the large counties, as manure can be obtained without them.

A species of rough garden husbandry has been introduced on the best soils nearest to London for the growth of early potatoes, sweet peas, and other garden vegetables, which are succeeded in the same year by other crops, the whole being forced by an abundance of manure. The plough is used, but a great portion of the labour is done by hand, and by women.

There are many orchards in Hertfordshire, chiefly for apples and cherries, which are sold in London. No cider is made. A good cherry-tree full-grown will give in a good year several hundred pounds of cherries, which occupies nine square perches of land. The grass under the trees is generally fed off. Many old orchards have ceased to be productive, although young trees have been planted where the old were past bearing. This is caused by the deterioration of the soil. But good orchards might be made by planting a succession of young trees in fresh soil, and converting old orchards into arable land. The old orchards will be admirably calculated to produce lucerne or any other valuable crop.

There are many woods and coppices in the poorer soils, but they are fast diminishing in number, and the land is gradually brought into cultivation as arable or pasture. But they are usually only cut in suitable periods, the fine Spanish chestnut, which is valuable for hedges and rough fences, is improving in value every year; but unless they are well managed they are not a rent proportionate to the value of the land, if it were in cultivation.

There are no breeds of cattle peculiar to Hertfordshire. The Suffolk cart-horses are esteemed for farm-work, being active and tractable. Some farmers buy young horses of the black Northampton or Lincolnshire breed, which they sell again with a good profit for dray-horses in London when they are six years old. Few horses are bred in the county. The grass-lands are reserved for hay, and there are few rough pastures. A few pigs are bred, as they are on most well managed farms; the breeds are the Essex or Berkshire, and crosses of these with the Chinese and Nepolian, than which there are none more profitable. By judicious crossing the principal qualities of the hog may be kept up to a high degree, uniting prolific breeding with early fattening.

The principal fairs in Hertfordshire are the following.—
St. Alban's, March 25, October 1; Baldock, March 7, last Thursday in May, August 5, October 2, December 11; Barnet, April 8, 9, and 10, September 4, 5, and 6 (both these are great cattle fairs); Berkhamsted, August 5, September 20, December 11; Cheshunt, August 20, October 11; Stevenage, August 30; Hemstead, Thursday after Whits-Weekend; Hertford, May 12, July 5, November 8; Hitchin, Easter Tuesday, Whits-Tuesday; Redburn, first Wednesday after January 1, Easter-Weekend, Wednesday after July 20, November 24; Royston, Ash-Weekend, Easter-Weekend, Whits-Weekend, Wednesday after October 11; Sawbridgeworth, April 23, October 20; Ware, last Tuesday in April, Tuesday before September 21; Watford, March 28, August 31, September 9.

Dinotions, Towns, &c.—The county is divided into eight hundreds, namely—

<table>
<thead>
<tr>
<th>Name</th>
<th>Situation</th>
<th>Pop. in 1831</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braughing</td>
<td>E.</td>
<td>17,827</td>
</tr>
<tr>
<td>Brondwater</td>
<td>Central</td>
<td>17,643</td>
</tr>
<tr>
<td>Coalpitts</td>
<td>Central and S.W.</td>
<td>32,691</td>
</tr>
<tr>
<td>Decorum</td>
<td>W.</td>
<td>28,572</td>
</tr>
<tr>
<td>Edwinstree</td>
<td>N.E.</td>
<td>9,237</td>
</tr>
<tr>
<td>Hitchin</td>
<td>S.E.</td>
<td>19,217</td>
</tr>
<tr>
<td>Hitchin &amp; Pirton N.W.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Odsey</td>
<td>N.</td>
<td>7,143</td>
</tr>
</tbody>
</table>

143,341

In the foregoing table we have given the general situation of each hundred; but it is to be observed that the limits of the hundreds of this county are most irregularly formed. Cashio hundreds, in particular, has detached or owning portions in various parts of the county, as the parishes of Norton and Nuthamstead near Baldock, Hexton near Hitchin, and others. Decorum and Broadwater hundreds have also owning portions.

Hertfordshire has no city: it contains two boroughs and market-towns, namely, Hertford and St. Albans, and twelve other market-towns, namely, Baldock, Barnet, Berkhamsted, Bishop Stortford, Hatfield, Hemel Hempstead, Hitchin, Hoddesdon, Royston, Tring, Ware, and Watford. The markets of Buntingford andRickmansworth have fallen into disuse; but these places are still frequently enumerated as market-towns. Of some of these an account is given elsewhere. [ALBAN'S, St.; BARNET; BERKHAMSTED; BISHOP STORTFORD; HATFIELD; HEMEL HEMPSTEAD; HITCHIN; HODDESDON; ROYSTON; TRING; WARE; and WATFORD.]

Hertford, the county-town, is in a low valley below the junction of the Maran or Minram, and just above that of the Beane with the Lea, which last-mentioned river runs through the town. In fifty-five hundred of Hertfordshire the limits of the borough jurisdiction, as determined by the Boundary Act and the Municipal Reform Act, include parts of the parishes of St. Andrew, St. John, and Bengeo, the parish of All Saints, and parts of the liberties of Brick-
Baldock is in the hundred of Broadwater, about 10 miles from London, on the great North-road. The parish contains 1320 acres; the town occupies a low situation, surrounded on all sides by an open chalky country. It is said to have been built by the Knights Templars before the time of Henry III. The church is a large and handsome Gothic edifice, and is dedicated to St. John. The town was surrounded by a wall at the time of the Black-Death. A great improvement in the town is the arrangement of six almshouses in the High-street. The population of Baldock in 1831 was 1704, about one-fifth agricultural. A considerable trade is carried on in malt, the barley of the surrounding country being ground on a mill at the town, and the malt is frequently sent into a range of six hamlets, of which the ‘town quarter’ is one. The manor of Hertford (as it is called in Domesday) was granted by King Edgar to the abbey or monastery of St. Ethelred at Bury, and was held of the bishops of St. Etheldreda at Ely, and under the bishop of the diocese of London. In a.d. 1108, it is supposed to have acquired the designation of Bishop's Hertford. The town lies on the slope of a hill, and consists of a principal street intersected by a smaller one. The hills to the north and west are a, mere hill-side, and the manor was made over to the crown in the time of Henry VIII.; the palace was the residence of Prince Edward, afterwards Edward VI., immediately before his accession. The palace of Hertford, or Elizabethan mansion, was built by Sir Robert Cecil, and still remains. The town is still standing. Hertford-house, the residence of the earls (and now of the marquis) of Salisbury, was built by Sir Robert Cecil, and is a fine specimen of the architecture of the Elizabethan period. It was almost destroyed by fire in the month of November, 1838. The grounds are beautifully laid out. The church is a large one, and the town is surrounded by the chasms of Otteridge, the archdeaconry of Hertford, and the diocese of Lincoln. There are several dissenting places of worship. In 1833, thirteen day-schools (one with 18 children, one with 50, and one with 150 children, a national school), containing altogether 485 children; and three Sunday-schools with 83 children.

Hemel Hempstead is in the hundred of Westcote, 234 miles from London, through Watford. The parish comprehends 7310 acres, with a population in 1831 of 4759: including the dependent chapelry of Bovingdon and Flaunden, it comprehends 12,442 acres, 2 roods, 27 perches of land, on the side of a hill sloping down to the rich valley of the Gade, consists chiefly of one long street. The males of the town are much engaged in making the straw-plait, and there are corn and paper mills in the neighbourhood. The Grand Junction Canal pass near the town. The town-hall is a large narrow building with an open space under for the market, which is held on Thursday, and is one of the largest in the country. The town is surrounded by a line of churches, partly of Norman architecture, of which the west door is one of the richest specimens in the country. The living is a vicarage with the dependent chapellies mentioned above, in the deanery of Berkhamsted, the archdeaconry of Hertford, and the diocese of Lincoln, of the yearly value of 700L. There were in 1833, in the parish and two chapellies, two infant-schools with 56 children, two national schools with 98 children, two schools of industry with 67 girls; ten other day-schools and four boarding-schools with 374 children.
and five Sunday schools with 280 children; there were also twenty-four schools in which about 247 children were taught to plat straw and read. The town of Hemel Hempstead was incorporated under Henry VIII., but the corporation is not noticed either in the Commissioners’ Reports or in the Municipal Corporation Reform Act.

In the year 1837 several curious Roman relics were discovered by the Rev. J. F. Gorton in the burial-ground of Box Lane Chapel near Hemel Hempstead. They consist of two glass vases (one globular and thin, the other square and of this shape a handle), an earthen pitcher and some nails. The square vase, which is entire except a slight chip off the handle, is three times as thick as the globular vase, and is a good specimen of glass. This square vase was found not more than an inch or two from the head of one partially filled. For these facts and a drawing of the different objects we are indebted to a communication from the Rev. J. F. Gorton.

Hitchin is in Hitchin and Pirton Hundred, 34 miles from London, on the little river Hiz. The parish comprehends 6150 acres, and had in 1831 a population of 5211, about one-third agricultural. The town, which consists of several streets, is irregularly laid out. It was formerly the seat of a woolen manufactory; this is now in corn and malt, of which latter a considerable quantity is made. Much straw-plait is made; there are some breweries, and also a silk-mill. The church is a handsome edifice near the north end of the town, built upon the foundations of a much earlier antient structure. The south porch is a remarkably fine specimen of Gothic architecture in the perpendicular style, and there is a font of the same character; also numerous sepulchral monuments and elephants of almshouses. The town is divided into three wards, for each of which constables and other officers are elected. There was formerly a small village called for Carmelite monks, and one for Gilbertine nuns. The market is on Tuesday, and there are three yearly fairs. The living is a vicarage in the deanery of Hitchin, the archdeaconry of Huntingdon, and the diocese of Lincoln, of the value of £435, a glebe of 66 acres, and a chancel of a chapel at Langley, in the parish of Hitchin, three miles from the town.

There were in 1833 one infant school with 50 children, two endowed day-schools with 36 boys and as many girls, two Lancastrian schools with 171 boys and 190 girls, a school partly supported by subscription with 25 children, and five day or boarding and day-schools with 127 children, and four Sunday-schools with 581 children.

Hoddesdon is in Hatfield Hundred, in the parish of Hoddesdon, in the hundred of Hertford, 17 miles from London, on the North road, through Ware and Royston. The population in 1831 was 9900; the area is 2520 acres. The town consists chiefly of the market-house. The town, which was partly wooden supported on arches and pillars curiously carved, is in the middle of the town, and near it is a conduit by which the town’s people are supplied with water. There is a chapel, a square brick building. The site of a more ancient chapel is marked by a building called the clock-house. There are two Dissenting meeting-houses. The market, which is on Thursday, has much declined; there is one yearly fair.

The chief business of the town is malting: there is a cotton-mill in the neighbourhood. There are some almshouses. The living of Hoddesdon, of which the chapelery is a dependency, is in the deanery of Braughing, the archdeaconry of Huntingdon, and the diocese of Lincoln, of the value of £36L, with a glebe-house: the yearly value of the chapelry of Hoddesdon is 54L. The church is a large church of the perpendicular style, with some elegant chapels, and another font. The town of Hoddesdon hamlet which is in Hoddesdon parish, in 1833, had 717 inhabitants. There were 117 children, two national schools with 142 children, and one Sunday-school with 90 children.

Jesselton is in the parish of Old Loveden, in Huntingdonshire, 49 miles from London, on the road through Huntingdon, 734 miles from London. The parish extends into Arthington hundred, Cambridgeshire, and the town extends beyond the parish boundaries. The area of the parish is 532 acres, the population in 1831 was 1767, about one-third agricultural. The town is situated in a bottom surrounded by chalk downs, and consists of four principal streets. The principal business is malting; a large corn trade is also carried on. The market is on Wednesday; the market-house is quite a modern building. The church was formerly the conventual church of a priory of the regular canons of St. Augustine; the yearly revenues of this priory at the dissolution were 106L. 3s. 1d. gross, or 89L. 16s. clear. The living is a vicarage in the deanery of Braughing, the archdeaconry of Huntingdon, and the diocese of Lincoln, of the yearly value of 63L. There are several houses for different classes of dissenters. A brick building in the northern part of the town was once the occasional residence of James L., who came here to hunt and shoot, and which then surrounded on the neighbouring downs. It is in the town of the house is a very fine specimen of Gothic architecture, the nave is 90 feet by 37 feet, and the bell-shaped submarine cavern, 30 feet high, and nearly 20 feet in diameter, cut out in the solid chalk, and ornamented with rude carvings of sacred subjects, supposed to have been the work of the Middle Ages. The church is frequented by the "hooded-crow," a species not found in other parts of England, and popularly called the Royston crow: it is a migratory bird, and passes the winter here.

There were in Royston parish, in 1833, one infant school with 53 children, a Lancastrian school with 53 girls, eleven day or boarding and day-schools with 194 children, and three Sunday-schools with 259 children.

Tring is in Dunmow Hundred, 36 miles from London on the road to Aylesbury. The parish comprehends 7390 acres, and had in 1831 a population of 3488, nearly one-third agricultural. The town is near, and contains several good houses. The church is an antient building, with a massive tower, and a large number of monuments. There is held every Monday a weekly market on Friday, and two yearly fairs. There are several dissenting meeting-houses. The living is a perpetual cure united with the chapelry of Long Marston; the joint living is valued at £182, and in the same benefice are held the chapels of Berkhamsted, the archdeaconry of Huntingdon, and the diocese of Lincoln. There were in the parish, in 1833, six day-schools with 240 children, and five Sunday-schools with 295 children.

Ware is in Braughing hundred, on the east bank of the Lea, 20 miles from London on the road to Cambridge. The parish comprehends 4430 acres, and had in 1831 a population of 4914, including the population of Anwell End; of this the bulk are agricultural. The town is near the water, and has a market and fairs. Up to this place the Danes, in the reign of Alfred, brought their vessels, and protected them by a dam or weir across the river, from which wear the town is said to have obtained its name; but this is disputed. Ware consists of one long street and several smaller ones. The church consists of a chancel, with a chapel on each side; a nave with two side aisles, and two projections resembling transepts; with a square tower; the font is of the perpendicular architecture, with considerable enrichments. There is considerable trade at Ware; the market, which is on Tuesday, is one of the greatest in the county for corn, and there are two yearly fairs. At one of these fairs (the Saracen’s Head Fair) a large bedstead, twelve feet square elaborately carved in oak, and probably of the age of Queen Elizabeth. It is alluded to by Shakspeare (Teeteth's Night, act iii., scene ii.), and is popularly known as the Bed of Ware. The living of Ware is a vicarage united with that of Thundridge, of the yearly value of 333l., in the deanery of Braughing, the archdeaconry of Huntingdon, and the diocese of London. There were in the parish, in 1833, two infant or dame schools with 26 children, an endowed grammar school with 28 boys, a Lancasterian school with 120 boys, a national school with 75 boys, two charity schools with 94 girls, ten day or boarding and day-schools with 190 children, and one Sunday-school with 90 children.

Watford is in Cassio hundred, 15 miles from London on the road to Aylesbury, near the Coln. The parish comprehends 10,980 acres, and is divided into four hamlets: the principal is Watford, and contains the population of the parish. The town is a market and fair town, and has a considerable agricultural trade.

The town, which is neat, consists principally of one main street, about a mile in length, near the centre of which stands the church. There are considerable silk-mills, and also a paper-mill. The market is on Tuesday. The living is a vicarage, in the archdeaconry of Middlesex, and the diocese of London, of the clear yearly value of 730l., with a glebe-house. There were in the parish, in 1833, an endowed school with 60 children, another endowed school with 11 boys, two schools with 107 scholars, and a chapel united to the Church of England by the earl of Essex, thirteen other day-schools with 279 children, and five Sunday-schools with 419 children. Buntingford and Rickmansworth are still frequently spoken of as market-towns.
Buntingford is in Edwinstree hundred, in the parish of Layston, on the road to Cambridge, 31 miles from London. It has a brick chapel built about two hundred years ago. There are also some almshouses, forming three sides of a quadrangle. The population of the parish in 1831 was 1095, two-fifths agricultural. The market was on Monday, but has been discontinued. The living of Layston is a vicarage in the deanery of Braughing, the archdeaconry of Middlesex, and the diocese of London, of the yearly value £194. There is an independent congregation. There were in the parish, in 1831, 133 marriages, 73 births, 31 deaths. There is one charity-school with 36 girls, and one Sunday-school of 70 children.

Rickmansworth, or Rickmersworth, is 18 miles from London, in the county of Buckingham, and on a branch met with the connection of the Colne, the Chesham or Chess, and the Gade. The parish comprises 9740 acres, and had in 1831 a population of 4574, more than one-third agricultural. The town is irregularly laid out. The church has been lately rebuilt: the former church was a large antient building; the tower, which is in the perpendicular style, is yet standing. There are several paper and flour mills near the town; and some straw-plaiting and horsehair weaving is carried on. The Grand Junction Canal passes through the town. The living is a vicarage in the archdeaconry of St. Albans' and diocese of London, of the yearly value of £516, with a glebe-house. There are two dissenting places of worship. The parish has been the seat of a hospital for twenty-five poor children, and an endowed national school for sixty children, a Lancasterian school with about 60 boys (since, we believe, discontinued), eighteen day or boarding and day-schools, with 120 scholars, a Sunday-school with 40 to 60 children, and two Sunday-schools with 81 children. Near Rickmansworth is Moor Park, which was the residence of Cardinal Wolsey, of the unfortunate Jane, duke of Monmouth, and of Lord Anson.

Cheshunt, though only a village, has some claims to notice. The parish comprises an area of 8430 acres, and had in 1831 a population of 5021, from one-fourth to one-third agricultural. It is divided into three wards, Cheshunt South, Cheshunt North, and Cheshunt West. There is a weekly market on Monday called Cestrehunt, from which it has been conjectured that it was a Roman station. Waltham Cross takes its name from one of the crosses erected by Edward I., to mark the resting-places of the corpse of his wife Eleanor, when conveyed to Westminster for interment. This beautiful cross, which had become much mutilated, has been lately restored by Mr. W. B. Clarke. In Cheshunt parish there is a hospital. The living of Layston is a vicarage in the archdeaconry of Middlesex, containing 37 benefices; and the deanery and archdeaconry of St. Alban's, containing 22 benefices. That part which is in the diocese of London constitutes the deaneries of Baldock, containing 24 benefices; Berkhamsted, 21 benefices; Hertford, 18 benefices; and Hitchin, 15 benefices: all in the archdeaconry of Huntingdon. Of the whole 137 benefices, 65 are rectories, 22 vicarages, 4 donatives, 14 chapellies, and 2 curacies. The number of parishes is only 130; some of the benefices not being distinct parishes.

Hertfordshire is included in the Home circuit. The assizes and quarter-sessions are held in the hundred of Cashio, the quarter-sessions for which are held at St. Alban's. The county returns three members to parliament. The place of election is Hertford: the polling-station is at the market-house. Hertford, Bishop's Stortford, Hoddesdon, Hatfield and Hemel Hempstead. Two members each are returned for the boroughs of Hertford and St. Alban's.

Divisions for Ecclesiastical and Legal Purposes.—Hertfordshire is comprehended in the dioceses of London and Lincoln, which are here conterminous. That part which is in the diocese of London constitutes the deaneries of Baldock, containing 24 benefices; Berkhamsted, 21 benefices; Hertford, 18 benefices; and Hitchin, 15 benefices: all in the archdeaconry of Huntingdon. Of the whole 137 benefices, 65 are rectories, 22 vicarages, 4 donatives, 14 chapellies, and 2 curacies. The number of parishes is only 130; some of the benefices not being distinct parishes.

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Severn. Edward the Elder, son of Alfred, built Hertford Castle, probably with the view of checking the incursions of the Northmen who had been allowed to settle in East Anglia. An ancient castle at Bishop's Stortford was probably built at the same time.

When William the Conqueror, after the battle of Hastings (A.D. 1066), advanced into the interior of the kingdom, his march was impeded near Berkhamsted by the bold conduct of Frotham, foot of St. Alban's, who caused the men that grew by the road-side to be cut down. The same spirited ecclesiastic placed himself at the head of a confederacy, with which the Conqueror found it necessary to contend, by swearing, in a grand assembly of the clergy and nobles at Berkhamsted, to govern according to the ancient laws of the realm, and especially those of St. Edward the Confessor: but when he thought himself strong enough, he scrambled to break his oath in April his 1st.

In the civil broils of the reign of John, Hertford castle was defended for the king by Walter de Godarvil, a retainer of Fulke de Brent, against the revolted barons and the dauphin Louis of France; and in the troubles in the reign of Edward II. the barons confederated against Gaveston, the king's favourite, assembled their troops at Whetstone, a few miles from St. Alban's, A.D. 1312. After the general rising of the peasantry under Wat Tyler and Jack Straw, many of the ringleaders were tried and executed at St. Alban's, the king being there at the time with a guard of 1000 men.

In the war of the Roses this county was repeatedly the scene of the contest. In the year 1455 three thousand men from the north, under Richard duke of York and the earls of Salisbury and Warwick, advanced towards London in order to seize and bring to trial the duke of Somerset, who had been impeached of treason by the House of Commons but released by the influence of the queen, Margaret of Anjou. The insurgent nobles reached the neighbourhood of St. Alban's, which was occupied by the king, who had advanced from London with a body of two thousand men to impress their progress. After a vain attempt at negotiation the town was stormed by the Yorkists; the duke of Somerset and several other nobles and gentlemen of the royalist side fell in the battle, but the king himself was wounded and taken prisoner. In the year 1461 a second battle was fought at St. Alban's. The queen, who had just vanquished and slain the duke of York at Wakefield in Yorkshire, was advancing to London when she was met near St. Alban's by the Yorkists under the earl of Warwick, having with them the battle was bloody, but the Lancastrians prevailed, and the king was restored to the keeping and use of his own faction. The battle of Barnet, A.D. 1466, in which Warwick fell in battle against Edward IV., whom he had been mainly instrumental in seating on the throne, was fought in Middlesex just beyond the boundary of Hertfordshire.

One of the monastic or castellated buildings of the middle ages Hertfordshire possesses but few remains. St. Alban's Abbey [Alban's, St.] is the chief; to which may be added Royston church, formerly conventual, and some remains of the priories at Hitchin and Ware. There are castles at Hertford and Berkhamsted [Berkhamstede]; some slight remains of a castle at Bishop's Stortford, and the earthworks of Auve or Austra Castle, between Royston and Bishop's Stortford. Waltham Cross and Hatfield Park have been noticed; there are some remains of a palace built by king Henry III. at King's Langley, between Watford and Berkhamsted.

In the breaking out of the war between Charles I. and the Parliament, this county was the scene of one of Cromwell's earliest exploits. While yet a captain of a troop of horse which he had raised, he arrested the high-sheriff of Hertfordshire, by swearing, in a grand assembly of the clergy and nobles at Berkhamsted, to govern according to the ancient laws of the realm, and especially those of St. Edward the Confessor: but when he thought himself strong enough, he scrambled to break his oath in April his 1st.

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The total number of commitments in each of the same years was 95, 101, and 167 respectively.

The number convicted was 59
28 acquitted
12 Discharged by proclamation

In 1837 there were 335 persons charged with crimes at the assizes and sessions in Hertfordshire. Of these, 191 were charged with offences against the person, 6 of which were for common assaults; 21 for offences against property, committed with violence; 283 for offences against property, committed without violence; 1 for killing and maiming cattle; 8 for uttering counterfeit coins; 10 for poaching; and 2 for other misdemeanors. Of the whole number committed, 243 were convicted, 68 were acquitted, 6 were not prosecuted, and no bill was found against 16. Of those convicted, 4 were sentenced to death, the sentence of 3 of whom was commuted to transportation for life, and of 1 for 7 years; 17 others were transported for life, 1 for 15 years, 4 for 14, 11 for 10, 29 for 7 years, and 1 for some other period; 2 were imprisoned for three years or above 2 years, 7 for two years or above 1 year, 8 for 1 year or above 6 months, and 154 for 6 months or under; and 5 were fined. Of the whole number of offenders, 306 were males, and 29 females; 194 could neither read nor write; 91 could read and write imperfectly, 45 could read and write well, and the degree of the remaining 5 could not be ascertained.

The number of persons qualified to vote for the county members of Hertfordshire is 5094, being about 1 in 26 of the whole population, and about 1 in 7 of the male population twenty years of age and upwards, as taken in 1831. The expenses of the last election of county members to parliament were to the inhabitants of the county 4658. 1st. 1d., and were paid out of the general county-rate.

There are 5 savings' banks in this county. The number of depositors and amount of deposits on the 20th November in each of the following years were—

Number of depositors
3,055
3,209
3,229
2,483
2,073

Amount of deposits
£130,449
£134,415
£137,120
£93,395
£72,044

The various sums placed in the savings' banks in 1835 and 1836 were distributed as under:

Education.—The following summary is taken from the Parliamentary Returns on Education made in the session of 1835—

Schools. Scholars. Total.
Infant schools
55

Number of children at such schools:
ages from 2 to 7 years:
Males
310
Females
278
Sex not specified
263
957

Daily schools
451

Number of children at such schools:
ages from 4 to 14 years:
Males
6,110
Females
5,555
Sex not specified
2,130

13,795

Total number of schools
506

Total number of children under daily instruction
14,725

Sunday schools
191

Number of children at such schools:
ages from 4 to 15 years:
Males
5,067
Females
5,079
Sex not specified
2,173

13,119

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Assuming that the population between the ages of 2 and 15 is in the same proportion to the whole population as it was in 1831 and that it has increased in the same ratio since 1831 as the whole population did in the ten years preceding that date, we find by approximation that there were 49,214 children between the ages of 2 and 15 in the county of Hertfordshire, in 1854, the time the Educational Inquiry was made. Many of these children would, if the schools were returned from places where no other school exists, and the children, 924 in number, who are instructed therein, cannot be supposed to attend any other school; at all other places Sunday-schools, however, in consequence of going to other schools also; but in what number, or in what proportion, duplicate entry of the same children is thus produced, must remain uncertain. Forty schools (containing 2291 children), who are not in theIf Sunday-schools are returned from various places, and duplicate entry is therefore known to be thus far created. Making allowance from this cause for a number of children having entered twice as one instruction, we may perhaps fairly conclude that about 20% of the population between the ages of 2 and 15 are receiving instruction in this county.

Maintenance of Schools.

<table>
<thead>
<tr>
<th>Description of Schools</th>
<th>By endowment</th>
<th>By subscriptions</th>
<th>By perquisites</th>
<th>By public assistance</th>
<th>By charity</th>
<th>By other sources</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants</td>
<td>2</td>
<td>1,001</td>
<td>3</td>
<td>9,077</td>
<td>2</td>
<td>999</td>
<td>12</td>
</tr>
<tr>
<td>Daily Schools</td>
<td>50</td>
<td>90</td>
<td>9</td>
<td>497</td>
<td>1</td>
<td>145</td>
<td>50</td>
</tr>
<tr>
<td>Sunday Schools</td>
<td>11</td>
<td>160</td>
<td>18</td>
<td>1,187</td>
<td>1</td>
<td>56</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
<td>1,251</td>
<td>236</td>
<td>14,438</td>
<td>5</td>
<td>383</td>
<td>52</td>
</tr>
</tbody>
</table>

The schools established by Dissenters, included in the above table, are:

- Infant schools
- Daily schools
- Sunday schools

<table>
<thead>
<tr>
<th>Description of Schools</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant schools</td>
<td>433</td>
</tr>
<tr>
<td>Daily schools</td>
<td>48,924</td>
</tr>
<tr>
<td>Sunday schools</td>
<td>8,557</td>
</tr>
</tbody>
</table>

Forty-six boarding-schools are included in the number of daily-schools given above. No school in this county appears to be confined to the children of parents of the Established Church, on the subjects relating to the most part to agriculture and the general conduct of life. Whatever may be the decision which is arrived at regarding the authorship, we think one must be very evident to all who read the poem, that in its present state it is not a work of genuine and of unity, too great to be accounted for otherwise than on the suppression of its fragmentary nature. Ulrici considers the moral and the agricultural instruction as genuine, the story of Prometheus and that of the Five Ages as much altered from their original Heliodorian form, and the description of Winter as latest of all.

The 'Theogony' is perhaps the work which, whether genuine or not, most emphatically expresses the feeling which is supposed to have given rise to it. As regards Hesiod, it consists, as its name expresses, of an account of the origin of the world, including the birth of the gods, and making use of numerous personifications. This has given rise to a theory that the ancient fragments of Homer, where the idea of a few of the songs, without understanding them, were in fact philosophical and not mythological speculations; so that the names which in after-times were applied to persons, had originally been connected by the poet himself with his system. Thus much we may safely assert respecting the 'Theogony,' that it points out one important feature in the Greek character, and one which, when that character arrived at maturity, produced results of which the 'Theogony' is at best but a feeble promise; we mean that speculative tendency which lies at the root of Greek philosophy.

The 'Shield of Heracles' is a fragment, or rather a cluster of fragments; some of them by very late Rhapsoeids who copied, according to Aristophanes the grammarian, from Homer's description of the shield of Achilles.

These who are desirous to pursue the subject of the 'Theogony,' will do well to consult Ulrici, Geschichte der Heiligen, Dichtkunst, 1, 360, 199; Herrmann and Creuzer's Briefe über Homer und Hesiod; Creuzer's Symbolik; and especially Mr. Thrillwall's History of Greece, and Müller's Prolegomena.

The best modern editions of Hesiod are Goetings's (in 1 vol. 8vo., published in the Bibliotheca Graeca, and Dun- dorf's, Leipzig, 1825, 8vo.HEY/SION (Zeugma), the name of a genus of Dor- sitarchia Astyuchia (Dorisbrachyla, vol. i.,) with a short but rather stout body, composed of a few ill-defined spines. A very long cirrhus, which probably executes the
function of branchie, occupies the upper part of each foot, which has also another lower one and a packet of fine bristles. The proboscis of Hesione is large, and without either jaws or tentacles. The Hesperides, three in number, which we must leave to be accounted for by the general uncertainty that may attend the name. They were named Agelo, Arusputthus, and Hesperothusa, and were the daughters of Atlas, by Hesperia, the daughter of Hesperus. They dwelt in a beautiful garden in the western parts of the earth, in which grew the celebrated tree which bore golden apples. These apples were guarded by a fierce dragon named Ladon, which never slept. Hercules killed the dragon and carried off the precious fruit. Some authors make the treasure to consist of sheep instead of apples, both being called by the same Greek word, meta. Some think them citrons or oranges. The Gardens of the Hesperides are variously placed, in an oasis of the African desert, in Cyrene, at the foot of Mount Atlas. Upon islands of the same name.

HESPERIDE (Stephens), a family of Lepidopterous insects of the section Lepidoptera Diurna of Latreille. Distinguishing characters:—Antennae terminated by a distinct club, generally with a minute hook at its extremity; tibiae with short hair; anal appendages at the apex, and the base of the hind leg. He keeps the middle; claws very small, bifid, body thick, wings small, with a posterior pair with a groove to receive the abdomen. The larvae are pubescent, or naked, and have a large head, puffed out.

These little butterflies have a large head, and a thicker body and smaller wings than the more typical species; they are moreover at once distinguished from them by their possessing two pairs of spurs, or spines, on the legs; their flight is short and in frequent jerks, hence they have received the name of skippers.

Hesperia Syloemus is about one inch and a quarter in width; the wings are of a rich brownish yellow above, with the outer margins deep brown; the anterior wings are spotted towards the apex with yellow, and have an oblong black dash near the base; the posterior wings have some indistinct spots.

This butterfly, which is very common in various parts of England, and is chiefly found on the borders of woods, will afford an example of the tribe of which we are treating.

There are several other species of the family Hesperide four in number, which will not be noticed. This is a little black butterfly with numerous silver-like spots, and is known by the English entomologists by the name of the Grizzled Skipper.

This is a very small insect which, in common botanical language, is confounded with the word Bacca (Bacca) but which indicates a different structure. It has a tough separable rind, the seeds hardly lose their attachment when ripe; and the cells readily separate through the dissepiments. Of this nature is the fruit of the oranges, which is the type of the Hesperidium.

HESSE, an extensive country of Germany, which, in ancient times, was inhabited by the Catti, part of whom however emigrated before the Christian saint to the Low Countries, where they were called Batavi. The Catti are mentioned under the emperors Augustus and Tiberius. Germanicus burnt their chief seat, Mauritiam (probably Mainz), in A.D. 20. He had left the great part of the empire of the Franks, losing their name in the third or fourth century. The Christian religion was introduced even before Charlemagne's reign by Boniface, the apostle of the Germans, archbishop of Mainz (Mayence), who preached here; and Christian churches and convents flourished in the seventh century at Hertford, Fulda, Friar, Amöneberg, &c. Till about the middle of the thirteenth century the country was subjected to the power of Thuringia; but Henry Raspe, landgrave of Thuringia, dying without children, in 1247, a war for the succession took place, which was terminated in 1263 by a compact, by which Hesse was divided four parts, one going to Thuringia, and assigned to Henry, son of Sophia, Duchess of Saxony, the younger brother of the late landgrave's brother, who was the common ancestor of all the succeeding landgravies of Hesse. It is beside our

purpose to detail the various changes that occurred in consequence of the alternate partitions of the territory among the sons of the sovereigns, and the re-unions on the extinction of collateral lines. Philip, grandson of Generous, who succeeded his father William II. in the sovereignty of the whole country in 1509 (the other line becoming extinct in the person of William III.), and who introduced the house of Nassau among his dominions among his four sons: William IV., the eldest, obtained Nassau with Cassel, the capital; Louis IV. a fourth part, with Marburg; Philip II. an eighth, with Rheinfels; and George I. an eighth with Darmstadt. But Philip II. dying in 1583, and Louis IV. in 1604, leaving no male heir, the three remaining only the two still flourishing main branches of Hesse-Cassel and Hesse-Darmstadt.

HESSE-CASSEL, from the time of William IV., 1592, suffered, in the successive wars which devastated Germany, but did not sustain any loss of territory; on the contrary, it made several acquisitions. After the Thirty Years' War Hessian mercenaries in the service of other Continental powers were employed in almost all the European and Turkish wars; a system which indeed enriched the princes of Hesse, but did not tend to promote the prosperity of the country. Frederick II. who succeeded to the government in 1740, though he embraced the Roman Catholic religion, signed an agreement to the league of princes, and entered into treaties, under the guarantee of England, Denmark, Sweden, Prussia, and Holland, not to change the constitution in church and state, and he also had his children educated in the Roman Catholic religion. After his death the state was administered by his nephew, John Frederick, who having freed his capital, Cassel, and liberally promoted the arts and sciences. All this he was able to do by increasing his military force, of which he let out several thousand men to England in the American war, and received for them from 1776 to 1784, above three millions sterling. He died in 1786, and was succeeded by the landgrave William IX., who, in the war of the French revolution not only furnished his contingent as a prince of the empire, but also by body of troops in the pay of England. In 1796 he joined in the treaty of Basel, and allied himself with Prussia. For the loss of his territories beyond the Rhine he received ample compensation, and on the 24th February, 1806, obtained the dignity of elector, on which he took the title of William I. When war broke out between Prussia and France in 1806, both parties recognised the neutrality of Hesse; but within less than a month afterwards Napoleon, pretending that the elector was partial to the Prussians, seized Cassel; and by the peace of Tilsit the greater part of the electorate was incorporated with the new kingdom of Westphalia. A secret article reserved to the elector, as an indemnity for the loss of his country, was his assumption the title of king of Westphalia, which he refused to accept, and retired first to Holstein, and then to Prague, where he lived as a private individual. After the battle of Leipzig, 1813, he returned to his capital, where his enthusiasm for Napoleon was so great that he was suspected of being a subject of the French. He concluded a treaty with the allied powers, and subsequently became a member of the German Confederation. Unfortunately he did not live on good terms with his subjects, to whom he thought of giving a new constitution, but could not agree about it with the antient Estates. He alienated the affections of the people by reviving old monopolies, by refusing to recognise the validity of any act of the late government, and by harassing those who had served under it. He died in 1821. His son and successor, William II., has embroiled himself still more seriously with his subjects; in the first instance, by the scandal of his connection with the countess of Reichenaich, who took the title of countess from him, for which she subsequently came to him in Moravia. A pseudonymous letter, threatening both with death, unless a constitution were given to the country and the influence of the countess in the government put an end to, gave occasion to a figure which incensed the people, and caused dissension in the elector's own family. The fermentation increased, serious riots took place in 1830, the countess left Cassel, the elector moved to Ansbach, where the countess was presented to them by the elector on the 5th January, 1831, general joy prevailed, which was interrupted by the return of the countess on the 11th. Fresh disturbances arose, and the countess left Cassel; but the elector was so angry that he also left Cassel, and appointed his son, the electoral prince, regent, who entered on his functions October 1, 1831. Fresh discontent arose.
and new troubles were caused by the accession of the Eleonore de Roman to the commercial league.

Situation; Extent; Boundaries. — The electorate of Hesse is situated between 50° 6' and 52° 29' N. lat. and 8° 29' and 10° 45' E. long. It consists of three distinct portions, of which the largest, extending only to 50° 40', and 10° 15' long., is bounded on the north-east by Hanover and the Prussian province of Saxony, on the east by Weimar and Bavaria, on the south by Bavaria, on the west by Nassau and Hessen-Darmstadt, on the north by the county of Schmalkalden to the north, surrounded by Hanover and Lippe, and the lordship of Schmalkalden to the east, surrounded by the Saxon principalities and the Prussian circle of Schleswig. The area of the whole is 4350 square miles.

Divisions. — The electorate is divided into four counties, with a total population, at the end of 1835, of 700,583 inhabitants.

I. LOWER HESSE (337,400 inhabitants), divided into ten circles, with 34 towns, 8 market-boroughs, and 519 villages. Chief towns, Cassel, the capital of the electorate (Cassel), with 29,931 inhabitants (garrison included); Eschwege, 5686 inhabitants. There is no other a settlement of 5000 inhabitants. Among the principal are, Frizlar (2882 inh.), Hofgeismar (3193 inh.), Melsungen (3341 inh.), Rothenburg on the Fulda, with a palace, late the residence of the landgrave, and 4 ports, and the Ruthe (Ruthe, 2986 inh.), Allendorf (2985 inh.), Wolfsburg (2761 inh.), Volkmarsen (2769 inh.), Homberg-on-the-Ecke (3007 inh.).

II. UPPER HESSE (114,769 inh.), divided into four circles, with 16 towns, 4 market-boroughs, and 189 villages, divided into 4 circles; chief towns, Cassel, the capital of the principality (Hannau, according to the most recent account, 14,834 inh.) [HANAU]; Geselhausen (2137 inh.), Steinau (3237 inh.).

Hesse-Cassel, as a member of the German Confederation, is, the eighth in rank, has in the full council 3 votes, one in the petty council, though in the electoral they have no representation. The landed country is in general hilly; but it contains numerous valleys, which in some places expand into more extensive plains. On the south-east and south the Thuringerwald, the Rhön, and the Speyart, extend their branches into the country from the Saxony duchies and Bavaria, and cover the province of Hanau, and the whole tract between the Werra and the Fulda. Schmalkalden is situated on the mountain called the Thuringerwald, on the northern frontier of which is the Inselberg (2992 feet high). The mountain is thickly-wooded, chiefly with red pine and fir. The other principal chains are the Hunsrück, the Wesergebirge, and the Vogelsgebirge. The soil of Hesse is not indeed distinguished in general by great fertility, but it can by no means be called sterile. The finest parts are the beautiful valleys of the Fulda, the Schwalm, the Eder, and the Werra. The climate is on the whole temperate, and everywhere of much advantage to the banks of the Main, and most severe in Fulda, on the summits of the Rhön. The principal rivers are the Maine, the Weser, the Werra, the Lahn, and the Fulda. The last, though not the largest, is the most important, being the only one of the circles of Fulda, Hersfeld, Rotenburg, Melsungen, and Cassel, becomes navigable at Fulda, and joins the Werra at Münden, in the kingdom of Hanover, both together called the Weser. The fortress of Cassel, situated on the circles of Fulda, Hersfeld, Rothenburg, Melsungen, and Cassel, becomes navigable at Fulda, and joins the Werra at Münden, in the kingdom of Hanover, both together called the Weser. The utmost boundary of which there are 200 miles, and the districts of Diemel alone.

Natural Productions. — Corn, maize, pulse, and potatoes in great abundance, especially in the mountainous parts, are cultivated. Flax and timber are staple articles: tobacco, hemp, madder, a few hops, and rapsée, are also among the products. The vine is cultivated only in some parts of Hanau. The pasturage is in general good. Garden produce of excellent quality is raised above Cassel and Hanau. Berries and fruits are cultivated chiefly in Upper Hesse, Hanau, and Hersfeld, where immense quantities of dried fruits are exported. The breeding of cattle is very general, but much neglected, and the cattle kept in some parts are of very small size. There is a great industry in agriculture; and sheep chiefly in Lower Hesse, Hanau, and Fulda. Domestic poetry and game are very abundant. Hesse abounds in mineral wealth, producing silver, copper, iron, coal, iron, coal, oil, cobalt, salt, and all metal. The great quantities, salt, petrole, vitriol, and alum. There are also coals, marble, very fine white alabaster, porcelain, potter's, and pipe clay, &c.

Manufactures and Trade. — The manufactures, which are chiefly in Cassel, Hanau, and Fulda, are insufficient for home consumption. The principal are linen, mostly coarse, which is exported to the value of 300,000 sterling annually. Fine linen is made in Cassel and Hersfeld. Cotton spinning has been introduced of late years, and is become pretty general. Schmalkalden manufactures almost all the steel and iron of the country; Grossalmerode is celebrated for its crucibles, which are exported to all parts of the world. With respect to the trade of Hesse, Hanau, and the two fairs at Cassel are of little importance. The exports are corn, dried fruits, timber, leaf tobacco, wrought iron, linen, earthenware, crucibles, salt, &c. The imports are colonial goods, and wigs, etc. The importation of articles of all kinds, but not to a large amount, the inhabitants being very simple in their habits and mode of living. The proximity of Frankfurt favours a profitable transit trade with the North of Germany, and the treaties lately concluded between Holland and the States on the Rhine will doubtless tend to promote the foreign commerce of Hesse.

The Revenue. — By the triennial budget for 1837—1839, the expenditure is estimated at 3,330,870 dollars, and the receipts at 3,314,810 dollars; leaving a deficiency of 15,260 dollars; but there is reason to expect that there will be a surplus. On the 1st of January, 1837, the public debt was 1,548,569 dollars, for 4 per cent. interest, of which however 900,000 dollars are in the hands of the government. The interest of the debt has been reduced to 3½ per cent.

The army consists of six regiments of infantry of the line, two battalions of infantry, two battalions of light infantry, and two regiments of cavalry.

The Constitution of January, 1831, is one of the most liberal in Germany. The estates form only one chamber; the electoral is divided into the major classes of the community. Though there is no longer an emperor of Germany, and consequently no elector, the sovereign of Hesse-Cassel has thought fit to retain the title of elector. Since the introduction of the constitution, many good laws have been passed, and many material improvements introduced; but unhappily, there have been serious differences between the government and the states, some of which have been compromised, but one of much importance remains undecided. It arose on the extinction of the collateral branch of Hesse-Rothenburg by the death of the landgrave Victor Amadeus, in Nov. 1834; the revenue of his dominions (250,000 dollars) is claimed by the Estates as public property, whereas the Constitution claims it to belong to the private property of his family.

Religious Education. — The great majority of the inhabitants are Protestants (for the most part, with the court, Calvinists), the Roman Catholics are a minority. A law for the emancipation of the Jews was passed in 1833. The Protestant Church is under superintendents; and the Roman Catholic under the bishop of Fulda, which was established in 1735. The number of churches is 442; there are 76 town churches; 106 country churches, 94 parishes, and 8 tithe parishes; 136 parochial schools; 2 academies for clergymen; 2 seminaries for schoolmasters, 2 academies of drawing and painting, and 63 town schools, and elementary schools in all the possession of the crown. Thus.

HESSE-DARMSTADT, the grand-duchy of which is governed by the second main branch of the house of Hesse, was founded in 1867, as stated under Hesse-Cassel, by George I., youngest son of Philip the Generous, of whose dynasty more is related above. Hesse-Darmstadt is a little more than one-eighth square mile in extent, and is a small addition to the death of his brother Philip without issue. On
the death of George his dominions were divided among his three sons, Louis V. succeeded him in the principal line; Philip obtained Butzbach, which reverted on his death to the main line; and Frederick, the youngest, was the founder of the junior line of Hesse-Darmstadt, namely, that of Hesse-Homburg. Excepting the ruinous effects of the Thirty Years' War, the reigns of the succeeding princes were on the whole prosperous, and various acquisitions of territory were made. Louis IX., who reigned from 1678 to 1790, was a friend of peace, and he left his duchy in a state not far removed from the condition of the French revolution; that is to say, he acquired very large additions to the extent of his dominions and the number of his subjects. By the treaty of Lunéville, 1801, and by the settlement of the affairs of the empire, in 1815, he lost territories containing above 100,000 inhabitants, and obtained instead, provinces more than double the extent, with 218,000 inhabitants. In 1866 he joined the Confederation of the Rhine, and obtained from the defection of the nearest territories containing above 100,000 inhabitants, and obtained instead, provinces more than double the extent, with 218,000 inhabitants. In 1866 he joined the Confederation of the Rhine, and obtained from the defection of the nearest territories containing above 100,000 inhabitants, and obtained instead, provinces more than double the extent, with 218,000 inhabitants. In 1866 he joined the Confederation of the Rhine, and obtained from the defection of the nearest territories containing above 100,000 inhabitants, and obtained instead, provinces more than double the extent, with 218,000 inhabitants. In 1866 he joined the Confederation of the Rhine, and obtained from the defection of the nearest territories containing above 100,000 inhabitants, and obtained instead, provinces more than double the extent, with 218,000 inhabitants. In 1866 he joined the Confederation of the Rhine, and obtained from the defection of the nearest territories containing above 100,000 inhabitants, and obtained instead, provinces more than double the extent, with 218,000 inhabitants.

Division.—The grand-duchy is divided into 3 provinces.

I. STARKENBURG (236,745 inhab.) contains 22 towns, 24 market-villages, and 282 other villages; chief towns, Darmstadt (24,500 inh.), the capital of the grand-duchy [Darmstadt]; Pfungstadt (2800 inh.), Griesheim (3400 inh.), Bensheim (4000 inh.), Heppenheim (3600 inh.), Gernsheim (3900 inh.), Lampertheim (2900 inh.), Dieburg (3000 inh.), Offenbach on the Main (9000 inh.), and Offenbach.

II. RHEINHENNE, that is, RHEINISH HESS (190,000 inh.), contains 19 towns and 180 villages; Oppenheim (2200 inh.), Mainz (21,000 inh.), the capital of the grand-duchy [Mainz], Worms (8000 inh.) [Worms], and Alzei (4200 inh.).

III. OBERNHEIM, or UPPER HESS (271,442 inh.), with 34 towns, 19 market-villages, and 510 other villages; chief towns, Giessen, the provincial capital (8000 inh.) [Gießen], Friedberg (3200 inh.), Bibingen (2700 inh.), Asfeld (3700 inh.), Lauterbach (2800 inh.), Schiltz (3200 inh.), Biedenkopf, on the Lahn (3200 inh.).

To the province of Upper Hesse belongs the entirely detached district of Wöll, or Itter, the most northern part of the grand-duchy, a wild sterile country, surrounded by territory of the German confederation [Mainz]; Worms (8000 inh.) [Worms], and Alzei (4200 inh.).

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Face of the Country, Soil, Climate.—A large part of the surface of the country is mountainous. The banks of the Rhine, and the Wetterau, which contains about twenty square miles, are pretty level and very fertile: the remainder of the country is traversed by branches of the Vogelgebirge, the Odenwald, Taunus, and the Westerwald; but of the latter only a very small portion is under cultivation. The Vogelgebirge, in Upper Hesse, is a volcanic mass, which, with its branches occupies 400 square miles; it consists chiefly of basalt, and of various compact and porous lavas. The Odenwald, in Starkenburg, presents a pleasing and picturesque rather than a wild mountain character. Most of its summits are clothed with forests of oak, beech, and fir, while the broad well-watered valleys and middle declivities are covered with numerous habitations and carefully cultivated. Hesse-Darmstadt is on the whole an agricultural country. The chief productions are corn of all kinds, likewise maize and sweet; wheat and rye chiefly produce the wheat, the rye, and oats, which are used in the manufacture of corn, barley, tobacco, pulse, potatoes, wines, both white and red, garden vegetables and fruit, and timber. Rheinish Hesse is nearly destitute of timber. The valleys of the Odenwald and Vogelgebirge are well adapted to the breeding of cattle, of which there are about 250,000 horned cattle, and 250,000 sheep. Swine are kept chiefly in Upper Hesse and Starkenburg. The breeding of horses is much neglected. Domestic poultry is abundant; game is not scarce, but it is not plentiful. Mining is not carried on so extensively as might be expected: it is confined to copper, iron, coal, salt, and brown coal. Cobalt, salt, lime, sandstone, marble, and slate, are found in different parts of the grand-duchy. The Lahn (2500 feet broad at Mainz), and the Main, and next to these the Lahn, the Schwalm, the Nidda, the Rhine, and the Itter. Manufactures and Trade.—The manufactures have greatly increased in late years, and they are still in a flourishing condition. The chief manufactures are of woollens, cottons, and linen (of which latter 600,000 ells are annually made in Schlitz), leather, and hardware. Wine is produced in considerable quantities. The eventual market town is Offenbach, which has two annual fairs. Mainz is the principal place for the transit-trade. The exports consist of the natural productions of the country and of manufactures. Hesse-Darmstadt joined the Prussian commercial league in 1828.

The revenue is estimated at 6,576,105 florins, and the expenditure at an equal sum, including the interest of the debt, which is above ten millions of florins. Provision is made for the gradual extinction of this debt. The military establishment in time of peace is fixed at
3588 men, namely, 908 cavalry, artillery 308, infantry 4065, a company of sappers and miners 61, general staff 6. The war establishment is 9469 men.

Religion. Education.—Of the 716,000 inhabitants, 516,000 are Protestants (in 1822 the Lutherans and Calvinists in Rheinland Hesse united in one Evangelical church), 177,888 Roman Catholics, about 1300 Mennonites, and 22,174 Jews. In education Hesse is not so far as some other German states; but considerable improvements have lately been made. There is one philhological seminary, an episcopal seminary, 2 seminaries for schoolmasters, eight gymnasium, 4 schools of arts and sciences, one military school, one midwifery school, 16 schools of industry, and at least one elementary school in every town.

HESS-HOMBURG was formerly a part of the landgrave of Hesse-Darmstadt, till it came, in 1596, into the possession of Frederick I., youngest son of George I., who was the founder of the still flourishing line of Hesse-Homburg. Frederick Charles Louis, who succeeded to the government in 1751, experienced various vicissitudes in his long reign. In 1806, on the foundation of the Rhineland Confederation, he was obliged to suppress the sovereignty of Hesse-Homburg, on which he became dependent. The Congress of Vienna however, in 1815, not only restored to him the sovereignty of his ancient principality of Hesse-Homburg, but to it the lordship of Menheim, on the other side of the Rhine. The landgrave therefore is now a sovereign prince, and was unanimously received in 1817 as a member of the German Confederation, and as such has one vote in the full council, making the whole number 70. However, his reconstruction has exhibited itself to the Princess Elizabeth of England, and dying without issue in 1829, was succeeded by the reigning landgrave, Louis William Frederick.

Division.—1. The lordship of Homburg, which contains about 58 square miles and 8800 inhabitants. The chief town, Homburg vor der Höhe, with 3600 inhabitants, is situated under an eminence, on which the palace of the landgrave is placed, commanding a situation of extraordinary beauty. Homburg is divided into the old and the new towns, the latter of which is open, and regularly built.

II. The lordship of Meisenheim, which contains 126 square miles and 15,200 inhabitants. It lies between the Prussian province of the Lower Rhine, the Bavarian circle of the Rhine, and the principalties of Lichtenberg and Borken. The chief town is Meisenheim, with 1700 inhabitants. The territory of Hesse-Homburg contains a considerable proportion of arable land. Meisenheim, which is occupied by the outskirts of the Hundsbruck, has mines of coal, iron, stone-unnaries, and considerable forests. The landgrave owns the building of the castle, Meisenheim, and houses his residence, Homburg, and Oeselsberg, in the Prussian province of Saxony, and some other private estates. The revenue, including 34,000 florins from the Prussian bailiwicks, and an appanage paid by Hesse-Homburg, is 186,000 florins (18,000 marks). The public debt is 450,000 florins, for the gradual extinction of which provision is made. The military consists of a contingent of 200 men, furnished by Hesse-Darmstadt to the reserve of the army of the Confederation.

Religion.—14,000 Calvinists, 6000 Lutherans, 3000 Roman Catholics, 150 Jews. The supreme power is vested in an hereditary landgrave, and descends only in the male line. The Jews of estury.

HESS-PHILIPPSHAL, the younger collateral line of the house of Hesse-Cassel, was founded in 1682 by Philip, the sixth son of Landgrave William VI., and was divided in 1823, and the two surviving branches became extinct by the death of Landgrave Victor Amadeus without issue on the 12th November, 1834, when the revenue, about 250,000 dollars per annum, came to Hesse-Cassel.


HESS-WILLIAM, LANDGRAVE OF, was born at Cassel about the middle of the sixteenth century, and died in the year 1597. He immortalized his name by the encouragement which he gave to all kinds of philosophical research, and more particularly by the zeal with which he supported the advancement of astronomy. With the assistance of Christopher Rothmann and Juste Ripe, he erected an observatory, and furnished it with the best instruments that were then obtainable. His observations, which are said to have been of a very curious nature (Hutton, Life of Reynolds), were published in 1627, one year after his death, by Willebrord Snell, and are spoken of by Tycho Brahe, both in his Epistles, and in the second volume of "Poggilannnnecat." (Martin's Biographia Philosophica, Lond., 1764.)

HESSNES, commonly called ESSENES, one of the three great sects into which the Jews were divided in the time of Christ. They are not mentioned in the New Testament; but it has been conjectured that they are alluded to in Matt. xix. 12, Col. ii. 18. Many particulars concerning the customs and religious opinions of this sect are given by Josephus and Philo. Their statements differ in some particulars; but as they appear worthy of more credit, since he had in his youth passed some time among the Essenes. (Life of Josephus, c. 2.)

The Essenes generally lived at a distance from large towns, in communities which bore a great resemblance to a monastery. Their mode of life was rigorous on themselves in agriculture, and had no slaves. They had all things in common, ate at a common table, and were exceedingly abstemious, never partaking of food before sunset. They were always clad in white garments, ashamed of wine, and generally led a life of celibacy. They sent gifts to the Temple, but never offered any sacrifices there. They were divided into four classes, according to the time of their initiation, and the three first were deprived of the peculiar doctrines and practices of their sect. (Philo, De Vita Contempl., vol. ii. p. 475.)

The origin of this sect is uncertain. Some writers consider them, the same as the Asentinis, or Chasidim, who are mentioned in 1 Macc. ii. 42; vii. 13. It would appear from the account of Pliny (Nat. Hist., v. 17) that their principal society was on the western side of the Dead Sea; and that from this society other smaller ones afterwards proceeded, and spread themselves over Palestine, Syria, and Egypt. Their numbers were never considerable; according to Philo and Josephus, there were only 4000 in Palestine.

The Jews from Egypt were called practical Essenes, whose manner of life was the same as the Essenes of Palestine; and the contemplative Essenes, who were also called Therapeutae. Both sects maintained the same doctrines, but the latter were distinguished by a more rigid mode of life.

From a passage in Eusebius (Hist. Eccl., ii. 17), it has been argued by Bellarmine, Baronius, and other Roman Catholic writers, that the Therapeutae were Christian monks. The Therapeutae was as a society by St. John, a founder of the Christian church at Alexandria. But it is evident from the account of Philo, that the Therapeutae were not Christians, but Jews.

It has been supposed, with considerable probability, that the early Christians derived many of their customs and opinions from the Essenes. Mr. Taylor, the editor of Calmet's 'Dictionary to the Bible,' gives many reasons for believing that John the Baptist belonged to this sect. (Josephus, Antiquities of the Jews, iii. 5, c. 5; xv., c. 10)
The peculiarity of the Heterocerical fishes is that the vertebral column runs along the upper caudal lobe: in the other forms of tail it is symmetrically placed with respect to the posterior finny expansion. M. Agassiz has found this peculiarity of the tail, which is least common among living fishes, and confined to particular groups, to belong to every species of fishes, of whatever group, and however differing in other respects, which occur in strata older than the oolitic system, while in and above that system Homocerat forms appear. It is therefore a characteristic of geological time; and among the conditions as to the relations of this form to physical conditions of the surface, or laws of the animal economy, we prefer the opinion that it is one among several marks of the saurian character of the fishes which lived in early geological periods. Some of the fishes of the oolitic rocks exhibit a slight inequality of the lobes of the tail, and some difference in the arrangement of the scales thereon, but without (we believe) the characteristic continuation of the vertebral column into the upper lobe. These may be thought to mark the gradual transition from the Heterocerical to the ordinary types of structure. Lepidosteus, with its two rows of sharks, and other fishes of the existing creation, which were ranked by Linnaeus as 'Acipenseriformes,' thus appear the few surviving representatives of organic forms which, in earlier periods of the history of the globe, were exclusively predominant. (Agassiz, *Recherches sur les poissons fossiles*.)

**HETERODON, M. de Blainville's name for a genus of Dolphins. [Whales.]** The term Heterodon had been applied by M. De Beauvoir to a genus of serpents placed by Cuvier under his great genus Célèbres.

**HETEROGANGLIATA.** The Heterogangliata of Professor Owen comprise all the Mollusca of Cuvier, with the exception of the Gireppeda.

**HETEROMORPH, a genus of Rodents, which, in M. Lesson's opinion, may be advantageously used, though M. Desmarest proposed it without adopting it.** The genus is characterized by chronic pouches, having no external expression; the general form of the body and tail of the rats properly so-called, and the dorsal flattened spines of Echymus, Geoff. (Longicornis, Illiger.) Dental system unknown; foot with six callusses below, and five toes, the internal toe very small. (Lesson.)

**HETEROSCI (other-shadowed), an old astronomical term for persons living in such parts of the earth that their shadows at noon are always turned contrary ways.** Thus the only heterosci are those who are situated without the tropics, and in different hemispheres; since in the northern hemisphere those who are situated north of their tropic have the shadow at noon always turned northward, and those south of the southern tropic, southward.

**HETEROCEOSTYNA.** From the Greek, 

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lished Animad. in Mach. Coelest. Hevelii. Lond. 1674, in 4to. Hevelius always imagined that better observations could be made with plain skies than with telescopes. Hooke recommended the use of the latter to Hevelius on the receipt of a copy of his 'Cosmographicum,' and some correspondence took place, which was increased into a quarrel by the diarrhetic manner of Hooke in the work just cited. Halley was requested by the Royal Society of London to visit Hevelius at Danzig, and judge of the goodness of his observations. This voyage, which happened in 1673, proved to Halley a very fruitful tour from Hevelius, who was highly favourable to Hevelius. In 1644 Hevelius was elected a member of the Royal Society of London. In 1679 he sustained considerable loss by the destruction of his observatory by fire. The whole of his instruments and library were destroyed, including most of the copies of the second part of his 'Machina Coelestis,' which had only been published that year. This second part is now extremely rare, as obserable objects appear only to have had the effect of increasing his ardour in the pursuit of astronomy, for he shortly after erected a new observatory, though on a less magnificent scale, and by 1685 he had another volume of observations ready for publication. He had now been occupied forty-nine years as an observer, and had attained sixty-three years, the climacteric, as it used to be called, of life, for which reason this volume (the last published during his lifetime) is called 'Annae Claudianae.' His posthumous

works are 'Firmamentum Sobiesckianum' (1690) and 'Promorbus Astronomiae' (1691). He died at Danzig, universally respected, in 1687-8, and in his 76th year. During his lifetime he carried on an active correspondence with many of the astronomers of Europe.!!!

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HEXHAM. [Northumberland.]

HEYDEN, JOHN VAN DER, a very eminent Dutch painter, born at Gorcum in 1637 (some say 1640). He is one of the most admirable painters of external architecture of the Dutch, or indeed of any other school. His views of temples, palaces, churches, cities, and country-houses, are not only painted with incomparable precision and minute-
ness of detail, but this miniature-like finishing is combined with the most admirable keeping of the masses, the most striking and effective unity of composition. The value of his early works is enhanced by their being adorned with figures by A. Van der Velde, after whose death in 1672 Van der Heyden very successfully imitated his manner, which was equally effective in both his living and his posthumous etchings. He died in 1715 at Amsterdam.

HEYLIN, PETER, born in 1600, at Burford, in Oxfordshire, studied at Oxford, where he took the degree of B.A. He gave lectures on history and cosmography in that university; and afterwards, in 1622, he published his 'Microcosm,' or description of the globe, which met with great success, and was reprinted several times with alterations and additions. Heylin was appointed chaplain in ordinary to King Charles I., who presented him to several livings, of which he was afterwards deprived in the Re- bellion. He devoted himself to the defence of England in 'Laws of the Ancient and Modern Lands of the Heavens,' and 'History of the Heavens.'

HEYNÉ, CHR. GOTTLIB born at Chemnitz, in Saxony, in 1729, studied at Leipzig, and distinguished himself early as a classical scholar. He was called to the University of Göttingen, where he was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university of Göttingen, where he was called to the University of Göttingen, where he was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed professor of oriental language and history, and in 1752 was made dean of the university. He was a grandson of Heinecke, and was a profound scholar, especially in oriental languages. He was appointed prof
HIBISCUS, a genus of plants of the natural family of Malvaceæ, so named from one of the Greek names (Διασεν) of the Mallows. The species, upwards of 160 in number, of this genus, are chiefly herbaceous, though of a large size, but a few are perennial and arborescent. They abound in the hot parts of Asia and America, and also in Africa and the tropical islands; a few extend into Europe, North America, and even into Asia, as H. Tridentifolius, which occurs in Europe, is also found in Casamance. The genus is characterized by having an exterior many-leaved calyx; carpels united into a five-celled capsule; valves with the partitions in the same number; seeds in the capsule, each containing only a single seed. The species are remarkable, like the family to which they belong, for abounding in mucilage, and for the tenacity of the fibre of their bark, whence several are employed for blackening in the different countries where they are indigenous.

The abundance of mucilage in some of the species renders them useful as articles of diet, as the unripe fruit of H. moscheutos, the obo or gombo of the West Indies, which is employed both for thickening soup and as a vegetable; so in India H. longifolius, there called ram tura, is similarly employed, and much approved by many Europeans, but objects to others on account of its camomilla.

The calyxes of H. Sabadarphi as they ripen become of a red colour and are pleasantly acid, whence in the West Indies the plant is called red sorrel. The calyxes are employed for flavoring soups; and the decoction of them, sweetened and fermented, is described in Browne's ' Jamaica' as a cool and refreshing drink, much used in many of the sugar islands. H. syriacus and H. Rosa sinensis are known as ornamental plants; the flowers of the latter are employed for the making of inks for the eyes, as well as for leather, both in India and China.

The species of Hibiscus are chiefly useful for the tenacity of their fibre, and hence several are employed in rope-making. Thus H. cannabinus is cultivated everywhere in India in the rainy season for this purpose; and its fibre is often imported into Europe as a substitute for hemp. It is known by the name sun in Northern India, ambar we in Western India, and in China is known as Oথe of the hemp. The stems of the plant are also made into a dye of a beautiful glossy white appearance, and as likely to be an advantageous substitute for such as are already cultivated for the purpose.

Hibiscus abelmoschus, so called from hab al-mosk, the Arabic name of its musk-scented seeds, is now often named Abelmoschus moschatus, and formed into a new genus. Its seeds are said to be added to coffee in Arabia, and are in India employed as a cordial medicine. The plant abounds in mucilage, and is employed in the process of clarifying.

HIBOLITHUS, one of De Montfort's subdivisions of Begetia.

HICKES, GEORGE, an eminent English divine and philologist, was born June 20th, 1642, at Newsham, in Yorkshire, where his parents were settled in a large farm. His father was employed in the grammar-school of North Allerton, and in 1649 to 1650 he was at Oxford, where he was made a Fellow of Magdalen College, afterwards to Magdalen Hall, and in 1644 was chosen Fellow of Lincoln College. In 1653 he became M.A., and was admitted into orders in 1659. He was in 1661 in the service of M. Andree, who gave him an allowance of 300 livres, and enabled him to spend the winter of 1662-63 at Oxford, having received the same degree the year previous from the University of Glasgow.

Between 1679 and 1893 he had several preferments, and in 1695 was made Dean of Worcester. In 1688 he refused to take the oath of allegiance, fell under suspension in 1689, and in the month of February following was deprived. He was subsequently consecrated suffragan bishop of Thetford by archbishop Sancroft. He died of the stone, Dec. 15, 1715.

Dr. Hickey was a man of general learning, deeply read in the fathers, and particularly skilful in the northern tongues. His critical pieces on politics and religion, especially those against popery, are held in the highest estimation, the most part forgotten. The work which goes by the name of his 'Theatrum, or Treasure of the Northern Tongues,' in three volumes, folio, Oxford, 1765, is that which is most likely to cause his lasting reputation.

HYERAX. [FALCONIDAE, vol. x. p. 180.]

HIERÉS. [HYRÈRES.]

HIERO-FALCO, Cuvier's generic name for the Gyr- 

hierocles, the name of several Greeks:-

1. Hierocles, a rhetorician of Abalarda, in Caria, lived in the beginning of the first century before the Christian era. He excelled in what Cicero termed the Asiatic style of eloquence. (De Orat., ii. 23; Brutus, c. 95.)

2. Hierocles, a stoic philosopher, lived in the time of Hadrian, or perhaps later. (Gell., ix. 5.)

3. Hierocles, a lawyer, wrote a work on veterinary medicine, addressed to Cassianus Bassus, of which three chapters are preserved in the 16th book of the Geoponikon, published by Needham, Camb., 1704, p. 424, 425.

4. Hierocles, a Sanscrit lexicographer, of the sixth century, was the author of a work entitled 'Syneclogos' (synec- 

lygos), that is, 'a travelling companion,' which gives an account of the provinces and towns of the Eastern empire. The 'Syneclogos' is printed by Wesselin in his 'Vetena Romanorum Illustrium,' 1720.

5. Hierocles, prefect of Bithynia, and afterwards of Alexandria, is said by Lactantius (Inst. Divin., v. 2; De Morte Persic, c. 17), to have been the principal adviser of the persecution of the Christians, under Emperor Diocletian. He also wrote two books against Christianity, entitled λόγοι φιλολογίας τός τύχων Χριστιανών, 'truth-loving words to the Christians,' in which, according to Eusebius, he so excited the Roman senate to such a pitch as to throw away holy books; whereon he also wrote the first book of the Paschæ and the sacred sacrifices. He endeavoured to overthrow Christ's miracles, though he did not deny the truth of them; and aimed to show that like things, or even greater, had been done by Apollonius. (Inst. Divin., v. 2. 5.)

6. Hierocles, a celebrated Alexandrine philosopher of the fifth century, wrote a Commentary upon the Golden Verses of Pythagoras, which is still extant; and also a Discourse on Foreknowledge and Fate, of which Plotinus has preserved large extracts. Stobæus has also preserved the fragments of several other works, which are ascribed to Hierocles. The Greek text of the Commentary on the Golden Verses was first published by Curterius, Paris, 1583; reprinted at London, 1654; and has also been published at London, 1742, and Padua, 1741. The fragments of the Discourse on Foreknowledge and Fate, which is in the first two attempts of a man with the foreknowledge of God, have been edited by Morel, Paris, 1593, 1597; and by Pearson, London, 1655, 1673; the latter edition contains the fragments of the other works of Hierocles. A complete edition of his works was published by Needham, Cambridge, 1709. The Discourse on Foreknowledge and Fate was translated into French by Regnault (Lyon, 1560). Grouss translated part of this work into Latin, and published it in Paris, 1564; and Amst. 1648; reprinted in the 3rd vol. of his theological works, 1679. The Commentary on the Golden Verses has been translated into English by Hall, London, 1657; reprinted by the same hand in London, 1717; and into French, by Dacier, Paris, 1706.

There is also another work, entitled Astées (astris), which contains an account of the ridiculous actions and sayings of pollets, frequently printed with the Largus of the same author, but it was probably written by another individual of the Vol. XII. — 2 C
same name. This work is translated into English in the Grimm's 'German Mystery,' 1741.

HIEROGLYPHICS, a compound Greek word which means 'sacred engravings,' is the name given to the well-known figures of animals, plants, and other material objects sculptured on the Egyptian obelisks, temples, and other monuments which were carved with a sort of ideographic writing among that people. The name 'hieroglyphics' has been also applied to other figures of a similar kind, used likewise for historical records on the monuments of Oriental and other nations. The ease and simplicity of mode of recording events seems to have been that of picture-writing, that is to say, by a rude delineation of objects, such as that by which the Mexican scions in former times, or the Roman emperors from the days of Nero to that of Charlemagne, and his band of followers, by sketching as faithfully as they could the appearance of the Spaniards, their ships, horses, and fire-arms. This however was only resorted to by the Mexicans on extraordinary occasions, in order to depict new objects. For ordinary purposes they had symbolical or conventional hieroglyphics to express historical events and other occurrences. As time passes on and events recur, and the relations of society increase, picture-writing becomes too cumbersome and inadequate a process for recording facts, and some method must be contrived for shortening and facilitating the task. This is effected at first perhaps by sketching only a part of the whole, such as a scaling likeness of the flying arrows, &c. The path of figurative imagery being once entered into, leads to symbols or tropical signs, in which one thing is put for another on account of some real or supposed resemblance: thus Arrows signify Wind, a sceptre or staff signifies Authority, and a hawk's head surmounted by a disc represents the Sun, &c. By a combination of such symbols an event may be recorded, and will present itself at once to the mind without the keys of the system, without the assistance of words. In fact even to many of us Europeans who are in the constant habit of reading the written or printed words often and with the eye, the hieroglyphic writing of certain characters to which we have been long accustomed immediately conveys to our minds the idea expressed, without any reference to sound or alphabetic spelling. Harford and M'Clintock say that the Egyptians had two kinds of written characters, Demotic and Sacred. The Rosetta inscription calls the common or vulgar character Enchorial. Clement of Alexandria, in a celebrated passage (Stinger), says that those who are instructed animal's the Egyptian nation all learn the kind of Egyptian writing which is called epigraphologic: next the hieratic, which the sacred registers use, and last of all the hieroglyphic. Of the hieroglyphic there are two kinds, one expresses the meaning by its form, and the other is symbol. Of the symbolic, one part expresses its meaning by imitation, a second part as it were tropically, and the third is purely allegorical, expressed by a kind of enigma. Accordingly when they wish to represent the Sun they make a circle; for the moon they make a crescent, the form of the object indicating the meaning. In the tropical mode of representation, following a certain analogy in the transfer and the change, they use the symbols, modifying some and in many ways altering others; consequently when they record the praises of their kings in sacred myths, they express them in anaglyphs. Of the third or epigraphologic mode of representation the following may serve as examples: they indicate the daily use of the stars (planets), on account of the obliquity of their course, by serpents; but the sun is indicated by a beetle. Clement of Alexandria says that the first-numbered sort of hieroglyphics, which expresses its meaning by the shape of the first element, phrase sufficiently obscure, but which is now generally supposed to refer to the phonetic use of the hieroglyphics. This phonetic system is a discovery of recent times. Zoega first suspected that some hieroglyphics were of this kind, not expressive of sounds, and Dr. Young, having observed that certain groups of characters which were repeated in the enchorial text of the Rosetta inscription corresponded to the name of Ptolomeus in the Greek text, soon discovered corresponding groups of signs in the hieroglyphical text of the same inscription, enclosed in a kind of ring or cartouche. Dr. Young then endeavoured to fix the alphabetical or syllabic value of each sign, so as to produce the name of Ptolomeus. This was the beginning of the discovery of the

The phonetic use of hieroglyphics by the Egyptians, who, it is afterwards ascertained, wrote this manner of writing on the sepulchral monuments by which the ancient object represented was known, and that by a series of characters, they wrote the proper name which they wished to denote. The Chinese, whose characters are also ideographic, expressing objects and ideas, not sounds, use a method somewhat similar: the Roman alphabet is a European proper name, but with them each character represents the entire syllable or sound which it expresses in ordinary use. Thus to write Maria or Melia, as they were pronounced, Roman authors would write the letters which mean in their language 'jasper' and stands for ma, the second is the character which expresses profit, and it stands for h, and the third, which means second in rank, stands for s. For a further account of the phonetic hieroglyphics, and the respective merits of Dr. Young and Champollion in discovering them, and the extent and value of the actual discovery, see Champollion and the authorities quoted there. Various hieroglyphics appear to have been used in different instances to express the same letter, a circumstance which increases the difficulty of deciphering the names written phonetically. There are, according to Champollion, sixty-nine different hieroglyphics for the name Zoscekeons of the Nectanebo Temple; of these the phonetic value of 134 one of the Hieroglyphics, and one half of the 134 have only a conjectural value which has not been tried by a sufficient test. Besides this, the arrangement of the signs themselves is very capricious; sometimes two hieroglyphics are placed one above the other, and down, at other times they seem to be thrown mappell together. And then it must be remembered that in many instances we do not know the antient Egyptian name of the object, or the object itself. According to Champollion, the *sacred* kings, have been traced on the monuments of Egypt by means of the phonetic interpretation. Whether the discovery will extend much further is a matter of doubt. We do not know (at least we do not know positively) whether the Egyptians wrote other words phonetically besides proper names, and their language being in great measure lost, it is not very likely that we shall be able to solve the question.

The hieroglyphic sacerdotal character appears to have been a tachygraphy, or abridged form of the hieroglyphic signs, adopted for the sake of convenience and expedition, and used by the priests in their records. The explanation of the epigraphologic, appears to be a further abridgment of the hieratic. The signs, having lost nearly all trace of their original hieroglyphical form, have the appearance of a running alphabetical writing, and are written from right to left. The distinct characters of the enchorial writing appear hardly to exceed forty. Akerblad and Dr. Young have composed alphabets of them (1) of a Roman Egyptian Dictionary, in the antient Enchorial character,' London, 1831, and article 'Hieroglyphics' in the last edition of the 'Encyclopedia Britannica.' Whether the enchorial was used entirely alphabetically is perhaps a question. We are told however by Plato, that Thoth, an Egyptian, invented the alphabet. Perhaps this may refer to the hieroglyphics, or to the enchorial characters which may have been derived from the hieroglyphics themselves. The writer of an article on the enchorial language of Egypt, in No. 5 of the 'Dublin University Review,' contends the hieroglyphics is distinct from that expressed by the hieroglyphics, and that both are different from the Coptic. (See varieties of hieratic and enchorial characters in Hieroglyphics, collected by the Society of the Egyptian Exploration Fund, London, 1832, where, by comparing the enchorial writing found on fragments of earthenware at Elephantine, plates 33, 54, and 55, with the enchorial inscriptions from Sakkara, in the 'Egyptian Antiquities,' plates 74, 75, one observes characters in which the enchoral character dwindled into a running and almost indistinct hand. See Robiano, 'Etudes sur l' Ecriture, les Hieroglyphes, et la Langue de l'EgYPte,' Paris, 1834; and Young, 'Account of some recent discoveries in Hieroglyphical Literature and Egyptian Antiques, Lon-
HIERON I, succeeded his brother Gelon, as tyrant or ruler of Syracuse, 478 B.C. He committed many acts of violence, encouraged spies, and kept a mercenary guard about his person. He was ambitious of extending his dominion, and his attempts proved successful. After the death of Theron, prince of Agrigentum, Hieron defeated his son Thrasymus, who was soon after expelled by his countrymen. Hieron took Naxus and Catana, and having driven away the inhabitants from both towns, he replaced them by Syracusans and Peloponnesian colonists. He changed the name of Catana into that of Rinia, and he himself assumed the name of Athanmus. Having joined his fleet to that of the people of Cumae, he succeeded in clearing the Tyrrhenian sea of the Etruscan and other pirates which infested it. His chariots repeatedly won the prize at the Olympic games, and his success on those occasions formed the theme of some of the odes of Pindar, who was his guest and friend. Aristophanes, Simonides, Bacchylides, and Epicharmus, were all well received at the court of Hieron, who was fond of the society of learned men. Hieron died at Catana, 467 B.C., and was succeeded by his brother Thrasybus, who had all his faults, without any of his good qualities, and was at last driven away by the Syracusans, who restored the government of the Communities. (Diodorus, iv. 49-66.) Athanmus (i.e. Athanmus) gives Hieron credit for a much better character than Diodorus; probably the latter part of his reign, after he had firmly established his authority, was better than the beginning.

HIERON II, son of Hiero I, a wealthy citizen of Syracuse, and a descendant of Gelo, distinguished himself in early youth by his brilliant qualities; and he served with distinction under Pyrrhus in his Sicilian campaign. When Pyrrhus had suddenly abandoned Sicily, the Syracusans found themselves threatened on one side by the Carthaginians, and on the other by the Mamertines, a band of Campanian mercenaries, who had treacherously taken possession of Messana. The Syracusan troops, being in want of a trusty leader, chose Hieron by acclamation, and the senate and citizens, after some demur, ratified the choice, 275 B.C. By marrying the daughter of Leptines, a man of influence among the aristocratic party, he secured their support. Having led the army against the Mamertines, he divided it into two bodies, in the foremost of which he placed the mercenaries in the pay of Syracuse, who had of late shown a mutinous disposition, and ordered them to begin the attack. They did so, but were overpowered by superior numbers; and Hieron, instead of supporting them with his Syracusan soldiers, withdrew, and left them to be slaughtered by the Mamertines. He then recruited his army among his own countrymen, and having deceived the Mamertines, who were waiting for him at the pass of Tauromenion, he marched round the western base of Etna, attacked Tyndaris, Alcina, Tylus, and other towns, before the main body of the enemy could come to their relief, and lastly defeated the main body itself in a pitched battle on the banks of the river Longanus. He was on the point of attacking Messana, when the Carthaginian commander in Sicily, who was then in the island of Lipara, came to offer his mediation, but in fact for the purpose of introducing a Carthaginian garrison into Messana. In this object he succeeded; and Hieron, unwilling to bring on himself the whole might of Carthage, returned to Syracuse, where, through the influence of Leptines, he was proclaimed king, B.C. 270. Shortly after, the Mamertines at Messana quarrelled with the Carthaginians and drove them out of the citadel, upon which the Carthaginians invited Hieron to join his forces to theirs, in order to drive the Mamertines out of Sicily. Hieron crossed to Messana with a fleet, upon which the Mamertines, according to Polybius, B.C. 271, fixed their camp on the other, whilst their squadron guarded the strait. The Mamertines meantime had applied to the Syracusans for assistance, claiming to them as being descended from Mara, called Marmatius in the Ocean language; and Rome eagerly seized this opportunity of obtaining a footing in Sicily. The consul Appius Claudius marched to Rhegium, having contrived to pass the strait in the night, unobserved by the Carthaginian cruisers, he surprised Hieron's camp, routed the soldiers, and obliged Hieron to seek for safety in flight. The consul next attacked the Carthaginian camp with the same success, and this was the beginning of the first Punish war, B.C. 264 or 265. In the following year the Romans took Tauromenium and Catana, and advanced to the walls of Syracuse, when Hieron sued for peace, which he obtained on condition of paying 100 talents of silver and supplying the Roman army with provisions. He punctually fulfilled his engagement, remaining faithful to Rome during the whole of the war, and by his supplies was of great service to the Romans, especially during the long siege of Agrigentum and Lilybæum. Hieron was included in the peace between Rome and Carthage, by which his territories were secured to him, and he remained in friendship with both states. He opposed Carthage and Rome in the war of 218 B.C., was most glorious for Hieron and most prosperous for Syracuse. Commerce and agriculture flourished, and wealth and population increased to an extraordinary degree. Hieron paid particular attention to the administration of finances, and issued wise regulations for the collection of the tithes or tax upon land, which remained in force throughout Sicily long after this time, and are mentioned with praise as the Lex Hieronymi, Cicerone. On the death of Hieron introduced the custom of letting the tax to farm every year by auction. He embellished and strengthened Syracuse, and built large ships, one of which, if we are to trust the account given of it by Athenaeus, (v. 46.), was the largest ever built at Syracuse. He was most extravagant in his expenditures and entertainments.

This ship he sent as a present to Ptolemaus Philadephus. Archimedes lived under Hieron's reign. When the second Punic war broke out, Hieron continued true to his Roman allies and allegiance, and after a long siege was driven by the Romans to Ostia with provisions and other gifts, and a body of light troops to the assistance of Rome. He lived to see the battle of Cannae, after which his own son Gelo embraced the part of the Carthaginians. Gelo being killed, died, not without suspicion of violence, and Hieron himself, being past 90 years of age, died shortly after, 216 B.C., leaving the crown to his grandson Hieronymus. With Hieron the prosperity and independence of Sicily may be said to have expired. (Livy, xxii. and xxiii.; Polybius, vii.)
to forsake the Roman alliance for that of Carthage, and
messengers for that purpose were sent to Hannibal in Italy,
and also to the senate of Carthage, which gladly agreed to
an alliance with Syracuse, in order to effect a diversion
against the Romans. The Proconsul Claudius, who governed
that part of Sicily which the Romans had taken from
the Carthaginians, sent messengers to Hieronymus to ex-
hort him not to forget the old friendship existing between Rome and
Syracuse. The messengers were received con-
temptuously, and the young king ancerely asked them
for some details concerning the battle of Cannae, which
had occurred not long before. War being at last declared
by Rome, Hieronymus took the field with 15,000 men;
but a conspiracy among his own subjects caused him
to be murdered, a reign of only thirteen months. On this
news a popular insurrection took place at Syracuse, the
daughters and grand-daughters of Hieron were murdered,
some by the populace. The messengers were received con-
temptuously by the magistrates of the city, and the people were
provoke by factions and by the mercenaries in their pay, and revolu-
tion succeeded revolution until two adventurers of Syr-
cusan extraction, but natives of Carthage, who had been
surnamed the 'Emissaries,' were sent to Carthage to
keep up the measure of the Carthaginian
party in Syracuse, became possessed of the chief power, and
so provoked the Roman Consul Marcellus, that he laid
siege to Syracuse.

HIERONYMUS, a native of Carthage, or Carthalia, a
town in the Chersonese of Thrace, lived in the times of
the immediate successors of Alexander. He wrote a work
entitled 'Historical Memoirs' concerning the successors
of Alexander, and the wars which followed the death of that
conqueror, which is mentioned by Suidas, and also
by Dionysius of Halicarnassus in the preface to his
history. The work of Hieronymus is unfortunately lost.
Dio Cassius appears to have made mention of it in several parts
of his work. Gerard Vossius (De Historiis Graecis, b. 6,
ch. x.) distinguishes Hieronymus of Carthage both from
Hieronymus of Rhodes, a disciple of Aristotle, and from
Hieronymus the Egyptian, who was governor of Syria
under Antiochus Soter, and who wrote a history of Pto-
mecia, quoted by Josephus, Antiqu. Jud., b. 1. (See also
Recherches sur la Vie et les Ouvrages de Jérôme de Carde
by l'Abbé Serre, in the Mémoires de l'Académie des Inscrip-
tions et Belles-Lettres, vol. xiii.)

HIGDEN, RANULPH, or RALPH, author of
the Polychronicon, was a Benedictine monk at St.
Werbich's monastery in Chester, where he died at a
great age, after having lived in the convent sixty-four years;
according to Bale, in 1367; according to Pits, in 1373.
D diblin, in his edition of Herbert's 'Ames,' and Chalmers, in
his Biographical Dictionary, say Higden died about 1360.
Gale published a portion of his edition of Higden's original work in the
translation of the 'Polychronicon' was printed by Caxton
in folio, in 1491, in seven books, to which Caxton added an
catalogue. The Chaucer Mysteries, exhibited in that city in
1328, at the expense of the several trading corporations,
were ascribed to Higden. That a monk of the name of
Randle, or Ranulph, contemporary with Higden, had
some connexion with the number, is not so
far from the fact that Higden was himself the person. (See
Tanner, Bibl. Brit. Hist., p. 403; Pref. to Markland's Chester
Mysteries.)

HIGGINS, or HIGINS, JOHN, was born about 1544,
according to the author of a note in a late edition of The
Mirror for Magistrates. He was educated at Oxford, but
whether he took a degree is uncertain. He was one of the
contestants for the bishopric of Lincoln, to which the
Paris University had appointed him, to the great regret of
the nation. He was the author of a book on the same subject, mentioned, to which he
supplied forty legends, relating mostly to the mythical
history of England. In one of the 'envoys' he tells us that
he did not 'take the pain to learn the tongues and write'

until he was twenty; that French and Latin were his chief
studies, and that he published his part of the 'Mirror for
Magistrates' when thirty. One stanza from the introduc-
tion will give a fair specimen of his manner, and at the
same time supply incidence on the nature of the poem. He
tells us that he bought the book to which he was then
employed in making additions, and goes on to enumerate
those who were celebrated therein:

---Some peers were kings of high estate,
And some were dukes as great a state;
Some princes, lords, and judges great, that are
In this book, till, discovering we drew
Some other, knightly, that vies did endure;
Some prelates, some poor rascal high;
Yet every one had played their part well.

The 'Mirror for Magistrates' went through many editions
from its first appearance as Lidgate's 'Fall of Princes' to
its latest shape in the impression of 1610. Its importance
has, we think, been little seen; but the very evident appli-
ation of many of the stories (such as, for instance, as
James I. of Scotland) must have had its effect in the six-
teenth and seventeenth centuries. (Wood's Ath. Oec.
Mirror for Magistrates, edition of 1812.)

HIGGINS, JOHN.

HIGHWAY. [Way.]

HILARION, SAINT, the founder of monastic institu-
tions in Palestine, was born at Tabatha, near Gaza, about
the year 291. He was a sinner, who, being hardened in his early age
to Alexandria to pursue his studies, where he
made great progress in philosophy and literature. Having
been converted to the Christian religion, he resolved, in
imitation of Anthony, to live in the deserts of Egypt, with whom he
had been brought up, to live in the deserts of Egypt, to retire from the
world. Accordingly, on his return to Palestine, he divided among his
relatives the property which his parents had left him, and
retreated at the age of fifteen to the desert country south of Gaza.
After dwelling in this place for about two years, during which time he
practised the greatest austerities, his reputation for sanctity became so great, that numbers
of people resorted to him in order to be cured of their
diseases. According to the tradition of the Church, Hilarian
promised to Mary Magdalene, and to some other
saints, and 'was so full of the power of the Holy Ghost
as to be able to discover from the smell of the clothes of the
and clothes of men, or of anything else they had but touched, the
soil of any disease or sin.' Hilarian afterwards went to Egypt, and
successively visited Sicily, Dalmatia, and Cyprus, where he died
about the year 371. We are informed by Jerome, that 'by
the influence of Hilarian's example innumerable monas-
teries began to be founded throughout all Palestine.

The life of Hilarian has been written by Jerome, and is
printed in vol. iv., part ii., pp. 74-90, of the Benedictine
edition of Jerome's works.

HILARIUS, a native of Sardina, was made deacon
of Rome about A.D. 354. He is frequently mentioned
by Jerome (Adv. Lucif. c.) as a rigid Luciferian, a sect which
served its name from Lucifer, bishop of Cagliaria, in Sar-
dina, who separated from the Church on account of the
absolution that had been granted to those Catholics who
had become Arians during the reign of Constantius.
Hilarius wrote several works in favour of the opinions
of Lucifer; in which he maintained, among other things, that
Arians and all other heretics ought to be baptized again
when they were converted to the orthodox faith.

Hilarius is generally supposed to have been the author of
a Commentary on the Thirteenth of St. Paul's Epistles, which
is usually printed with the works of St. Ambrose; and also,
though this is more doubtful, of 'Questions in Vetus et
Novum Testamentum,' usually joined with St. Augustine's
works. The Latin dictionary editors often express their
skepticism as to whether the MSS. of the Commentary on St. Paul's Epistles
differ considerably, and that in some parts there appear to be
interpolations of long passages. This commentary is
full of errors, and is not clear, plain, and literal, and to give
the meaning of the text of St. Paul is not enough: but it
gives very different explanations from St. Augustine
in those places which concern predestination, prophecy,
grace, and similar subjects.

(Lardner's Credibility, Works, vol. iv., p. 381-385; Du
Trans.)

HILARIUS, SAINT, was born at Poitiers, of which
place he was afterwards made bishop about A.D. 354. He is
distinguished in ecclesiastical history by the active part which
H I L

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took against the Arians during the reign of Constantius. He was exiled for six years and shortly after this he had been elected bishop of Poitiers, on account of his defence of Athanasius, in the council of Béziers, against Saturninus, bishop of Arles. In the East he continued his exertions in favour of the Catholic faith. In 355 he attended the council of Seleucia in Iaussia, which had been summoned by order of Constantius, and boldly defended the doctrine of the Trinity against the Arian bishops, who formed the majority of the council. He afterwards attended the council of the emperor's court, and presented a petition to Constantius, in which he desired permission to dispute publicly with the Arians in the emperor's presence. In order to get rid of so formidable an adversary, the emperor bribed the Arians to arrange a plot to send him away from the court. But previous to his departure, Hilarius wrote an invective against Constantius, in which he denounced him as Anti-Christ, and described him as a person who had only professed Christianity in order that he might deny Christ. After the Catholic bishops had recovered their liberty under Julian, Hilarius assembled several councils in Gaul for the re-establishment of the Catholic faith and the condemnation of Arian bishops. He also travelled into Italy for the same purpose, and used every exertion to purify the churches of that country from all Arian heresies. When Auxentius was appointed bishop of Aquileia, Hilarius, as the bishop of Aquileia, in 361, Hilarius presented a petition to the emperor, in which he denounced Auxentius as a heretic. Though this charge was denied by Auxentius, Hilarius still continued his attacks, and the bishop was obliged to remove to another city, where he was eventually deposed. In 367, Hilarius died at Rome, a.d. 467, and was succeeded by Simplicius.

HILDEBURGHAUSEN. [Saxe Meiningen.]

HILDESDHEIM, a principality in the kingdom of Hannover, formerly part of the province of Saxony, lies between 51° 44' and 52° 20' N. lat., and is bounded on the north by Calenberg and Luneburg, on the east by Brunswick, on the south by Goettingen and Brunswick, and on the west by Calenberg. Its Capital, Hildesheim, is 8 miles, and its population, which in 1812 was 128,936, is now 155,014 of whom 30,000 are Roman Catholics, 167 Calvinists, and 1000 Jews; the remainder are Lutherans. The town is about 50 miles south of Braunschweig, and 10 miles east of Harz. The soil is stony and not generally fertile. In the centre and north the surface is undulating, and the soil rich and fertile. The principal rivers are the Innerste, Leine, Oker, Eckert, and FUSE. The climate is healthy. The agricultural products are corn, garden vegetables, fruit, flax, hops, and timber: the mineral products are iron, coal, and salt. The trade is very considerable. The exports consist of the natural products, and of some manufactures, chiefly linen, which is the principal manufacture of the principality. The exports amount to about four million of dollars annually; the imports to three millions.

Hildesheim was formerly a bishopric, founded in 822 by Lewis the Pious. The diocese was several times converted into a bishopric; but in 1519 the bishop engaging in an unsuccessful contest with the duke of Brunswick was placed under the ban of the empire, and stripped of a great part of his territories; and it was not till 1647 that a considerable portion of them was restored. As all the towns and most of the nobles had embraced the Protestant religion, and the bishopric remained Roman Catholic, the religious liberty of the subjects was guaranteed by several compacts. After the treaty of Luneville, the king of Prussia took possession of Hildesheim and Goslar in 1805, giving a pension to the bishop. In 1807 the principality was incorporated with the kingdom of Westphalia, and in 1813, by a convention with Prussia, was annexed to Hannover, to which it was confirmed by the congress of Vienna, 1815. The principality has 660 schools, in which 45,211 children are educated.

HILDESDHEIM, the capital of the principality, situated in 52° 30' 3" N. lat. and 9° 55' 38" E. long., is a place of considerable extent, and, like most of the ancient German cities, very irregularly built. It is situated on the east side of the new town. There are seven gates; but the ancient race-ways have been levelled and converted into public walks. The city is situated at the foot of the Gailberg, near the Innere, in which river there is a beautiful island converted into gardens. The area is inhabited by both Lutherans; but many, with the bishop, are Roman Catholics. The principal public buildings and institutions are: a palace, 4 Roman Catholic and 8 Lutheran churches, 12 Roman Catholic and 8 Protestant hospitals, 3 orphan houses, a convent (7 others have been secularized), a synagogue, a
Roman Catholic and a Protestant consistory, a Lutheran gymnasium, with a good library, schools of industry, and an admirably-regulated poorhouse, where nearly 600 children receive gratuitous education, beggars are employed, the sick nursed, &c. The cathedral, founded in 818 by Louis the Pious, has 10 altars, very fine paintings on glass, magnificent iron doors covered with bas-reliefs, and numerous antiquities, among which is the celebrated pillar, erroneously called the bacchante, a hollow cylindrical pillar of greenish marble sixteen feet high, which now bears an image of the Virgin Mary.

HILL, AARON, was born at Beaumont Buildings, in the Strand, London. Having been deprived of an extensive family estate by his father’s imprudence, was left dependent on his mother and grandmother. He was educated at Westminster school, and in his sixteenth year went to Constantinople with the design of visiting the English ambassadour, Lord Paget, who was a relation of his mother’s. The nobleman received him kindly, and provided him with a tutor, with whom he travelled through a great part of the East. Having subsequently lost his kinsman’s favour, he was engaged by Sir William Wentworth, of Yorkshire, as his travelling companion through Europe. On his return he wrote in 1789 a History of the Ottoman Empire, compiled from materials collected at the Turkish court, and about the same time was made ‘mater’ of Drury Lane Theatre. At this time he wrote his first tragedy of Elfrida. He started several commercial projects with indifferent success, and in 1788 he swore in Egypt, where he devoted himself to study. Here he translated Voltaire’s tragedy of Merope, and lived just long enough to see it produced. He died in 1748-50.

Aaron Hill wrote five plays, of which only two are generally remembered, Alzira and Zara, both of which are adaptations from Voltaire. The English national feeling is so entirely averse to tragedies on the French model, that although such attempts may obtain a transient reputation, a more serious and circumspect treatment, when they are once forgotten, of their ever being recalled from oblivion.

HILL, SIR JOHN, was born about 1716, and began life in the practice of a law. He was appointed to an apothecary in London, in which capacity he gained that knowledge of botany which is his only claim to honourable notice: though being possessed of lively parts, industry, and impudence, he managed to obtain in his lifetime no little notoriety. He pushed his way into fashionable life; published a fashionable and scandalous newspaper called the ‘Inspector’; made, puffed, and sold quack medicines; and yet found time to compose a great number of works, many very laudable, privately and pellonally on botanical subjects. He was very desirous to obtain admission into the Royal Society; but being rejected, on account of his equivocal character, he published in revenge a History of the Royal Society, 4to, 1751. He ridiculed of that body, which sealed his exclusion from ever. No doubt subjects enough for satire might be found in their voluminous Transactions; but the Review is said to have shown as much unfairness as ingeniosity, and not little of both. Hill obtained a Scotch diploma of medicine, and assumed the title of Sir John in virtue of a Swedish order of knighthood presented to him by the king of Sweden in exchange for a present of his botanical publications. He died in 1772. Of the following are some of his most considerable works:—History of the Materia Medica, 4to, 1751; General Natural History, 1748-53, 3 vols. fol.; British Herbal, 1756, fol.; Vegetable Synonym, fol., a magnificent book, containing 1600 plates, published at 38 guineas plain, and 160 coloured; Constitution of Timber from its Early Growth, fol., 1770, a work highly praised by Haller. (Watt, Bibl. Botan. Brit. and Foreign Account of the Life, 9th, of Sir J. Hill, Edinb., 1779.)

HILLAH. [BABYLON.]

HILDE, one of the most celebrated of the Jewish Rabbis, and the founder of the Babylonian school, but his father belonged to the tribe of Benjamin. His birth is placed by Bartoloce (Bibloth. Rabbin., vol. ii., p. 784) in A.M. 3648 (a.c. 112), which agrees with the account of Jerome, who says that he lived shortly before the birth of Christ. He was a learned and eloquent orator, and was surnamed the Orator of the Synagogue. At the age of forty he came to Jerusalem, where he applied himself to the study of the law, and became so eminent for his sanctity and knowledge that he was ap-
leys of the Indus and Sutlej forms towards the table-land of Tibet, so far as is known, one uninterrupted range; its northern portion, which encloses the valley of Cashmire on the north-east, is called by the natives of that country Tibet, the southern, between the upper course of the Chinab and the Sehore, bears the name of the Parashar Mountains. At the point of junction of these two ranges (between 33° 30' and 34° 40' N. lat.) are its highest summits, the Mer and Ser, which rise considerably above the snow-covered plateau from which they are determined. From this elevated range, the mountain-region spreads south-west about 80 miles, and is formed of several ranges parallel to the principal range, but at unequal distances from each other. In the middle of these, the ranges enclosed by them are of different widths. Though the ranges themselves are not covered with snow in all their extent, they contain several summits which rise far above the snow-line. These ranges are not continuous, but several breaks of considerable extent occur between them. The valleys which lie between the ranges are probably between 5000 and 7000 feet above the sea. The best known is the valley of Cashmire, which is nearly enclosed by snow-covered mountains, on the north-east by the Tibet Panjahl range, and on the south-west by the Peer Panjahl Mountains.

Twelve mountain-passes connect the valley of Cashmire with the adjacent countries, among which the four following are the principal: - 1. The Pass on the Tibet Panjahl range (near 34° 20' N. lat.) to Leh, or Ladak, on the table-land of Tibet; 2. The Sagam Pass, from Lhasam in Cashmire to Kashmaw and Junmli on the Chinab. 3. The road from the principial range of Tibet to the Peer Panjahl range by Cahanor to Prunch; and 4. The Barramulla Pass, running along the course of the river Jhelum to Muzfarabad and Attock. The passes which traverse the Panjahl range, the highest and most difficult of the whole, which offer the most favourable specimen. [Cashmire.]

The whole of this part of the range is now subject to Mahara Sau Sing, the raja of Lahore.

We pass the central part of Tibet Panjahl range, and on the south-west by the Peer Panjahl Mountains. We have a great deal of the mineral wealth of this range, excepting its most western extremity, where the effects of the Gosseie Mountains approach the Indus south of Attock, extensive layers of rock-salt occur, which are worked to a great extent. As to the natural riches of this portion of the Himalayas, Cashmire may perhaps be considered as offering the most favourable specimen. [Cashmire.]

The road we are now following is the most direct road to the valley of the Upper Chinab, and is practically the only road to the upper branches of the Upper Chinab, which lies nearly to the middle of the mountain-region. These masses, which are of great extent and elevation, contain between them only a few transverse narrow valleys, which, when compared with the height and extent of the surrounding mountains, may appear wasted to us. Such extensive mountain-masses are the Moriri-kas-kanda Mountains between the valley of the Sutlej and the upper branches of the Junma, which exhibit numerous peaks rising to between 16,000 and 20,000 feet above the sea; the Mandjiri Mountains, with their extensive snow-field, between the Supin, a tributary of the Junma, and the last mentioned river; the Uncha-kas-Dunda Mountains between the Junma and the Bhagrathee, the principal branches of the Junma; the Mianzil-Masses of Jaunli and of the Panch-Kedar, which with their extensive snow-fields and numerous peaks, several of which rise to more than 20,000 feet, fill up the country between the two principal branches of the Junma; and lastly, the Akhananda between the last mentioned river and the upper branches of the Kali and Gogra, the most southern elevated mass, is called the Tri Sula Mountains. It is overtopped by the Junma and its tributaries, rising to between 20,000 and 21,000 feet, and contiguous to it on the north is the grand mass of the Jawahtir, which in its most elevated summit rises to 24,236 feet, and is surrounded by other peaks not much inferior. To the east of the upper branches of the Gogra River lies an extensive mountain-region, called Malabum, of which we hardly know anything else than that it is covered with very high mountains and partly with snow. It extends the Dhashwarohgi range, the highest mountain-masses in the whole region, which occupies the space between 28° 30' and 22° N. lat, and 83° and 84° E. long, and is traversed by the Gandaki Ganga or Gan-duc. Its highest summit, called Ghosa Cote, attains an elevation of 28,000 feet above the sea, and is the highest known land on the surface of the globe. Contiguous to the Dhashwarohgi Mountains on the east is the great mass of the Dhangang Mountains, whose highest pinnacle rises to 24,560 feet. These extensive masses fill up the space between the Gandaki Ganga and the Bori Gadaki, and terminate north-west of Khatmandu on the banks of that river. The space between the Bori Gankali and the Arun, a large affluent of the Gogra, is occupied by the Khova range, which contains two summits exceeding 24,000 feet in height, and many others nearly as high. The elevation and extent of the Arun river and the boundary of Botan are imperfectly known. The enormous mountain-masses are separated from one another by long but very narrow valleys, which descend to wards the south and south-west with rather steep slopes, especially in their higher parts. During the summer the upper valleys are covered with a vigorous vegetation, and are used by the inhabitants of the lower valleys as pasture-ground; but during the greater part of the year they are buried in snow, and uninhabited. The few roads by which the plain of the Ganges communicates with the countries on the table-land of Tibet. The most northern of these roads follows the valley of the Sutlej. At Pauri, which is situated on the road from the Kangra-kas-kanda Mountains, the road is 6160 feet above the sea-level; and at Shipkee, where it issues on the table-land, it is 10,484 feet. North of the Moral-kas-kanda Mountains the road between the Kali and the Gogra is 11,400 feet above the sea-level; and the Charang Ghaust leads over it from the valley of the Buspa to that of the Todang Ghaz; this pass attains the height of 17,400 feet above the sea. Out of the several branches of the upper Gogra, its upper branches, the Jamerree river, the Gangstang Ghaust leads from Nillong to Chapprung, which is built on the banks of the upper Sutlej. It attains only the height of 10,150 feet, and is practicable for horses. The Mannah Ghaust leads from the Viahari Gogra to Nangan, on the Upper Akhananda, to Chapprung, and rises to 18,080 feet. The road from the valley of theDouli, an affluent of the Akhananda, leads to Dampo, on the banks of the upper Sutlej over the Nangan, and rises to 16,630 feet. The Oola Dhooorah Ghaust (30° 35' N. lat.) rises to 17,720 feet, and contains the road which connects the valley of the Gori, an affluent of the Kali, with Dampo. This seems to be the most frequented of all the roads. Through the Bhotiya Mountains, as far as they are within the British dominions. The Neo Dhooorah Ghaust, whose elevation has not been determined, is traversed by the road which leads from the table-land of the upper Gogra across the Suckh and the lakes of Nhrwan Hrad and Mans Sarower: it is only frequented by Hindu pilgrims. The Takhal Ghaust, which attains an elevation of 17,000 feet, is traversed by the road which leads from the valley of the Dangu to the Takhal, an affluent of the Gogra, with Takhal, a post built 16,700 feet above the sea, near the sources of the Gogra, and on the table-land of Tibet. From Takhal the road runs through another mountain-pass to the sacred lakes. We have only a very imperfect knowledge of the passes by which a communication is maintained between Nepal and Tibet. From the Alpine province of Kehnub to the Gandra Ganga over Mastung, where it attains a height of 8000 feet, and is 5410 feet above the sea, at the village of Sampoo. The road by which the Chinese army in 1792 inhaled Nepal, begins on the side of Tibet at Kheru, attains its highest level at Sapi, and thence descends to Dhiyakub, Noyak, and Khatmandu. It seems to offer advantages to the other roads. Another road leads from Khatmandu along the Bhootiya Coose to Cuti, and thence over the Langu Pass to Tingri, on the table-land. Further the road leads from Sikim to Tarkin and then to Tibet; a part of this road runs through the territories of the raja of Botan. Nearly all these passes are too steep and high for any beasts of burden, except sheep, which in the Himalaya mountains are used for the transport of merchandise. The high mountain-masses advance so far from the prin-
cipal range into the interior of the mountain-region, as to occupy more than one-third of it, when they descend with a rapid declivity. The other two-thirds of it are of a very different level. The depth of this lower portion may be between 4000 and 5000 feet above the sea. Almorah, the capital of Kumaon, on the river Kosia, and only 15 miles in a straight line from the lower edge of the mountain-region, is on 2500 feet above the sea. On the valley, which is drained by the Bhagirathi and Alakananda, the two principal branches of the Ganges, sink considerably below this level; Tiri, on the Bhagirathi, being 2170 feet, and on the Alakananda, 1860 feet above the sea. Though the surface of this portion of the mountain-region is extremely uneven, and consists of

The eastern portion of the Himalaya range, extending from the western boundary of Botan to the very source of the Brahmaputra river, is almost entirely unknown. We are only able to describe the general character of the road which leads from the plain of the Ganges through Tassaudon, the capital of Botan, to the table-land of Tibet. [Botan.] Further east the range has never been visited by Europeans. When seen from the valley of Assam, does not appear any higher, more extensive, or of a greater space, and several of the summits attain the snow-line. The Chur-Peak (30° 50' N. lat., and 77° 30' E. long.), which is hardly 20 miles from the lower edge of the mountain-range, is 11,600 feet above the sea level. The difference in level between the two places which the great unevenness of this tract presents to an easy communication between the inhabited places, explains the circumstance of there being in a great number of sovreignates villages frequently only a stone's throw.

The mineral wealth of that portion which belongs to the British, or under their protection, is unknown; but Nepaul contains, according to Sir Francis Hamilton, rich minerals of a high grade, and the whole country along the banks of the Gangesresents a mountainous and is sulphur.

In such a mountainous country the climate must of course vary extremely. We shall confine ourselves on this point to observing that the snow-line rises much higher on the north-eastern than on the south-western declivity: on the former it occurs at about 16,600 feet, and on the latter at 12,500 feet above the sea-level. It follows that the vegetation also must be different at the same elevation on the two sides. [Assam. II., p. 467.] The portion of the Himalaya range which the Sutlej and Botan is partly immediately subject to the British, or under their protection, and partly subject to the independent raja of Nepaul. The British dominions comprehend the Sutlej, and about half the country of the Sutlej and Botan, and Kaliguragoverned by rajas under British protection, and the other half constitutes the British province of Kumaon. The mountainous country along the banks of the Sutlej river is occupied by thirty-two petty rajahs, among whom the raja of Indus, who resides at Ramgar, and the raja of Bhulaur, who resides at Bulaspur, on the Sutlej, are the most powerful. But the territories of these rajahs do not extend to the table-land of Tibet. The higher mountain-region is possessed by the raja of Bisahasah, whose territories extend along both sides of the Sutlej river and beyond the Kailas mountains, over a mountainous tract which ought to be considered as a part of the table-land of Tibet, and approach the town of Shipke on the Sutlej. He resides in Ramgar, on the Sutlej. The raja of Sirmur governs the countries situated in the middle of the lower region west of the Jumna river. His residence is at Nahun, a town built not far from the edge of the mountains towards the plain extending between the Ganges and Indus. The territories of these princes occupy about half of the countries which are under British protection; the other half belongs to the raja of Gurval, whose territories stretch over the whole breadth of the Himalaya range, comprehending all that is on the Bhagirathi, and by the upper course of the Jumna, and as far north as the town of Tiri, on the banks of the Bhagirathi; but the most important place is Dhera, a large town not far from the lower edge of the mountain-region, in a low and warm valley. North of this place, on the mountains of

The word Himalaya is a Sanscrit word, compound of hima, 'snow, ice, or ice-clad mountain,' and alaya, 'abode.' (Wilson's Sanscrit Dict.) The resemblance of the first part of the compound to the name of the Hamsu (Balkun), to the Greek chelema (ψιθα), and the Latin hima, is obvious. The Greek and Roman geographers supposed this enormous mountain-range under the general name of Imaus or Emous, though their limited geographical knowledge does not allow us to assume that their term Imaus comprehended the Himalaya. It was known to Pliny that the word 'Imaus,' signified, 'in the language of the natives, snow' (vi., c. 17).

These mountains have their south-west or Indian base clothed with a dense and almost impenetrable jungle, which separates them from the plains of India. This belt diminishes in breadth as we proceed northwards, until it altogether disappears to the north of the Jumna, where, in the country of the Sikhs, cultivation is carried on close to the foot of the mountains. From the proximity of water to the surface of the soil, this tract of country is usually called the Tarai, or Wet-land, and is divided into the Jumna and Jumna rivers, Khardi-lands. The moisture is maintained by the want of free evaporation from the surface of the soil, and is increased by the great quantities of watery fluid transpired by the magnificent leaves of this dense forest; its dispersion being prevented by the want of free ventilation. With this uniformity of moisture we have also greater equability of temperature than in the open plains; for as less solar heat is absorbed during the day, so less heat is less free during the night under this unmagorous covering, as is the case in the open plains in cloudy weather. Accordingly we have the characteristics of tropical climate, and wish it tropical or Indian vegetation, which these plains resemble more than anything else, emphatically called by Bishop Heber the belt of death, than in the open plains, where great heats alternate with great cold. In the south-east parts, as in Siilhet, Chittagong, and Lower Assam, the forests are composed of gigantic trees, with
extensive climbers reaching to their tops, epiphytes covering the branches, and many orchids, both epiphytic and epilithic, as well as the elephants, which are found there of the finest description. The trees are composed of Artocarpus, Treb- 

hinites, Euphorbiaceae, arboreous Leguminosae and 

Mallacca, Coniferopsida, Eucalyptus, Anacardiaceae, On 

cichory, Rutaceae, &c. Ficus elasticus, the Caoutcho- 

cree, occurs in great abundance and of gigantic size, 

as well as the Teeswee, or Varnish-tree, of the 

Burmese (Melanoarthrosanita of Dr. Wallach). The figs 

may not vary 1/2 of a foot in diameter, and even the 

form the climbers, with species of Cathartocarpus, Eryth- 

rina, Butea, Bombax, Hibiscus, and Coccolobupera Cos- 

sypium, with large and showy flowers. Here splendid 

trees, many of them running 80 feet in height, are planted 

with the plantain and peppers. Great uniformity extends 

along the whole of this tract, as many of the species of 

southern parts are found in the northern as far as 30°, as 

the Dipterocarpe, Shorea robusta, Elaeocarpe, Disopy- 

rugina, Lanneaa, Cinnamomum alibiflorum, Piperaceae, 

Piper longum; a dwarfish Phomix, P. humilis, and a 

trailing Calamus, represent the Palms.

In the tract of forest between the Ganges and Jumna there 

are found many species which occur also beyond the limits 

of India, as Cassia elata, at the mouth of the Irrawady, in 

the Birman empire, Madras begoniafia in Java, and Deo- 

рине, in the Moluccas, and the north, parts Nerium odorum, or Oleander, is found along the 

banks of riviulets, as it is on those of watercourses in 

the north of Africa.

In this tropic-like forest the elephant reaches his most 

northern home, on the banks of the Jumna, where a 

Paradoxurus is common: the rhinoceros does not extend 

beyond the eastern bank of the Ganges. Many tropical 

birds travel even farther north in the rainy season. A huge 

Pycnonotus of Java has filled all the trees of the north. 

Most of the insects also are those of hot and 

most climates: Papilio Parakite, found by Dr. Horsfield 

in Java, is also common at the foot of the hills in 

30° N. lat. The climate is such that we ascend the 

mountains, so is the disappearance of tropical forms in the 

Himalayas; and we continue for some time to meet with 

plants like Nyctanthes arbore tristis, which are common 

in the plains of India. But Indian trees and shrubs soon 

disappear. On reaching the region of Rhododendron 

arbutum and Quercus lanata, at about 5000 feet, scarcely any 

but European forms are visible. But as a few species of 

tropical genera travel into northern latitudes, so we find 

some very rare forms of plants from America, as we ascend 

at 6000 and 7000 feet of elevation, in 30° N. lat., as a 

few laurels and some AcerPtaceae, with species of Loranthus, 

even on an oak. But annuals which require only a few 

months for their development, are at their highest specif- 

es the season, and not that of the year. Thus many 

tropical plants may be cultivated in the summer of 

European countries, and European plants and cultivation 

can be seen in the islands of India, as in the month of 

March, or in what is the winter, as of more northern 

latitudes. In the same way we may see annuals char- 

acteristic of Indian or tropical vegetation at a much higher 

elevation in the Himalayas in the summer months than 

appears compatible with the prevalence of snow and great 

cold in winter. This anomaly presents itself at much 
greater elevations than would be expected, or indeed possi- 

ble, it is not that the whole of the surface of the 

Himalayas is under the influence of the tropical rains, dur- 

ing which they are inundated like the plains, and at the 

same time enveloped in clouds. The air, as it rises from 

the heated plains loaded with moisture, deposits it on 

reaching the point of saturation in the mountains. Hence 

continual the moisture is preserved, and also equable tempera- 

ture; for the cloudy covering prevents much absorption of heat during day, 

as it does radiation during night. The cooling besides of 

a ridge in our ascent is as great as in the lowest atmosphere by which it is surrounded. Hence we observe 

but little change in the thermometer from night to morning, 

or from day to day, or week to week, and the temperature 

does not vary 1/2 of a Fahr. for months, from the middle of June to the end of September. During this 

season therefore we see many plants in luxuriant growth which could not exist here for even a single day if 

either the moisture were less or the cold greater, as bal- 

sams, Begonias, some Melastomaceae, numerous Cyrtandra- 

ceae, tropical Orchidaceae and Scitamineae. The branches 

of these trees become the bases and forms, as well as 

epiphytes, such as Dendrobiom sphegodes and Cattleya 

cox; even Thalictrum radium and Arum viviparum are 

found on trees at this season of the year. A small bamboo 

may be seen at 5000 and 10,000 feet, as well as Roscoea alpina at the upper height, well protected by the earth and the covering of snow during winter.

It is in those months that rice is cultivated in these 

mountains, as well as other tropical grain, whose growth is a 

species of arum, which is one of the principal articles of the 

chiefly vegetable diet of the hill-people.

The climate however of these mountains at about 7000 

and 8000 feet of elevation is very healthy and salutary 

however, and a less range of the thermometer, or from 

about 25° to 80°, supports a European-like vegetation, as 

has already been mentioned in Asia, Botany of Himalayan 

Flora, to which the reader is referred. Kaur and however of 

all the species being Indian, but of European forms, 

as there are several instances in the families of Crucev-bean and Labiate plants, 

also among the Composite and Leguminosae. We shall 

mention as instances, Ranunculus arvensis, common thyme, 

marjoram, and some of the mints; shepherd's purse, 

Rumex sterilis, Prateland, and Turta vulgaris, and the widely diffused Salvia valeriana, though now mixt with the growth in the 

Himalayas. This identity of species is not confined to herbaceous plants, as 

we have the yew and the walnut, with the ivy and Rubus 

fruticosus. The apricot and pomegranate may be supposed 

to have been introduced, but the wild fig tree, and the 

Pyrus baccata is a small Siberian tree found also in 

these mountains. Several of the Caucasian genera are also met 

with; and there is great similarity between the vegetation 

of the Hindustan and the Himalayas in general, and 

probably also in species.

It is curious to find among the above many which have 

hitherto been thought the peculiar genera of China 

and Japan, are also met with in the Himalayas in 

summer. Hence the species of Rinaria, Epimedium, 

mellins. Thee 'tis now has been found in Upper Asam, 

but probably escaped from cultivated places; even some 

of the same species occurs in the Himalayas and these countries; 

as Cleopatra ochres, Hovenia dulcis, Kaur and Lonicer 

Japonica, Houttuynia cordata, Ophiopogon spicatus, 

Paranthus chinensis, and many others. Hence inferences 

were drawn that many parts of these mountains were fitted 

for the cultivation of the tea, long before it was known 

that it already was there. Thus it is interesting to find 

here some North American genera and species; 

as Triostemum, Osmorhiza, and Phryma; and even identical 

species, as O brevifolia and P. leptostachya, with Des 

caries. A species allied to the Chinese G. P. chinensis 

and American G. Quinquefolium, which Dr. Wallach has named P. pseudo-Ginseng.

The vegetation of the upper belt has also been noticed 

by Mr. Hooker, in vol. ii., p. 7271, as well within as beyond the limit of forest. Here the climate bears some resemblance to that of polar 

regions in the same season, as the peaks are covered with 

snow for nine months in the year, which only melts when 

the sun has great power and the light is bright in the 

aridated atmosphere of these elevated regions. Junipers, 

dwarf-willoas, and Rhododendrons, with Andromeda fasti- 

giata, closely allied to the Siberian A. tetragona, reach the 

highest limits. Along with showy Primulas may be seen 

plants which are very similar to those of Arctic regions, as 

Ranunculus polygalus to the Siberian R. glacialis of 

Fischt; a species of saxifrage, St. stenophyla, hardly to 

be distinguished from S. polinifera, brought from Melville 

Island. This similarity in form to the plants in the 

very distant regions is not however confined to genera containing 

numerous species, but is observable in others where two 

three only constitute the genus, and of which one is found 

in these mountains, and the other in Melville Island and Kamchatka, and Dalibarda in North America and the Straits of Magalhaens, where many of 

the same genera are found as on those lofty peaks. The genera 

Dactyri, Gymnandra, Wulfersia, Diaphanum, Coriaria, and 

Staphylea, afford other instances, though some are found at 

a lower elevation. Ourisia is found in these mountains 

as well as in Van Diemen's Land and the Straits of 

Magalhaens.

The snowy passes exhibit many of the phenomena cha-
racterizing these lofty peaks. The resemblance in form however is not confined to the vegetable kingdom. The Himalayan fox can scarcely be distinguished from the European species. Many birds are identical in species with those found in Europe: the woodcock may be adduced as an instance. Many insects also do not differ from those found in Europe. At still greater elevations the Altai hare, or Lagomys, is found, which hardly differs from the Siberian Pika. A joy (Gaurula bispecularis) is of an American form, as is the genus Pausans among insects, which, used to live in the Himalayas. The 12 o'clock, sheep and goat are both used as beasts of burden, and the dog is of large size, and, like the others, furnished with fine wool under the upper shaggy hair. The Bhalur (Asiatie Argali), the yak and the Himalayan rhinoceros, are all found here, and obtain nourishing food from the grasses of European genera, and the Leguminous Astragalus and Caragana. Among birds, Gypustus barbarus and the chough, or red-legged crow, are common, with three species of pheasants, and the Chukor, which is most frequently seen on the mountain tops. (Dr. Royle's Illustrations of the Botany and other branches of the Natural History of the Himalayan Mountains.)

HIMANTOPUS, the generic name for the Long-legged Flcer, Longshanks or Stilt. (Plovers.) The term is also applied by Muller to a genus of Microcoris.

HIMMELE, FRIEDRICH-HEINRICH, a German composer of celebrity, the reputed son of Frederic William II., of Prussia, was born in the duchy of Brandenburg in 1785. He was intended for the church, and studied theology in the university of Halle, but devoted all his spare time to music, in which he became so skilful that the king, his supposed father, encouraged him to pursue the art as a profession, and settled on him a pension to enable him to study it under proper instruction. He chose Naumann as his guide, with whom he made such progress that in two years he produced the oratorio of Isacco. He then travelled into Italy, and at Venice brought out a pastoral opera. Il Primo Navigatore. In 1794 he succeeded Reichardt as Kapellmeister at Berlin, and in the following year produced his Semiramis. The opera on which his fame chiefly rests, are Flitchon das Letemidchen (Fluchon, the Lyrical maiden), and Des Sylphen (the Sylphs). His best compositions are a Flitche Carolina on the death of Frederic William in 1779, and a Te Deum for the coronation of his successor.

Himmel wrote many good songs for the piano-forte, and his romances for voice and piano are very numerous, abound in sweet and original melody. He visited London in 1801, but made only a short stay. His death took place at Berlin in 1884.

HIMEN, the name of several Carthaginians.

1. Himile, who is said by Pliny (N. H. ii. 67) to have been contemporary with Hannibal, was sent by the Carthaginian government to explore the north-western coast of Europe. A few fragments of this voyage are preserved by
HIN

Vestus Arvinnus (Orv Maritum), I. 90, in which the naval battle was fought, with Carthage, Clys- 100, and islands, Clysmyrias, which are usually consid- ered to be Cornwall and the Scilly Islands. (Gosselin’s Récherches sur la Géographie des Anciens, vol. IV., pp. 164, 165.)

Himilcon, who commanded the Carthaginians in their wars with Dionysius I., tyrant of Syracuse, a.c. 405-368. Himilcon was an able and successful general. He took Gela, Messana, and many other cities in Sicily, and at least 50000 mariners died in the capture of Tarentum. It was finally destroyed by Dionysius, who burnt most of the Carthaginian ships. (Diodor. Sic., b. xiii. xiv.)

3. Himilcon, a supporter of the Berenic party at Carthage (Hieron, b. ii. 79). While the Carthaginians were oppo-se Marcellus in Sicily. (Livy. xxiv. 33-39; xxv. 22- 36.)

HINDUSTAN, that is, the country of the Hindus, in the Persian language: this term has been adopted by geographers to designate that part of India, or the East Indies, which was formerly called the Peninsula within the Ganges, and which extends from Cape Comorin, its most southern extremity, to the foot of the Himalaya range and the mountain-ranges which separate the high table-land of Iran (Persia) from the low plain traversed by the Indus, or Sind, after this river has issued from the Himalaya mountains. As the long declivity of the last-mentioned extensive moun-tains is broken by a series of ‘edifices’ which, with the salt-plain, extend along its base, and as the rivers originating within this range descend towards those plains, the Himalaya moun-tains are commonly and properly included in Hindustan. The principal rivers of Hindustan are divided into two great systems: 1. north-west and south-west, and 2. east and south, and west, and the mountains which enclose it on the north-west and north-east, mark distinctly its boundary on these sides. On the east, where the valleys traversed by the rivers Soomara, Menu, and the Seema, converge into the plains of Bengal, the boundary-line is uncertain; but we may fix it at 99° 30' E. long., to which meridian the possessions of the East India Company now extend, if the coast of Aras- cia be not less one of the limits of the possession of our Indian possessions, the large est and most southern Tract is included. Within these boundaries Hindustan extends from 5° 30' N. lat., to Attock on the Indus, 34° N. lat., and from Cape Monze, west of the delta of the Ganges, 67° 30' E. long. to the meridian of 90° 30'. Its length, in round numbers, is about 4000 miles, and its greatest breadth between Cape Monze and Silhet, on the Soormah river, along the parallel of 23° N. lat., about 1500 miles. Its surface is stated to be 1,300,000 square miles, or three times the extent of France. At 17° N., a point near the mouth of the Godavery. From the mouth of the Kista to Cape Cal-meere, an extent of about 430 miles, no harbour occurs, even for vessels of moderate size. Between Cape Calmyere and Calcutta, there are 2000 miles of coast, the only open and shallow harbour of Tuticorin. The coast, which stretches north-north-west, and afterwards nearly north, between Cape Cornimor and the innermost corner of the Gulf of Cambias, is only 100 miles long, but it is rich in the great number of small and very few and safe and good harbours. The coast-line of the peninsula of Gujerat, which, exclusive of the Lesser Rann, is about 300 miles in extent, has several harbours, between the 21° and 20° 30' of moderate size. The coastline of the island of Cutch, exclusive of the Rann of the Chota, but inclusive of the Korree, or eastern mouth of the Indus, extends about 200 miles. The coast intersected by the several mouths of the Indus extends as far as Cape Monze, about 150 miles, but it cannot be approached, by vessels of more than 50 tons burden, except at the harbour of Cutch, which admits vessels of moderate size.

The surface of Hindustan is characterized by very marked features on a large scale. From the mouths of its two great rivers, the Ganges and the Indus, two low and level plains extend in a converging direction along both sides of these rivers till they meet between 24° 30' and 26° 30' N. and 70° 30' and 72° E. long. Near 28° 30' N. lat. the country begins to rise rather abruptly, constituting between the two plains, and after wards between the two seas (the Indian Ocean and the Bay of Bengal), a group of terraces, which rise higher and higher as they advance southward, until they attain their greatest elevation in the table-land of Mysore, at the foot of the Nilgherry mountains (between 11° and 13° N. lat.). This table-land is low, in some parts less than 20 miles in width, and it is crossed by the peninsula. This narrow portion of the plain is called the Gap of Coimbatore; and south of it is a mountain region which occupies about half the breadth of the peninsula in this part, but as it advances southwards grows narrower till it terminates at Cape Comorin in a narrow ridge. The table-lands do not extend to the shores of the sea, but are divided from it by flat tracts varying in breadth. The table-lands themselves are divided into two unequal portions by two deep valleys which traverse them obliquely, beginning on the west near 22° and terminating on the east near 25° N. lat. In these valleys run the rivers Nerbudda and Sone, the fall of which is considerable. The Ghaghra, the Ghambay, and the latter joins the Ganges north of 25° N. lat.

Following this natural division we shall give a general description of the surface, soil, rivers, climate, and principal products of Hindustan, divided into the following regions:—

1. The Southern Region.—The narrow sea which separates Hindustan from the island of Ceylon is traversed by a chain of islands and sand-banks called Adam’s Bridge. (Adam’s Bridge.) The island of Rameserum is low, sandy, and not cultivated, but celebrated for its great paddy, the ancient and splendid port of which has been supplanted by the admiration of many travellers; it is still visited by pilgrims from all parts of Hindustan. At the western extremity of the island there is a small place called Paumbe, where travellers take the south sea route to the coast of Africa, about 34 miles wide, and has six feet of water at high tide. The adja-cent coast is low and sandy, but at a short distance from the sea some sand-hills occur, between and behind which are numerous salt swamps and lagoons, whose exhalations render these swamps unhealthy. These swamps often extend several miles inland. Behind them the country rises but very slowly to the foot of the mountains on the west, a distance of from 40 to 60 miles. This tract is very well supplied with water, numerous small rivers descending from the mountains, and supplying plentiful means of irrigation. It is accordingly well cultivated and presents a succession of rice-fields and palm-groves. Among its rivers is the Vay- varoo, which formerly contained a population of 40,000 inhabitants, but now has hardly half that number. Further south is the town of Timnevelly, in a very well cultivated country not far from the mouth of the coast, south of the river, with the exception of that of Tuticorin, which however is small; in its neighbourhood pearls are fished.

At the foot of the mountains the plain may be about 360 feet or less above the sea. In about 1400 miles in breadth on the west are very little known, except that between 9° 10’ and 10° 20’ N. lat. they occupy a consider-able surface. Their elevation seems to be considerable. Mount Perinam, north-west of Dindigul, which appears to be the most prominent elevation in this region, was surveyed by Colonel Lambton to be 7364 feet high, and it is con-ceived that much higher summits may occur farther west. According to a native account they even attain the extreme height of the mountain-rid to be con-
sidered as the highest land in Hindustan south of the Himalayas. The Alighur, which runs into the south-west of Madura, another offset of the same stock, rise to 4192 feet. South of 9° 10' the mountain-mass runs out southwards in one single range, which is lower, but continues at a considerable elevation to a distance of about 20 miles from Cochin, at an elevation of about 2900 feet. The remainder is a low ridge of granite overgrown with thick forests of a vigorous vegetation, in which are numerous large boulders of granite. As these mountains are exposed to the south-east, the effects of rain and leaching, they are everywhere covered with trees, among which the teak is abundant, and forms one of the chief sources of wealth to the country. In these forests pepper-vines and cardamom-plants grow, but most of these valuable productions are yet undersold. Two passes are at present known to exist across these mountains. The northern, called the Arikangal Ghaut occurs near 9° N., lat. and leads from Trincomalee on the east to Quilon on the west, through Cotalum. The southern, the Amboli Ghaut, lies about 20 miles from Cape Comorin, near the place where the mountain-range suddenly lowers.

The country which lies to the west of the mountains exhibits a much more diversified surface than that to the east of it. Numerous offsets consisting only of low hills advance towards the coast and leave a level tract along the sea some miles broad. Between Quilon and Angandu on the northern coast the sea shelf is wide and mostly covered with cocoa-palms. At a short distance from the coast are lakes, among which that is particularly remarkable which extends from its branches from Cochin on the south, to the Dutch Factory of Edapoul on the south-west. These are very advantageous means for the transport of goods. The low country, which extends east of the lakes some miles inland, is in many places swampy, and used as pasture-ground in the dry season, or covered with jute. The higher parts in the higher tracts produce rice and other grain in abundance. These tracts are mostly uninhabited. The villages are built farther inland on the low ranges of the hills, where the ground is more recent from the mountains of palm, jack, plantains, and mangos. Still farther inland the mountains rise with a steep ascent, and are covered with forests, especially of teak. The navigation along this coast is safe and very pleasant from November to March, but during the south-west monsoon no vessel ventures to approach it. A very heavy surf always runs along this coast, and renders landing difficult.

The coast is the native princes, allies of the English. The king of Travancore possesses the southern portion, which is about seven-eighths of the whole; and the rajas of Cochin is in possession of the most northern districts. The English and Dutch have some settlements. Travancore has 96 miles diameter from the sea, is a large and well-peopled place with a castle. Anjengo is a small harbour, where the English had a factory up to 1813, when it was abandoned. Between it and Quilon is the Dutch Factory of Edapoul. Quilon was formerly in possession of the Portuguese, and afterwards of the Dutch, but it has been abandoned. It has a small harbour, but a considerable population. Cochin, which was first possessed by the Portuguese, and afterwards by the Dutch, is now in possession of the English; it has a good harbour, and a considerable commerce with Bombay, Surat, Arabia, the Sunda Islands, and China. It exports pepper, cardamoms, teak, and sandal-wood, copra, nuts, oil, cacao, and the produce of its fisheries, a branch of industry much attended to along this coast. No place is better adapted for the exportation of teak than Cochin, as the timber is floated down the rivers, which fall into the sea, and then easily conveyed to Cochin. Bencoolen observed that vessels sailing in the fine season along the coast of Malabar always experience a stronger eastern wind when they approach the mouth of the river, as if the river itself acts as a lee-shore to the winds that blows upon it from the south-west. The same wind is strongest in the month of May, is least strong in August, and almost ceases to blow during the south-west monsoon the greater part of it is converted into a swamp. It is not cultivated, and almost exclusively frequented by immense herds of wild elephants and buffaloes. To the north of the town of Malabar, the river Paniry becomes navigable for canoes, and the culture of rice and other productions increases on the banks of the river as it advances towards its mouth, which is near 9° N. lat. The town of Malabar is a small harbour and a population of about 10,000 souls. It carries on a considerable commerce with the towns along the Malar coast, Arabia, and Bengal. Its rich merchants are mostly Mohammedans.

II. Decoom.—This term, which is derived from the Sanscrit Dakshina (the south), was originally applied to the whole peninsula south of the river Nerudda, including also the country south of the Gap of Coimbatore. It was afterwards used to indicate that portion of the peninsula which had become subject to the Mongol emperors. We have however applied it, in a geographical view, to the peninsula north of the Gap of Coimbatore, and we fix its northern boundary at the mouth of the Nellitigreenest vated table-land of Omercuncutus, and the range of mountains which, branching off from the table-land to the east, terminates in the Nellitigreen mountains, in the neighbourhood of Kollam. The southern boundary is the coast of Malabar, which runs across the whole peninsula between 21° and 23° N. lat.

The interior and by far the greater part of this extensive region is an elevated table-land, which is enclosed on all sides by a range of mountains of moderate height. The name of the table-land are here, as in every other part of the world, raised above the surface of the table-land itself, and appear in the form of mountains or high hills, and the lower borders of them. The surface of the table-land is steep, and full of impediments to easy communication. The Table-land extends from south of 12° to 21° N. lat. Between 12° and 16° its average breadth probably does not exceed 100 miles, but north of 16° it widens gradually to 400 miles. Its boundary will be determined by a survey of the ranges which surround it. By the natives it is called Bala-Ghaut, or the country above the Ghauts; and the plains of the coast are named Payan-Ghaut, or the country below the Ghauts. The name Ghaut (or gorge) passes by which the mountains which divide the Payan-Ghaut from the Bala-Ghaut are traversed. The resemblance of the word in form and meaning to our word gaiti, or gati, a way or path.

The elevation of this table-land varies to a certain extent. The country south of 15° N. lat., which is called the table-land of Malabar, is the highest part, and it is highest to the east than towards the west. Bangalore is 3626 feet and Colar 2000 feet above the sea; but Seringapatam is only 2412 feet, being built in a deep depression on the river Cavery. North of 15° N. lat., the table-land grows lower, and the greatest depression seems to occur between 15° and 17° in the region drained by the Kistna and its tributaries. In this part the country slopes slowly from west to east. Bharwar, near the western edge, is 2352 feet above the sea; Bellary, nearly 77° E. lat., 1468 feet; and Gooty, between the rivers Penn-air and Kistna, 1182 feet. Further north it again rises higher, and the western and higher districts, as far east as 19°, may vary between 2500 and 2600 feet. East of 77° its plateau, which is mostly directed to the south-east or south, is more rapid. Hyderabad is 1696 feet, and Nagpoor only 900 feet above the sea.

The surface of this table-land is a level plain, on which a hill rises here and there in a considerable form, and in a few places ridges of sandstone appear, but these ridges are not continuous; they are frequently interrupted by depressions, which sink to the level of the plain. These depressions rise from 300 to 600 feet above the sea. The eastern and southern margins which constitute the eastern edge of the table-land is the surface is much more uneven; numerous short spurs branching off from the mountains and advancing about 30 or 35 miles into the plain. The isolated hills, as well as these spurs, are of very steep ascent, and on them are built
the numerous strong fortresses called droogs or durgas,* which served for a long time as places of retreat to those who opposed British rule. There are two such towns.

They are now mostly in the hands of the English, and are going rapidly to decay.

Here, as in other countries between the tropics, the year is divided into a wet season, rainy, and a dry season. The rainy season does not occur, as on the eastern coast, during the north-east monsoon, but during the south-west monsoon, as on the western coast. It begins however not immediately on the capital, Hyderabad, but in the few months in which only small showers fall. In June or July they become more regular and continuous, and they last till October. But the quantity of rain is not great, being estimated from from the southern coast it is 116 inches, and on the eastern 45 inches. It is further observed that more rain falls in the districts which skirt the Western Ghauts than farther east; and likewise that the quantity of rain also decreases towards the north. The last circumstance is ascribed to the direction of the Western Ghauts, which do not run exactly south and north, but decline some points to the north-west. In the districts which skirt this mountain-range a strong south-westerly wind blows during the night, even in the season of the north-east monsoon. The mean annual temperature of the higher districts of the table-land seems to be nearly 10° less than at Madras; it is stated to be at Darwar 75°, and at Agra 82°.

The table-land here also, as in other parts of the world, is destitute of trees so far as the plain extends. On the low spurs of the Western Ghauts and in the valleys between the mountains the table-land is covered with grass. On the whole surface of the table-land a black soil prevails, which, from being favourable to the growth of cotton, has been called the black cotton ground, or regur; this soil is never manured nor does it ever lie fallow, on the contrary it is always kept fully managed. The hills which rise on the table-land are bare and sterile, like most of the small valleys between them, some of which however exhibit a great deal of fertility, probably on account of the deficient quantity of moisture. Vast tracts without cultivation frequently occur here. During the rainy season and the cool months which immediately follow, this country, especially in the districts not habitually cultivated, is covered with a fine spread of grass, and mostly cultivated or planted. But towards the spring the plains lose their verdure, and their surface becomes a brown level, intersected by numerous drainages and small canals, which wind about the country and when a calm suddenly occurs they remain for some time stationary in the air. The excessive heat produced by the vertical rays of the sun extinguishes every trace of life; every plant disappears and the waters slowly in their deep beds, and their bare black banks descend abruptly 20 or 30 feet to their channels, and thus have the appearance rather of artificial cuts than of rivers.

All the smaller streams dry up, and the larger, which during the rainy season rise from 20 to 30 feet, and even inundate a few tracts along their course, are during the dry season so deep below the surface of the adjacent fields that the water cannot be used for irrigation, as in the plains of the Ganges, and in some of the tracts along the Bay of Bengal.

The cultivation of rice is only carried on where there are abundant and perennial supplies of water; tanks for this purpose are numerous in some places. But the number of other grains, plants, and fruits is very great.

* Difficult of access or approach, &c. * a fort, a stronghold, a droog, or hill fort. Wilson's 'Bommai Dict.'

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is Sringeripatam. The ancient capital, Mysore, south of Sringeripatam, is said still to contain 16,000 inhabitants. Be part of the town of Mysore, there are two small flourishing commerce, Bangalore and Bednore. [BANGALORE; BENDORE.]

The territories of the Nizzam, or caj of Hydrabad, a Mohammedan prince, occupy the centre of the western portion of the table-land, and comprehend an area of about 110,000 square miles, or little less than the British islands, and are inhabited by more than ten millions of souls. The capital of this large town, which is formed from several villages some is stated to amount to 120,000 souls, by others even to 200,000; it is noted for its extensive traffic in diamonds. In its neighbourhood is Golconda, a fortress on a high hill, containing once one of the most beautiful and richest kingdom of Golconda. Other remarkable places are Beder, a commercial town, situated on one of the great thoroughfares of the table-land, Aurungabad [AURUNGABAD], Dowletabad [DOWLELTABAD], and Elora with its famous rock. Only the ceded districts, or Balaghauts, belong to Madras. [BAGHAUTS.]

The territories of the raja of Berar, called Bhoosati, extend to the east of Golconda over a surface of about 65,000 square miles, or an extent of country greater than England and Wales together. The population is estimated at about three millions. The raja of Berar, towards the northwestern boundary of the table-land, is a large town, with a population of 100,000 and a circuit of seven miles. The prince is a Hindu of a Mahatta family. 4. The raja of Cempore contains about 9000 square miles, or nearly the extent of the island of Sicily, and inhabited by more than half a million of souls. It extends along the Western Ghauts, but reaches far into the interior, and includes a large town and fortress of Satara, which is situated in a very fertile and well cultivated country. In their territories are the ancient town of Beopore [BEOPORE], and Punderpore on the Godavari river, a commercial town and noted place of pilgrimage.

6. The raja of Colapore possesses a territory of about 3000 square miles, nearly equal to the county of Devon in England. It extends along the Western Ghauts, south of the territories of the raja of Satara. The prince is a Hindu, and his capital is Colapore.

5. The English possessions are partly annexed to the government of Madras and partly to that of Bombay. Only the ceded districts, or Balaghauts, belong to Madras. [BA- LAGHAUTS.] They contain the fortresses of Gootydroog and Bellary. Two districts are annexed to the presidency of Darwar or Dewar, and on the south Mahatta country [DARWAR], and Deccan [DECCAN], the first lying towards the coastal territories of the raja of Colapore and Satara, and the second lying north of it. In Darwar is the town of Darwar [DARWAR] or Dharwar, and in Deccan the town of Poona, the seat and thriving commercial town, situated on one of the great thoroughfares of the table-land, with more than 20,000 inhabitants, and Nasuck, with 27,000 inhabitants. Near Nasuck are the excavated temples of Pundu Lasa; and not far from Poona those of Carli.

In surveying the higher lands, which encircle the table-land, we begin with the most northern portion, the elevated table-land of Omerentu, which lies between 25° and 23° N. lat. and 86° 30' and 82° 30' E. long. It rises considerably above the surrounding tracts; but as it has not been visited by Europeans, its elevation is not known. On its eastern declivity rises the Sone river, and the Nerbudda, which traverses it in its length from east to west, until it leaves near Mundial. Near the source of the Nerbudda is a Hindu temple, which is a pilgrimage. The table-land of Omerentu is the highest, and the Nerbudda, by which the highest lands of the Deccan are united to those which extend to the north of the Nerbudda. Below Mundial the high lands contiguous to the table-land extend westward on both sides of the narrow valley of the Nerbudda in extensive masses, which, near 79° E. long., take the form of three distinct ranges. The ridges diverge between 75° 60' and 79° E. long., but farther west they run nearly parallel. The most northern range, which is called the Soutpoora Mountains, and the southern, which is less distinct in its features, being only the northern declivity of the table-land of the Deccan, has no general name, but may perhaps with propriety be called the Northern Ghauts. Between these three ranges lie the two parallel valleys of the Nerbudda and Tapti.
The Northern Ghauts may be said to begin in 22° N. lat., between 78° and 79° E. long., with the high lands, on whose eastern declivity the upper branches of the Whuradah, an affluent of the Godavary, and on whose western declivity those of the Tapti rise. These mountain-masses, which extend from north to south, have probably an elevation of 4000 feet above the sea, and send off a very distinct and elevated range westward between the two upper branches of the Tapti. This range, called Mahadeo Par (the mountain of the great god), rises to the height of 4000 feet near the fortress of Gawulgar. The remainder of the Northern Ghauts, from the neighbourhood of Comratty (20° 55' N. lat. and 77° 45' E. long.), lies in a general direction from east to west, and forms the mountainous edge of the river Chanderit or of the Tapti, and joins the Western Ghauts between Chandore and Soolguna, west of 74° E. long. It rises with a very steep ascent from the valley of the Tapti, where it presents the appearance of a huge mountain-range, between 2000 and 3000 feet high, but its descent on the south is short and easy, the table-land of the Deccan being on an average perhaps only 500 feet lower than the range. The mountain-passes are very difficult, especially those leading from the valley of the Tapti to the table-land. The most frequented is the mountain-pass of Ajunteh, through which the road runs which leads from Boorpampoor to the Tapti to Dowleta and Ajunteh. No further the mountain-pass are some temples excavated in the rock.

The Western Ghauts, which constitute the boundary of the table-land of the Deccan towards the Indian Ocean, begin about 10 miles from the southern bank of the Tapti and about 2 miles from the sea-shore, a little north of 19° and 31' N. lat. The highest portion of the range preserves the same distance from the sea, but somewhat north of the parallel of Bombay it approaches within about 30 miles. At about this distance the parallel of Bombay is transferred to the shore to 15° N. lat. where it gradually approaches nearer, until the mountains come close up to the coast, at the mouth of the river Gan-gawally (14° 30' N. lat.). They continue to constitute a range of considerable elevations, as far as Bordur, or Baroor (13° 30'). South of this place these mountains again recede farther inland, so that opposite Mangalore they are more than 30 miles from the sea. Further south the parallel of Calicut, about 11° N. lat., where they converge to the northern border of the Gap of Penany.

This range varies considerably in elevation and width. North of Bombay it is stated not to exceed 3000 feet in height, and to be only about 1000 feet above the table-land on the sea. But south of Bombay it rises higher, and the Western Ghauts form a high table-land, rising to about 18° N. lat., rise to the elevation of 5036 feet. A sanitation has been established on them for Bombay. It is not known how far south this elevation is continued, but on the table-land the elevation is much reduced, and the mountain-pass which only is 2477 feet high, and hardly more elevated than the contiguous plains of Darwar. The pass, which leads from Sadashevarag to Yellapoor and Soonda, seems to be still lower. The small difference observed in the temperature between the coast and the summit of the pass induced Dr. Fr. Buchanan to think that the difference of the elevation could not exceed 1000 feet, but probably it is much more. Opposite Bordore south of 14° N. lat. the mountains rise to 4000 feet, and they seem to correspond with this elevation to the Hosse Angady Ghaut (13° 42') south of which they rise to 5000 and 6000 feet in the Alpine region of the Ghauts, and at the same time they probably are not much lower. The width of the Western Ghauts is incalculable, and perhaps nowhere except towards its southern extremity exceeds 12 miles, if the low spurs, which advance from them eastward into the plain to a distance of 6 miles and more, are not taken into account. South of the Hosse Angady the mountains extend near 40 miles east and west, and fill up the country between the upper branches of the Caverry river.

The narrow coastal Ghauts descend to the sea and offer it very difficult to ascend the table-land of the Deccan on this side. The mountain-passes or ghauts are not numerous, and most of them are not passable for beasts of burden. The most used to south, from north to south, are the following:—1. The Bor Ghaut, which begins at Panwally, opposite Bombay, and leads between steep rocks over Khan-

dools to the excavated temples of Carli, which are on the table-land; 2. The Colpar Ghaut, which leads from Fort Victoria (17° 46' N. lat.) along the river Backet to the town of Mhar, and hence through the pass northward to Poona and southward to Sitarah; 3. The Ghaut of Balguma, which leads from Goa to Darwar, and rises to 2477 feet; 4. The Kutki Ghaut, which begins on the coast at Sadashevarag (south of 15° N. lat.), and leads through the mountains to the river Chanderi, called Maldehy Ghaut (13° 49' N. lat.), one of the most frequented of the Ghauts, keeps up the commercial communication between Bednore and Mangalore; but we have no particular account of it; 5. The Kordaibol Ghaut (13° 9') leads from Man-galore to Poona and the coast; 6. The mountain- Ghaut between Kunern and Donroy Droog (5000 feet above the sea), to Wustara; 7. The Bessale Ghaut (12° 49') connects Mangalore with Us-cottah on the table-land, traversing Bessely, situate at the foot of the northern declivity of Mysore to the other parts of Hindustan. On these mountains alone in Hindustan sandal-wood grows (Buchanan), and it occurs only between 12° and 14° N. lat. Cassia and cardamoms are also collected in these forests, but the latter not north of Goa.

The whole of the narrow coast which intervenes between the Western Ghauts and the Indian Sea is sometimes comprehended under the name of Malabar. But properly the broad northern part, called the Konkan, is divided into two parts: the middle part, between 15° N. lat. and 16° 3', Canara; and only the southern part, as far as Cape Comorin, is named Malabar. The surface of this narrow tract is formed of low hills, converted into swamps by the injudicious occupation by forest-fruits. The whole of the narrow tract is covered with sand, and overgrown with cocca-palms; near the termination of the hills the soil is better, and planted with rice. The sandy coast is indented with numerous small inlets, which during the rainy season are the receptacles of torrents, most of which, as they flow only for a very short distance, are considered as mere rivulets. The small valleys which lie farther inland between the low ranges of hills are converted into swamps by the abundant rains, but when the water has run off they are cultivated and yield rich crops of rice. On the sides of the hills which separate these valleys from one another are situated numerous villages, enclosed by extensive plantations of fruit-trees. The top of these ranges of hills is level, but dry and barren.

This coast experiences the full effects of the south-western monsoon, more especially in the southern part. It begins there at the end of May or the beginning of June, but at the northern part it is delayed until July. The monsoon brings with it tremendous thunder-storms. The rain pours down continually for several days in torrents, after which it decreases, and is occasionally interrupted by fine weather for about a month, and finally increases to its maximum. It begins to decrease in August, but slowly, more rapidly so in September, and in October the rain and the
monsoons depart with thunder-storms. The annual quantity of rain in Malabar amounts to 116 inches, of which 36 inches fall in July; at Bombay it does not exceed 64 inches; and farther north the quantity is still smaller. The mean annual temperature at Bombay is about 80°, but observations on that of Malabar are wanting. The climate of this coast is considered very healthy, notwithstanding the immense quantity of rain and the cultivation of rice.

No kind of grain is cultivated except rice, for the growth of which no artificial irrigation is required, as the soil is saturated by the abundant rains. This country contains a great variety of fruit-trees, especially of the kind of mango, and the immense tract of land along the sea. The sugar-cane is also extensively cultivated. Cattle and buffaloes are the only domestic animals, and both are distinguished by their size. Fowls, geese, ducks, and turkeys of excellent quality. [By the English, the wild elephants are said to be numerous; and also tigers, leopards, hyenas, and jackals.]

The whole of this maritime tract, as far south as 19°, is now in possession of the East India Company, with the exception of that portion which lies between 15° and 16°, which is nearly equally divided between the Portuguese and the French; the difference of claim is a matter of law and Damana, of which the first belongs to the French, and the second to the Portuguese. The English possessions north of 16° N. lat. are annexed to the presidency of Bombay, and those south of 15° and Damana, to the presidency of Madras. [The port of Cochin, formerly important, has lost much of its commerce since the rise of Bombay. It lies nearly halfway between Surat and Bombay, and has a safe harbour for vessels of small size, there being 15 feet of water covered with sand, and the anchorage is good. There are several mosques here. Farther south (18° 56') is Bombay (Bombay); on the islands of Salsette and Elephanta temples are excavated in the rocks. [ELEPHANTA.] Near Fort Viceregal are deer and monkeys, Banyan and Palmyrah trees, and about 14,000 inhabitants. It has a harbour for small vessels, and carries on a considerable commerce with Persia and Arabia. Goa, the Portuguese settlement, is situated about 18° 30' north of the equator, and its ruins, built on the banks of the Salsette, where several rivers discharge their water, was destroyed by Tipu in 1784, but has risen again since it came into the hands of the British. Ships drawing less than 10 feet water can enter the harbour at high tides. The town is thriving, and derives its importance from being situated not far from the mouth of the Angadhy Ghat and other mountain-passes, by which it carries on a considerable commerce with the table-land and the mountains, from which it receives a large proportion of its trade. It has a population of 34,000 inhabitants. [BOMBAY.] Cananore (11° 52') is built at the bottom of a small lake, which is one of the best harbours on the coast. It is only known that there are 2,000 inhabitants of Hindustan, and contains about 10,000 inhabitants. Tallicherry (11° 44'), which was long the chief settlement of the English on the coast of Malabar, but is now much neglected at present, has about 6,000 inhabitants; it has still a considerable commerce in the produce of the country, coir, sandal-wood, cardamoms, pepper, cinnamon, and cocoa-nuts; shark-fins and salangana-nectars are also sent. It is, however, a port of call, and principally exports coffee. Farther south is the town of Calicut. [CALICUT.] These towns, which lie to the southern Ghaus, a term not yet in use, but which ought to be adopted to designate those mountain-ranges which support the table-land of the Deccan on the south, and have only been discovered within the last twenty years. They cover by far the greatest part of the space contained between the latitude of N. lat. and 76° and 75° E. long. The western portion of the Southern Ghaus is occupied by the Niglitch Mountains, which are well known to Europeans resident in India as affording them the best shelter on the south coast of Arabia. They extend for about 11 degrees from the equator. These mountains are connected with the extreme of the Western Ghauts extending between 75° 26' and 77° 20' E. long, and between 11° 30' N. lat. and 15° 30' N. lat., and their western limit is more than 60 miles, and their width about half as much. All this space is occupied by one mass of high land, broken by ravines or deep valleys. Its surface is not level, but a continual succession of ascents and descents, separated from one another by tracts of level ground. The lowest parts of these level tracts are estimated to have an elevation of from 6000 to 6000 feet. The hills by which they are overtopped are generally not high, but through the centre of this region there runs a more elevated ridge, containing various summits, the highest of which, nearly in the middle of the table-land, is called the Dodabatta Peak, which is 8429 feet above the level of the sea. The surface of this region is a fertile soil overgrown with a green sward of grass and several kinds of alpine herbs where it is not under cultivation. Only the northern part of it is under cultivation. The excellent climate on this mountain, and the establishment of several sanitary stations, in which Europeans may re-establish their health, when impaired by a long residence in the hot countries. One of these European settlements is at Usakandam, 7600 feet above the sea, at the foot of the Dodabatta Peak; the other is at Dimbhot, 5785 feet above the sea. The mean annual temperature at Usakandam is 36°, and consequently 28° less than at Madras; that of Dimbhot 64°. At the former place the thermometer sometimes rises to 69°, and has been observed to descend as low as 26°, but only once in 12 years. The changes in the temperature are very slow, and are not exactly equal in different parts. The effect of both monsoons is slightly felt; moderate rains occur all the year round, but more during the south-west than during the north-east monsoon. Frost occurs between the last of November and the first of March. The thickest ice does not exceed 14 inch in thickness. Agriculture consists chiefly in wheat, barley, millet, peas, and pulse, to which of late years European vegetables have been added. The fruit-trees of England succeed everywhere, and are frequently grown on the same trees on which no fruit is grown at the same time. Oranges grow only in the lower districts. No animals are kept, except cattle and buffaloes; sheep, goats, and dogs are found in a wild state. Some very large species of deer abound. The north-east monsoon, however, brings south this hilly table-land descends with a steep slope to the Gap of Ponany and the plain of Coimbatore, from which it is divided by the river Bhoyana. The deep valley through which the small river Bhoyana runs, is almost entirely cut off from the table-land of Mysore. The slopes on all sides are wooded, and it is only here that the animals of the tropical regions, as tigers, leopards, and elephants, are found.

North-east of the Niglitch Mountains are the central Southern Ghauts, which occupy nearly the whole space between the Cavery and the Bhoyana river, an affluent of the former, as far west as 77° E. long. Very little is known of the Ghauts beyond the first two or three passes of the Niglitch Mountains, though a mountain-road leads through the northern part of them, connecting the fortress of Sattesegala with the small town of Caveryporam. We possess no information as to the nature of this country, or the nature of the mountains, which rise steep ridges. The mountains in this region rise to a considerable elevation; Kumbaritine Peak, which is a short distance north of the town of Sattimungalam, attains the height of 5348 feet above the sea. To the east of the Cavery the Southern Ghauts extend eastwards, and their southern declivity approaches the towns of Salem and Ator; they terminate near the last-mentioned place. It is only their southern border that is known to any extent. On the banks of the Cavery, west of Salem, stands the Paulamally Peak, which is 4925 feet high. North of Salem are the Shershawary Mountains, whose highest summit, Mount Mutu (4935 feet) forms a table-land seven miles long and three miles wide, where Europeans whose health has been impaired seek the recovery of their strength.

The Southern Ghauts are broken through by the river Cavery, which for about one-fourth of its course drains the table-land of the Deccan, and then breaks through between the high mountains of the Ghauts, and for the remainder runs through a level plain. It enters the mountains a little above the fortress of Sattesegala, which is 7500 feet above the level of the sea, and takes from Cavery, and in this tract its course is extremely winding between high rocks, which approach so near its banks as not to leave space enough for a road: this part of the river rises from between the mountains, and forms a valley extending to the west of south. Where it receives
bhoyravu river it has already entered the plain, and is a large river in the rainy season. For about one-half of its course in the plains it runs in one channel, but below the town of Trichinopoly it divides into several branches, the island of Sercen island, being between two pagodas and as a place of pilgrimage. Below this island the river again unites for a short distance, and then divides again. The northern arm, called Celeron, runs in an east-north-east direction, and is said to be over 10,000 feet long, and nearby traverses the island of Oceanic and Havilchunrun; but its waters have been so exhausted by irrigating the adjacent fields, that it carries only a small quantity to the sea. The water of the southern arm is pure and clear, feeding a great number of canals which traverse the sandy alluvial plain extending on the coast between Cape Calymere and Devicotta. The waters of these canals being conducted over the adjacent fields, confer upon the area of the seventeen tracts in Hidra-.

The extensive country is dotted with villages, each of which has a well-built pagoda, with architectural ornaments in a good style. The towns also are numerous, and each of them has a well-stocked bazaar. The Cavery river receives its principal supply from the southwest monsoon, which during its continuance falls on the Western Ghauts. At Caverypoomar it begins to rise at the end of May, and attains its greatest height from 13th July to 13th August. The rains of the southwest monsoon set in, its waters begin to decrease, and after the 11th of November they are so low as to be fordable.

The delta of the Cavery and the level country along its banks lies in the flat alluvial belt of the Ganges and Brahmapur, which may be considered as a prolongation of the plain to the Indian Ocean. That part of this plain which extends between the Ganges and the delta, or between Trichinopoly and the delta, contains many large tracts, some of which are cultivated; but the greatest portion is covered with forests, which however do not exhibit such a vigorous vegetation as those in the Gap itself.

The delta of the Cavery by the southern Ghauts and the lower course of the Cavery constitute a portion of the Carnatic, the principal division of the presidency of Madras. The most remarkable places in it are: Coimbatore [Coimbasore], which is beginning to be a place of importance; Saleem, a well-built thriving place, with some manufactures and a good deal of commerce, but unhealthy. Trichinopoly is a fortress built on a rock. Tanjore is a place of great strength. [Tanjore] Negapatam, formerly a landlocked town and afterward of importance, has lost its trade since it was united to the British dominions (1783). Carrical, a French settlement, built at one of the outlets of the Cavery, which is rather more to the north than to the south, is a small town, inconsiderable commerce, and 15,000 inhabitants, Tranquebar, a Danish settlement, with a harbour, some commerce, and 20,000 inhabitants, is one of the principal stations of the Protestant missionaries in Hindostan. Chilhambrum, or Chilambrum, has an extensive and beautiful pagoda, one of the most antient in India.

The Eastern Ghauts, which separate the table-land of the Deccan from the low level country extending along the Bay of Bengal, between 12° and 18° N. lat., occupy in width a much larger space than the other Ghauts. South of 13° 10' N. lat., where their longitudinal direction is south-west and north-east, their breadth is not less than fifty miles and between 13° 30' and 18° N. lat., where they are called Nellia Malla Mountains, and, lying in a general northern direction, occupy the whole space between 76° and 79° E. long., they are probably nearly 60 miles wide. Between 18° and 18° 11' N. lat., west and north-east, and here their breadth is probably somewhat less. These mountains consist of a number of mountain-ridges running parallel to one another in their general direction. On the northern side, this feature is still more distinctly marked in the Nellia Malla Mountains than in the southern portion of the Eastern Ghauts. The longitudinal valleys, which separate the single ridges appear to be rather shallow. Their elevation has not been ascertained. It is stated that the most western range of the southern portion, which borders on the table-land about Bangalore, is about 500 or 700 feet above the plain, and may therefore attain an elevation of between 3500 and 4000 feet above the sea. In the Nellia Malla Mountains the eastern range is said to be the most elevated; but its highest summits do not seem to exceed 3000 feet. The low range of the whole region is very stony, dry, and exceedingly broken, and presents very few spots fit for agricultural purposes. It is also nearly destitute of trees, with the exception of a few tracts covered with wild date-trees. In many places it is waterless, and even the vegetation is of the hardiest kinds; but in general it is almost entirely without vegetation.

Three rivers, originating on the table-land, pass through this mountain-region in transverse valleys, so narrow, that they can only be reached by the numerous and banded gates of Devicotta and Scilla and Chilbrum; but its waters have been so exhausted by irrigating the adjacent fields, that it carries only a small quantity to the sea. The water of the southern arm is pure and clear, feeding a great number of canals which traverse the sandy alluvial plain extending on the coast between Cape Calymere and Devicotta. The waters of these canals being conducted over the adjacent fields, confer upon the area of the seventeen tracts in Hindostan, their crops of rice being only inferior to those of the district of Burdwan in Bengal. The principal of these canals terminate on the shore at Calymere, Negapatam, Nellore, Carrau, and Tranquebar. This extensive country is dotted with villages, each of which has a well-built pagoda, with architectural ornaments in a good style. The towns also are numerous, and each of them has a well-stocked bazaar. The Cavery river receives its principal supply from the southwest monsoon, which during its continuance falls on the Western Ghauts. At Caverypoomar it begins to rise at the end of May, and attains its greatest height from 13th July to 13th August. The rains of the southwest monsoon set in, its waters begin to decrease, and after the 11th of November they are so low as to be fordable.

The mountain-passes through this region are as difficult as those over the Western Ghauts. As the rivers which traverse it flow through very narrow valleys, the roads have been cut by undermining a number of the large rock outcrops which are little visited, and are nearly unknown, except the great military road which leads from Madras to the table-land. It runs over the plain to Arout, on the Pal-air, and thence to Vellore, whence it begins to work its way through the banded gates to Santchur (1120 feet above the sea). Here it divides into two branches: the northern traverses Venacaberry (2180 feet) and Pednadam (1907 feet), and terminates at Colar, on the Pal-air; the southern, coming from the southern Ghauts, traverses Kistnagur to Kistnagur, and thence over the Pan-air to Kistnagur, whence it passes to Ossooar and Bangalore. The two last-mentioned places are on the table-land. The Nella Malla Mountains are rich in metals; iron is very abundant, and copper and lead are worked in some places. Copper and manganese are found, especially to the north of the river Penn-air; and most frequently near Cuddapah and at Bangampan, in the neighbourhood of Nandhal.

The Eastern Ghauts from the Bay of Bengal, and comprehends the central and northern Carnatic, with the Guntur Circar, has a low sandy beach, from which the surface rises gradually, but slowly, to the foot of the Ghauts. A. harbour, called Vengavoor, is a considerable port in which 50,000 to 100,000 tons of foreign and domestic goods are landed. The sea, is 490 feet above it. The surface of the whole is nearly level, but towards the mountains somewhat undulating. Near the coast the soil is a mixture of sea-sand and loam, with some remains of marine animals. In some parts it is covered with an efflorescence of common salt in dry weather. Towards the mountains, where the low hills commence, it consists chiefly of a mixture of loam and sand, with a considerable proportion of vegetable mould. This latter kind of soil is very fertile when irrigated, which is partly done by canals from the rivers, and partly by numerous tanks; but the upper part of the hills is dry and sterile. Along the sea-coast the country is less fertile, but produces good crops of rice which has an abundance of kernels, and can be irrigated by canals. The sugar is cultivated in small quantities. The southern portion, as from the table-land southwards, is similar to the northern, but is not so fertile, and is barren as it is situated on the country which extends between the lake and the river Goondalagama; but the Guntur Circar, which comprehends the tract between the Goondalagama and the river Guntur, is more fertile. In the Kistna river the water is less than in the country south of the lake of Pulicat. This lake appears to owe its existence to the sea breaking through a low sandy beach, and overflowing the land within. It extends 33 miles from north to south, and 12 miles from east to west, in the broadest part. It contains several large islands. It communes with the sea at three points, but the outlets are extremely narrow and shallow.
The rainy season is later here than on the western coast of the Deccan. When the south-west monsoon (June to August) is in full force, only moderate showers refresh the air and soil. They become more abundant at the end of the south-west monsoon in September, increase greatly in October, and are heaviest in November, when they descend in torrents, sometimes for several days together. The north-east monsoon sets in regularly in December. In December they cease entirely. During the dry season (from January to June), a few showers only occur. The annual quantity of rain at Madras is about 46 inches. The climate of the Coromandel coast is in many respects similar to that of Ceylon, and it is especially a great contrast to the adjacent desert tracts, the temperature varying between 82° and 84° Fahr. On the coast the heat is mitigated by the sea-breeze, which sets in between ten and eleven o'clock; but at a distance of from 10 to 12 miles south, this breeze has lost its power, it is then a heat by passing over a heated surface of sand. Sometimes the sea-breeze fails altogether, and then the thermometer rises to 130° in the shade.

The Coromandel coast, extending from Cape Comorin to the river Gondognam, constitutes the main body of the presidency of Madras. Though exposed to a heavy surf from the sea, which renders landing very difficult and dangerous, and though it has a number of harbours, it has been for a long time the favourite country for European settlements. The whole coast is now under the dominion of the English, the Danes having preserved only their settlements at Taljaud, and the French at Coromandel and Pondicherry. The towns of Madras, Arcot, Conjeeveram, and Cuddalore are noticed under their respective articles. Near the small town of Sadras, 47 miles south of the river Cauvery, is an extensive town called Mahamalapura, or the Seven Pagodas.

The river Kista or Krishna originates on the eastern declivity of the Western Ghauts. All the waters collected on the eastern side of that range between 12° and 16° N. latitude unite successively in its channel. The source of the river, which is called Kista, is near 18° N. lat., between Poonah and Satara, hardly more than 30 miles from Fort Victoria on the west, and 60 from the Cauvery on the east. It winds its way through the wide plains and undulating country between the two rivers Ganges and Malabar, with its tributaries, for about 120 miles south-west, receiving numerous small streams from the west, among which the Warna, which separates the territories of the Rajas of Satara and Colapour, is the most considerable. Afterwards it flows south-west, and its waters are increased by the two rivers Ghatpura and Malpura. The remainder of its course on the table-land is nearly east, with some great bends towards the north and south. Here it receives from the north the Beouns, which in the farthest branches rise north of 19° N. lat., and whose winding course through the table-land probably exceeds 300 miles. Where the Kista approaches the Nella Malle mountains, it is divided in two branches, whose upper branches, the Toonga and the Budra, originate near 13° N. lat. After entering the mountain-region it forms some considerable cataracts near Timmecotta, and rushes between Kondapilly and the mountain chains, which include a great extent of land. It is surrounded by a green tract of land called the table-land of Yerramurti near 10° N. lat., between the adjacent land, and consequently it cannot be used to irrigate the fields. This river brings down a comparatively small volume of water, and is not navigable in any part.

The river Krishna, which separates the table-land of the Deccan from the south tract along the coast, and which may be considered as a continuation of the Nella Malle mountains, occupies nearly 60 miles of the table-land. On the north side of the table-land in the neighbourhood of Timmecotta, and extends to Kondapilly; on the Godavery, its western border is at Mahadeoopoor, near 80° E. long., whence it extends eastward to the east of Polavaram. On the north side of the Godavery, the table-land is intersected by the river Krishna, with the character of this region. It seems however that the mountains are of considerable height towards the Godavery, whose course is not interrupted by rapids and cataracts, which divide it into many branches, in which the tide ascends to some distance, and which admits vessels of considerable burden. On the most northern of these arms are the harbours of Godavery and Kona, which it is joined by the Maquiera river from the south, and by the Poorna and Whurda from the north. The Whurda is a considerable river, which, together with its tributaries, drains a great extent of land between the ghauts, with a southern declivity of the Northern Ghauts and the elevated table-land of Omercunctu, between 76° and 80° E. long. Its principal affluents are the Paim Gangas from the west, near the town of Naganpur, and the Baim, which joins the Nag Nadi, a small river, on which the town of Nagpoor is situated, the capital of Berar, is built. After the junction with the Baim Gangas, the Whurda is called by the native Brahminsev, but the Europeans give it the name of Whurda up to its junction with the Godavery. After this junction the Godavery is a mile wide, but at the end of the dry season it has only 15 inches of water. Soon after it divides into two branches, which include the town of Mulicotta, near Mahadeoopoor, and issues from it below Polenshaw. In the low country it is 4 miles wide, and has a great volume of water, but soon divides into two branches, which divide it into many more branches, in which the tide ascends to some distance, and which admit vessels of considerable burden. On the most northern of these arms is the harbour of Godavery and Konas, which is joined by the coast between Cape Comorin and the Hoogly during the south-west monsoon. This is owing to Godavery Point, which projects to the northward and breaks the swell. A bar of mud lies across the entrance, through which ships must be forced. Coringa is a place of considerable traffic. The course of the river Godavery exceeds 700 miles, and as it presents no obstacles to navigation, it is thought that a water communication might be established between the Godavery and Nagpoor by means of the Godavery, Whurda, Baim Gangas, and Nag Nadi, at least for some months in the year.

The north-eastern portion of the Deccan, extending along the Bay of Bengal, between the mouth of the Godavery and the Bay of Baisore, and from that coast westward into the interior, presents features very different from those of the remainder of the peninsula. Along the banks of the Godavery the vegetation is magnificent, the vegetation near the banks of the Kista, in the neighbourhood of the town of Kondapilly, are the diamond-mines of Mallavali. They belong to the Nisam of Golconda, though they are situated within the British territory.

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The low country between the lower course of the rivers Kista and Godavery comprehends the Circar districts of Kondapilly and Ellore; and Rennell properly compares it with the delta of the Nile, though it is somewhat smaller. A considerable portion of it is an endless expanse of the lake of Colair, which is a freshwater lake, situated in a deep depression, nearly in the centre of the low tract. It is about 24 miles long, and half as wide in the broadest part, and is successively crossed by rivers, which become the Godavery by channels in which the dry season contain no water, but from July to September convey a portion of the water of these rivers to the lake, which is then filled, and inundates the adjacent tracts of land, to the length of about 7 miles long. During the dry season the water is conveyed by means of canals to a considerable distance from the lake. The lake covers 200 square miles, and contains fifteen islands, which, as well as the surrounding country, is fertilized by the deposit of mud brought down by the rivers. The superfluous water is carried off by the river Oopatara, in which the tides ascend to the lake, but are prevented from entering it by embankments. This river is navigable for small vessels, and of great use for the export of produce. The soil of the whole tract is the black cotton ground, mixed with a rich vegetable mould. Besides rice, a great quan-
near the town of Wyragur, which remains on the west of it. This chain is very little known as to its elevation and width; but it seems to continue northward until it joins the table-land of Onnagh, or Onnagh and back to 1° 10' N. Long. It must be supposed that it is the natural boundary of the table-land of the Deccan in this part, which table-land to the west of it is not more than 1000 feet above the sea. Another range of high land lies to the south of the Deccan, for 40 miles as far as 2° 50' N. lat., but must be considered as unexplored ground, having never been visited by Europeans, partly on account of the difficulties which the steep mountains offer to such an attempt; and partly because the whole of it is inhabited by a race of Barbarians, who are not inclined to permit the visits of foreigners. This people are called Gonds or Gondas, and this extensive tract of country is called from them Gondwaras or Gondhwaras. It is only known that the whole surface of Gondwaras is covered with mountains and very thickly wooded, which latter circumstance distinguishes this tract from the Eastern Ghats. The British government and population are confined to the centres of these country in nearly equal parts, but the authority of both is only nominal. The low tract however along the sea-coast which skirts the Gondwaras on the east belongs to the British, and is in the presidency of Madura. It comprises the Circars of Rajahmundry, Vizagapatam, Chilkur, and Gajapet. (Cinacara.)

The mountainous country of Gondwaras extends between the two ranges of mountains, and is at least in width 21° 44' E. long. and in length about 200 miles, at least in width, but which in length from south to north extends from the neighbourhood of Kunur (near 20° 10' N. lat.) to Ruttapoon (26° 27') about 150 miles. This plain of Ruttapoon is a fertile tract with fine rivers, tanks, and irrigation, as is that belonging to the Vindhyas, in the same direction from east to west. This mountaintract, north of the valley of the Mahanuddy, seems to be a kind of mountainous table-land, whose increase, elevation, by estimation, is from 3000 to 6000 feet above the sea; while the ridges by which it is traversed, and which here run east and west, rise about 2000 feet higher. It is only at its most southern extremity that a single range of hills from it towards the Bay of Bengal, where it terminates west-south-west of Balasaore, under the name of Nelligreen or Nila Chitta (Nigerry Mountains). The whole region however is remarkable for its large rivers, which run southwards and eastwards, and pass near the town of Jagannugart. The main body of the river, called Chitterola, continues eastward to the sea; and the northern arm, named Berusa, runs north east until it joins the Brahmapoon, and then runs eastward to the sea, into which it falls near Cape Palmyra. The whole course of the Mahanuddy is estimated at 800 miles; it is certainly the most important river of the Deccan, being considered as the chief river of the southern plains of considerable extent, which are partly covered with high grass and partly cultivated, especially along the foot of the ridges, where the soil is more fertile. As many of these small streams have no scope, or only very gentle one, the great quantity of water poured down during the rainy season cannot be carried off, and thus extensive swamps and lakes are formed, which however dry up at the close of the rains. These temporary water-lakes are also fed by the inhabitants for irrigation. The climate is not so hot as on the low coast. The thermometer varies in the rainy season between 75° and 80°, in the cold season between 65° and 68°, and in the hot season between 82° and 84°, the highest place being in January even to 92° Fahrenheit. The rainy season lasts from June to October, with prevailing north-east winds: the quantity of rain which descends in these months must be considerable, for the plains, which are entirely without water in the dry season, have then from 15 to 20 feet water. The dry season is divided into the cold and hot, the former comprising the months between October and April, and the latter between April and June. At the end of the rainy season the jungle-fever is very prevalent. The productions which are cultivated are chiefly rice and jowar, but the greatest wealth of this region consists in its forests, over which the river and valleys, and woods...
thirteen different kinds of trees useful as timber or for cabinet-work. A considerable portion of the population is employed in preparing these trees for the market, and in floating them down to Cuttack. These forests are inhabited by numerous wild animals, and the natives are supplied with wild buffaloes. Iron-ore is very abundant in this region, and diamonds are found in the tract which separates the valley of the Mahanadu from Sambalpur from the sources of the great Ganges, with the assistance of the various inhabitants of Ossessa, and supplied to the presidency of Calcutta.

The table-land of the Deccan is separated from the mountains by a series of ranges of the parallel rivers Tapti and Nerbudda. The Tapti rises in the mountain-tract which joins the table-land of Omeercuntuc on the south-west, with two branches, the Tapti and the Poura; the former running west-south-west, and the second east-west. All they unite after a course of about 50 miles, near 76° E. long. The high mountain-ranges separate these two rivers and rises to 4000 feet, is called the Madobat Plain; it terminates on the west at their junction, and east continues to the town of Bhurumbh, a distance of nearly 150 miles. Its average width may be 30 miles. Both declivities of this range are extremely steep, but partly covered with forests. After the junction of these two branches, the central valley of the Tapti rises in a wide valley between the Sautpoora Mountains, on the north, and the Northern Ghats on the south, for about 280 miles, until it enters the Indian Ocean by a wide estuary below the town of Surat. The right bank of the Tapti has a level ground along the banks of the river, which is well cultivated in the upper parts, but almost entirely covered with bushes and jungle along its middle course. In its lower course towards the town of Surat, the right bank, which is covered with a deep black mould of great fertility, but traversed in a very remarkable manner by chaws 30 or 40 feet deep, and frequently several miles long. This plain, which is the valley of the Tapti in the town of Burambch, situated on a fertile plain; it is of considerable size, though less extensive than formerly, and carries on a considerable commerce with the countries both to the north and south of it. Not far from the mouth of the river is the great emporium of Surat.

The Nerbudda rises on the table-land of Omercutoc, but its sources have not been seen by Europeans, though the forest is inhabited by numerous wild animals, and which are visited by crowds of Indian pilgrims. It is said to wind slowly over the mountains in its course, and until it is precipitated from its deep western declivity not far from the town of Nerbudda. It descends by a large valley bounded by masses of rocks with a rapid course past Jubbulpur, below which town it forms a large bend at Baghalur. Further west, the valley widens, while the mountains to the north and south rise to steep heights, but traverse the valley in a rapid course. Thus it arrives at Burgessabad, or Hoshungab, where it is 900 yards wide and from five to six feet deep, so as to become navigable for small vessels. It continues to be navigable as far west as ten miles below Chinchadah, near the town of Burunvance (west of 72° E. long.), a distance of between 130 and 140 miles, though there are two rapids in it, the first at Deyri, between Hindu and the island of Mundas of Ura or Ukon Mundas, on which there is a famous temple and place of pilgrimage; and the second at Samsurah, below the town of Mhyesir. About ten miles below Chinchadah is the Harn Pahar (deer's leap), where the river, which at Mandighur is 240 yards wide, is 200 yards wide, and has a rapid course. About 10 to 12 feet above its usual surface lie across its bed. The water of the river rushes with great violence through three openings. Further downstream the river is still more unruly. It flows between the mountain sides on both sides to the water's edge; and thus the river becomes entirely unfit for navigation for a considerable length. But about 10 miles above Tubhukwarka it enters the low lands of Gujarad, and is navigable from this point to the mouth of the river for small vessels, a distance of about 90 miles, and for vessels of moderate size half that distance. Below the town of Barchou it forms a wide estuary. The whole course of the river is about 450 miles, and the greater part of it is supplied with a large river which flows from the mountains on both sides, and from the mouths of river-boats, a distance of about 90 miles, and for vessels of moderate size half that distance. Below the town of Barchou it forms a wide estuary. The whole course of the river is about 450 miles, and the greater part of it is supplied with a large river which flows from the mountains on both sides, and from the mouths of river-boats, a distance of about 90 miles, and for vessels of moderate size half that distance. Below the town of Barchou it forms a wide estuary. The whole course of the river is about 450 miles, and the greater part of it is supplied with a large river which flows from the mountains on both sides, and from the mouths of river-boats, a distance of about 90 miles, and for vessels of moderate size half that distance.
and extend eastward along the vale of the Nerbbuda. The western portion, as far east as Chichulad on the Nerbbuda, has not the appearance of a continuous range, being frequently broken into isolated peaks and presenting many scattered summits. So far its width is very considerable, and its southern offsets approaching to the very banks of the river, and its northern declivity being intimately connected with the extensive mountain-tract which extends between 75° and 77° 30' further north, each of these being connected by a series of ridges with the river Myhe, and which unites the Vindhyia Mountains with the Aravalli range. East of Chichulad (near 75° E. long.) the range approaches the river Nerbbuda and continues in a north-easterly direction. In this part of the country the Nerbbuda is bordered by a southern slope, and there is a good deal of elevation, and without summits. Its upper line preserves nearly always the same elevation, and only slight changes are observable in it. On an average, it is about 1700 feet above the vale of the Nerbbuda, and its declivity is exceedingly steep, and indented by short transverse cuts, which give to many of its single parts the appearance of projecting bastions: on many cliffs, however, the edges of these bastions were built out when they are rapidly going to decay. Such are the Vindhyia Mountains as far east as the road which connects the town of Bhopal on the table-land of Malwa with that of Hoshungabad on the Nerbbuda, and it is only in this part that the plateau of the Vindhyia Mountains is applied by the natives. But the range continues east of the road, with a slight inclination northward, is connected with the table-land of Omeroot (between 80° and 81°), and continues across the greater part of the Ganagas and the river Sone, approaching the Ganges within a short distance between the towns of Mirzapoor and Chunarthur: it terminates on the banks of the Sone between between Rotasgarh and Sasanpur. This eastern portion of the Vindhyia Mountains is called by the natives the Kimoor range. It rises from both sides with a steep declivity, but its upper surface, where not deeply furrowed by water-courses, is much reclined, and presents only slight eminences, and mostly covered with wood; cultivation is carried on in a few isolated spots. It may be, in general, 1000 feet or a little more above the sea-level, and about 700 feet above the plain of the Ganges near Patna.

The roads leading over the Vindhyia mountains are few. The most frequented seem to be the following. The most western connects Burunwass in the vale of the Nerbbuda with Chichulad on the table-land of Malwa, passing the Nerbbuda at Chichulad, and then ascending the mountains by the bed of a small river at Bajg, in whose neighbourhood there are temples excavated in rocks; it afterwards traverses the Tanda Ghat, and terminates on the west bank of the river Nerbudda near the village of Ojueen. This eastern portion of the Vindhyia mountains is called by the natives the Kimoor range. It rises from both sides with a steep declivity, but its upper surface, where not deeply furrowed by water-courses, is much reclined, and presents only slight eminences, and mostly covered with wood; cultivation is carried on in a few isolated spots. It may be, in general, 1000 feet or a little more above the sea-level, and about 700 feet above the plain of the Ganges near Patna.

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The thermometer sometimes attains 98°, but the nights are always cool and refreshing. Though the cholera is considered endemic on the table-land of Malwa, it is in general allowable to be a healthy country.

On the lower level of the table-land are several towns of importance. Near the Vindhyal mountains is Bhopal, a large town built near an extensive tank; it is of great antiquity, and carries on some commerce, being situated on one of the great roads which rise west through a part of the surface of the plateau in the vicinity of the Vindhyal mountains, is the residence of the Maharatta prince Holkar. Bhopal, once a very large place, has now a population of 36,000. Nearly in the centre of Malwa lies Bhandufor, which, being situated on a high road leading from the south to the north of the peninsula, is the chief station on the route of trade from Malwa to the south. It has an average breadth of about 45 miles, extending southward to the very banks of the Tapti at Surat, and northward to the river Sabarmati, or Babarun. It is the town of Gurroote, with 1200 houses, and in its neighbourhood the temples of Bhunmar (24° 12' N. lat., 73° 34' E. long.), which are excavated in the rocks. In the north-western corner of the table-land is Purandar, a town of considerable importance, situated on the great road which leads from the table-land to the plain of Gujarat and to Cutch; it is noted for its works in gold.

A line drawn from the last-mentioned town southward to Taunola, and hence to Dohod, marks the western boundary of the table-land of Malwa. West of this line is a mountain-tract, about 50 miles across from east to west, connecting the Vindhyal mountains with the Aravalli range. It is the country of the Jat, who are scattered about south and north, and are mostly connected with the western broken portion of the Vindhyal mountains. The valleys between the ridges are not wide, but well watered; yet they are hilly, and the lower lands are thickly settled. All the ridges are valuable for their timber, which consists of much teak and many other timber-trees. This region, called Kaunte, extends westward to the meridian of Lunawad, and is richly forested.

West of this meridian lies the plain of Gujarata, with an average breadth of about 45 miles, extending southward to the very banks of the Tapti at Surat, and northward to the river Sabarmati, or Babarun; and on the bank of the Sabarmati is Ahmedabad, with its extensive ruins, occupying a space of 30 miles in circuit; it still contains a population of more than 100,000 souls. [AHMEDABAD]

The Sindh divides the plain of Gujarata from the peninsula of the same name, is very difficult of navigation, on account of the violence with which the high tide enters it, and of the circumstance that at low tide the northern portion of it, as far south as 23° 5', is left entirely dry, with the exception of a channel about three miles wide. If a vessel cannot reach Cambay in one tide, and sticks fast in the mud and quicksand, it is certain to be utterly lost. The eastern winds are often very violent, and generally do not go farther with one tide than Gomangwy, at the mouth of the Mhie river, opposite Cambay, and the second tide carries them into Cambay creek. The violence with which the waves break on this coast is seen in the manner in which the beach is piled up. The Hingul is a long and large narrow beach, and is piled up from 10 to 15 feet high, and is endangered from thetide. It is supposed that the depth of the gulf has progressively decreased for more than two centuries past.

At the most northern corner of the Gulf of Cambay, and on the western banks of the river Sabarmati, lies a very flat, extensive sand ground. There is a small town near it, which is likewise a point of departure for the trade in salt. The village of Baramula is a salt-mine, and is used for the manufacture of salt, which is sold at Surat. The small sandy area is inhabited by a few hundred people. The trade in salt is carried on by the Portuguese, who are in possession of the small island of Diu, where there is a good harbour and a fort erected for its protection. It was formerly a considerable place, but has now little or no commerce.
We return to the continent of Northern India. On the north side of the table-land of Malwa, and separated from it only by the Harroulette mountains, a mountain-region called by the natives Up泰山, is a mountainous country. Its western boundary is well defined, and protected by the Aravalli range, which runs in a north-east direction between 24° and 25° 30' N. lat. and 73° and 76° E. long. This begins near the town of Moron, and extends to the north on the north-west to Reware. (Aravalli.)

The country between this range, the Harroulette mountains and the Kinnar division of the Vindhyas chain, is traversed by numerous torrents, giving rise to a great volume of fresh water, with which the Rann is partly covered. Those districts which are situated near the mouths of these rivers supply during the dry season much pasture-ground and some valuable rice. In summer they are covered with a saline incrustation. During this season Outch is separated from the continent of India by a desert. This island extends from east to west about 140 miles; its greatest width is about 60, but in some places not more than 18 miles; its surface may cover about 10,000 square miles, or about the extent of Sicily.

Two ranges of low mountains traverse the island from one extremity to the other. The higher, called the Lunghi or Lukki Mountains, is the southern; its width does not exceed 8 or 10 miles, but it is a continuous chain, dry, without springs and destitute of wood, but broken by deep ravines. Along the southern shores of the main body of the island there is another range, which constitutes the high coast of the Rann, but it is frequently broken by declivities, and appears in small peaks or in groups. It is connected by some transverse ridges with the Lukki Mountains. The value of these two ranges is very great. They constitute, with the southern plain, the cultivable portions of the island. The southern plain, which varies in width from 3 to 50 miles, is separated from the sea by a continuous plain of sand; but it has no lakes, and little pastoral or agricultural produce.

The country between the Chitore Mergans and the Aravalli, which, on an average, is 30 miles across, but towards the north considerably wider, may be considered as a plain with an undulating surface, which becomes hilly towards the north. Its southern portion forms an inclined plain, which gradually rises to the north, and is interspersed with some trade, the great road between Outch and Ahmednuggur passing through it. Though no active volcano is known to exist at present on this island, a great portion of its surface consists of particles of lava and other volcanic products, and extinct volcanoes have been observed in some places. The climate of this island, which is traversed by the tropic of Cancer, and is near the rainless region of the globe, is very dry and hot. The south-west monsoon brings rain from June to October, but as this island constitutes the most rapid boundary of the desert, the rains are not copious, and it sometimes happens that they do not set in at all. This seems to be the principal reason why the cultivation of the ground is in a very backward state, and the produce produced is insufficient to supply the large population of 400,000 souls. The summers are hot, but the winters rather cold. In the former season the thermometer rises to 106°, and in the latter it sinks to 33°. The prevailing winds during the months from April to September are from the west. The extraordinary extent of this island, especially in the north, makes it a most important part of the country.

The first commercial town is Mandawer. (Cutch, vol. viii, p. 243.) The second is Moomdr, farther within the Gulf of Outch; it has 12,000 inhabitants, and a good deal of commerce.
within the mountains—range of the Arawulli chain, is full of
interest; but it has improved since it came into the possession
of the English (1817), and now contains more than 25,000
inhabitants. In the northern districts is the large and
well-built town of Jyopoor, the residence of the raja of
Jyopoor.

As to the country south-east of the Chitore Mountains,
and between them and the Vindhyas range, its western
districts are known by the name of Harasoutte, and in the
eastern are called Bundelkund. It is a succession of narrow
valleys, separated from one another by broad-backed ranges,
which, in their upper parts, extend in uneven plains. The
only low and level plain of any extent occurs on the eastern
banks of the Chumbul, between Kotah and Pally, where the
plains of the Chumbul and Patband are near some cotton
plantations; however, these are extensive and profitable.
The cultivation of cotton is also carried on in the
Chitore Mountains. The valleys are narrow, and produce only
very scanty and other more coarse grains, no irrigation being
practice in the plains of the bed of the rivers being so deep.

On the plains, which rise from 1600 to 2000
feet above the sea-level, are still less productive, and mostly
covered with bushes of thorny growth. On the table
land of Patband, between the Cane and Toms rivers, is the
town of Patband, or Punam, a well-built place, perhaps
1800 feet above the sea, the neighbourhood of which contains
the best cotton in Hindostan. To the west of Patband, on the banks of the river Cane, is the town of Bandah,
which is well built, has some manufactures, and carries on
considerable commerce, especially in cotton, from the
valley of the Cane, and is the chief market for the cotton
of the mountain region. The cotton of Patband and
Bandah is the best in Hindostan, and the cotton of the
mountain region is of the worst. Another place, in a
similar situation, is the fortress of Gwalior, which is built
on a rock, having a tolerably level surface of considerable
extent, and on its top are nineteen palaces and two
baths, which are said to be the foot of the rock is the town of Gwalior, which contains
30,000 inhabitants. On the right bank of the Chumbul, in
a very mountainous country, is the town of Kotah, the
residence of the raja of Kotah, a well situated but unhealthy
place, and another, about a mile distant—called Patheh—
and Patheh is Patum, a thriving commercial town, in
which nearly the whole commerce between Malwa and the
other parts of northern Hindostan is now concentrated.

IV. The Plain of the Ganges.—The Ganges, or Ganga,
fmtes with its two principal branches in the highest elevation
of the Himalaya Mountains, near 31° N. lat. and between
75° 30' and 80° 30' long. The said branch, whose remotest
source lies on both sides of the mountain-pass of
Gangaghat [Himalaya], is called Bhaghirathi. Between
the higher masses of the Himalaya its general course is
southwards, south-eastwards, in a very shallow valley; but where it enters the lower mountains it turns south-east, and after
passing Tira, the capital of Ghatwal, it meets the other branch, the Alakandar, at Deogurch, or Deva Prayag. This other
branch, the Alakandar, rises in the basin south of the
mountain-pass of Manaj Ghat, and flows south-west, south-east, until it joins another mountain-stream, the Deon, which
joins the Ganges in the holy town of Haridwar. At
Jumna Math, which is still 6000 feet above the sea, the
Alakandar flows in a west-south-western direction past
Srinagar to Deogurch. The river formed by the junction of
the Bhaghirathi and the Alakandar contains about 26,000
cubits. Its course within the region of the Himalaya Mountains
is not long, but very winding, until it entirely leaves it below
Haridwar, and enters the plain of the Ganges. The surface of
the river at this point is from one to two miles wide, and
after leaving Haridwar, the length of its course, including the
Alakananda as the longer branch, does not fall short of
150 miles. In the plain it continues its course for a
considerable distance, its waters being taken in by the
waters of the river, the course of which extends to the
great towns of Benares and Calpee, after a course of
about 400 miles. The other rivers of Upermal, the Sindu,
Bhoj, Cane, and Toms, which issue from the mountains
into the rivers of the plain, are very small and imperceivable
to the Ganges, are all full of cuttacks, cannot be used
for irrigation, and are only navigable a short distance
above their respective mouths. The most eastern
branch, or the Tanur branch, which is between the
Sona, rises on the eastern declivity of the table-land of
Om Ramoune, south of 33° N. lat., and between 80° E. long. It
skirt that table-land on the east, flowing in a north-north
western course, and on the borders of the province of
Malwa, which is about 100 miles distant from the east-north-east, in which general direction it continues
until it joins the Ganges above Patna. Its course
is in a narrow valley as far as Patna, below which
fortress it enters the plain of the Ganges and becomes
navigable.

The mountain-region of Northern Hindostan is for the
most part in the possession of native princes. The British
empire have however annulled all the countries south of the Sone to
the presidency of Calcutta, and the lands between the Sone and the Ganges to Allahabad. Between the territories of Calcutta and Allahabad the possessions of the raja of
Diu are enclosed within, which comprehend a tract of
mountainous country on the Upper Ganges and the
Sone; the remainder is divided between the Makhatar princes, Seindia,
Holkar, and the Gurwecum, and the Rajputas. The Raj-
putas were formerly in possession of the whole of Upmal,
but were reduced to a very small portion of the country,
which is called Rajputa, or Rajputapula; but as the
Rajputas extended and still extend their dominions on the
western side of the Arawulli range over a great portion of
the desert lying between the Beja and the river, the
name of Rajastan is applied also to these countries. The Rajput
princes of Oolipoor and Jyopoor, with the raja of Kishna
di, have their dominions between the Beja and the
northern Hindustan and the banks of the Indian river, the name of
Rajastan is applied also to these countries. The Rajput
princes of Oolipoor and Jyopoor, with the raja of Kishna
di, have their dominions between the Beja and the
northern Hindustan and the banks of the Indian river, the name of
Rajastan is applied also to these countries.
exceed 120 miles; but in the plain it runs nearly 150 miles more than the Ganges up to its junction. Though its waters during its course are increased by those of the mountain-region of Northern India, the Chumbal, Binde, Bhera and Jumna, at the point of their confluence the Ganges is much larger, being a mile across, while the Jumna is only 1400 yards.

From Allahabad to below Boghipoor, situated at the foot of the hills, the Ganges flows slowly, but with a binding course eastward, and in this part of its course it receives a great number of large streams. The Goomteet, rising near the foot of the Himalaya range, runs through the plain part of the country, and the Ganges between Benares and Gagra Glazeepor; its numerous bends have given it the name of Goomteet, which signifies ‘the winding river.’ Above the town of Chupra the Ganges is joined by the Gogra, the largest of its affluents from this side, which rises far within the highest portion of the Himalaya range near the mountain-pass of Taklakot, and passes Fyzabad and Oude. Its course is hardly less than 600 miles, which is equal to that of the Rhine. Opposite Palna, near Hazgeepor, the Ganges receives the Ghandaki Ganga, or Ganduck, whose river source lies near the Mattan Pass, on the table-land of Tibet, and it is not much inferior in length to the Gogra. Further down the waters of the Ganges are increased by those of the Parnawa, which rises on the southern side of the higher Himalaya chain, passes near Khattanbod, the capital of Nepaul, and entering the plain, changes its southern into a south-eastern course. Nearly opposite Boghipoor it falls into the Ganges, whose further branches seem to originate on the table-land of Tibet, and which, like the Ghandaki Ganga and the Gogra, bring down the waters of a considerable area of the mountain-region of the Himalaya. At Sichurile, about 30 miles below Boghipoor and 10 miles above Rajamahal, the Ganges having passed the hills, which here approach its bed, turns southward, and here the great delta of the river may be considered to commence. Though it does not present directly at this place, it is evident that its waters formerly did, and that one arm passed near the extensive ruins of Gour, which at present are five miles distant from the river. At present the delta of the Ganges is the place at Siquihul, about 20 miles below Rajamahal. The name of Ganges, or Ganga, continues in the eastern arm; the western is called Bhaghiresetee by the natives, and Cosimbar the by Europeans.

The Ganges flows south-east, and the Bhaghiresetee south. The former divides again about 40 miles down, near Jellingy, from which the western branch is called the Jellingy river. It flows mostly in a southern direction, and joins the Bhaghiresetee near Nuddea. The island immediately west is called the Cossimbazar islands, and another branch off from the Ganges a few miles from Jellingy. This arm, called the Matabungee branch, runs likewise southward with many large bends, and joins the Bhaghiresetee at an equal distance between Nuddea and Hoogly. After the junction of these three arms of the Ganges, the western branch of the Ganges is called the Hoogly, under which name it passes Calcutta and reaches the Bay of Bengal near the island of Sagar. The principal branch of the Ganges, continuing its course to the south-east, sends off another arm near Cusdy, or Cusseta, which is called the Chundra river, and passes near Comercy. The fifth great bifurcation takes place at no great distance lower down, near Middapoor, and here the smaller or western branch is called the Garry river. These two great branches, the Chundra and Garry, unite again near Comercy, preceded southward under the name of Boiruch, or Horingibong, which, like the Hoogly, forms a wide estuary at its mouth. While the Ganges loses a great deal of its waters by sending off so many large branches, besides several smaller ones, it receives new supplies from the Himalaya range and the Brahmapootra. The Mahanda and the Teesta, which both run from 250 to 300 miles, rise on the southern declivity of the higher Himalaya in Nepaul and Botan, and run southward. They communicate by several branches with one another during the rainy season, but they join the Ganges at different points,—the Mahanda near Nabobgungeepor below Deginganpore. At the last-mentioned place the Ganges receives the Tepor or Jumna, which receives water from the Brahmapootra by the branch called the Jumna, which leaves its principal stream opposite the town of Sheerpoor, is very deep, and brings down a great volu...
The country not subject to inundation lies partly west of the Hooghly, and partly north of 25° N. lat. The district west of the Hooghly is of great fertility, especially Burdhwan, which produces grain, sugar, cotton, silk, and indigo, so abundant is the soil of excellent quality; it is the best cultivated, most populous, and most productive district in India. The country north of 25° N. lat. is fertile and well cultivated in its southern districts, as the lower tracts along the rivers are covered with water during the rainy season; but its northern limits lie hidden by a belt of scarp land exceeding 6000 feet above the sea-level; but the Brahmaputra running at their northern declivity is not more than 200 feet above that level. In these hills, at a place called Churna, are seen the remains of a stone station that was established for the presidency of Bengal.

The plains of Bengal comprehends four natural divisions: the Sunderbunds, the country subject to inundation, the country which is not inundated, and the Tarai. The Sunderbunds occupy the most southern part of the plain between the mouth of the Ganges and the Brahmaputra, and as far north as the salt water of the sea is carried by the tides. This district extends farthest along the Horingatal branch, where it advances to the northward of Calcuta at the junction of the Chundra and Goury branches of the Ganges, a distance of 70 miles: the mean width may be about 50 miles. This tract is entirely uncultivated. The soil is extremely fertile. It consists of gpal, tall trees, which produce excellent timber; these thickets are inhabited by tigers, rhinoceroses, and other wild animals; while the numerous branches into which the different khasis are divided, bear mangrove, garvavas, and contain numerous kinds of fish. The inhabitants are in number, owing to the great unhealthiness of the country. Their occupations are the cutting down of timber trees, and the preparation of salt from the sea-water, which enters these rivers and canals with the tides. It is only towards the two extremities, along the Hoogly and the principal branch of the Ganges, that some cultivations occur within the Sunderbunds. The district of Backergunge is one of the most prominent and richest parts for most abundant crops of rice, though the produce is of inferior quality.

The country subject to inundation comprehends not only what is called the delta, or the country between the branches of the Ganges, but also the country between that river and the Brahmaputra, as far north as 22°. The inundation is not equally spread over the whole surface; it is greatest in the eastern districts, especially where the waters of the Brahmaputra are connected with the Ganges, in which part an immense tract of country is covered for several months with water many feet deep, so that at the end of June and July, if the earth be unwatered, the lands are mere mounds and protected by embankments, appear like islands.

The river has then risen 15 feet above its level in the dry season, but it still continues to rise for several weeks, about 3 in every day. At Custy, at the bifurcation of the Chundra branch, it is deep between 20 and 25 feet; at Dacca, only 14 feet; and farther southwards, at Lucknow, not more than 6 feet. In the Sunderbunds itself it is not perceptible. In October, when the water rapidly decreases, the country is sown with rice, and the produce of this tract is sufficient to furnish the whole plain of Bengal with this principal article of food. The western districts of the country subject to inundation are only slightly covered with water, and they likewise are principally covered with plantations of mulberry-trees, especially towards the middle tracts; whilst in the northern parts indigo, sugar, cotton, and tobacco are raised in abundance. The plantations, with their walks and avenues, rounded, consist of mango-trees, jack-trees, coconuts, and other kinds of palms. The whole of this plain is covered with several layers of alluvial earth, to a depth of 100 feet in some places. On these deposits, no wells have been made in it. In this alluvial soil the rice is frequently change their course, favoring new channels through it, and leaving the old channels dry. The banks of the old channels are only sown with rice, and these hills, together with the abandoned beds of the rivers, form the waste land of the country, which frequently extends for 8 or 10, or even 15 miles from the present channel of the river. The best cultivated part of this plain is the island of Cossimbazar, between the Brahmaputra and the Jellibanghy of the Ganges. [Bengal.]

P C. NO. 751.

The country north of the Ganges is called Tirthu or Trihuta. It is an inclined plain, near the Himalaya mounds, about 600 or 700 feet above the sea, and sloping towards the Ganges, where its mean elevation may be about 400 feet. Its surface is formed of soil and fragments, which border on the Ganges do not differ much from Bahar proper in soil and cultivation. But about 30 or 40 miles from the river large tracts are covered with forest-trees, especially sal-trees, which are very much increased as it approaches the Tarai. The great abundance of water which descends in the heavy rains and is brought down by the numerous rivers from the Himalayas, forms extensive lakes, or dils, which render this part of the Gangetic plain nearly as unhealthy as the Tarai, and prevent the extension of cultivation in a country distinguished by an extremely fertile soil. But with all these disadvantages its agriculture is on the increase, as no part of India is better adapted for the raising of indigo; its cultivation is now on the increase. In no part of the great plain is saltpetre obtained.

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in such abundance; indeed the ground seems to be generally impregnated by it. The large forests of saul furnish an article of export. The plains of the Gangetic plain which extends west of the middle of Allahabad, and comprehends the Doab, or country between the rivers Ganges and Jumna, together with Oude and Rohilkund, differs considerably from Bahar, and still more from Bengal, in its climate and productions. The climate of the lands on the banks of these rivers does, however, differ much from that of Bahar, being sandy and loamy, and having likewise water under it at no great distance from the surface; but it slopes more with rapidity, descending from northward to south-east from 1200 feet to 300 or 400 feet, and consequently the running water is sooner drained off and the soil is much drier. As the heat of the summer, though excessive, lasts only a short time, and the cold in winter is considerable, the vegetation differs greatly from that of the lower plains. The winter crops resemble those of Europe, consisting chiefly of wheat, barley, oats, and millet, together with peas, beans, vetches; also tobacco, flax, and hemp. The summer crops, which grow during the rainy season, are rice, cotton, indigo. &c. The palm-tree disappears; but the European fruit-trees grow together with bananas, custard-apples, and the fruits which have been transplanted from China. Almonds, pomegranates, oranges, and grapes are the most of them. The fruits of England are cultivated with success. The number of evergreen trees is small; nearly all trees lose their leaves in December. Forests are rare in this plain, except towards the northern mountains, where the level of the country is lower, and approaches the Tarai, which however is of small width in this part of the plain. The country which lies to the west of the Jumna, and extends as far as the banks of the Sutlej and Gharra, contains some of the plains of the Ganges and the Indus. It is a level tract; no mountains or even high hills occur in its whole extent. The surface consists of a loose sand, and as the equatorial rains here begin to cease, and the winter rains in the upper ridge of the Indus during the winter do not extend so far south, it is nearly without cultivation. Where this plain borders on the Himalaya range, it is in some measure watered and fertilized by the numerous small rivers which originate along the declivity of the lower range and a short distance within it; and numerous villages, with some cultivated tracts, occur here. But the small volume of water brought down by these rivers is soon absorbed by the sand hill, and some of them lose at a distance of about 30 to 40 miles. The remainder unites in one somewhat larger stream, the Gagur, which continues to flow for about 100 miles, and then also is lost in the sand. It is said that it once joined the Indus, and that this ancient bed of it, the ancient bed of the Gagur, is seen under the depths of the sea, between these rivers the villages become fewer in number and smaller in extent, and the country gradually assumes the damal aspect of the Indian desert. At the inhabited places frequent salt springs are found at a short distance from 90 to 100 feet. Where this country borders on the Indian desert, it is chiefly covered with low sandy hills. The climate of the Gangetic plain presents still more marked differences than its surface and soil. The rains are brought by the south-west monsoon. It commences in March, but in the beginning affects only the waters of the Bay of Bengal, which are raised by it several feet: the current, which during the dry season runs to Cape Comorin, being then directed to the interior angle of the Bay. This higher level of the Bay lasts to the end of the monsoon in October. The rains set in towards the end of April or in May: they are not very copious, and usually extend over the region of the Cautella before the beginning of June. In the countries farther east, as Chittagong, Sylhet, and along the base of the Himalaya mountains, the abundant rains begin a month earlier, and therefore the rivers which drain these districts inundate the adjacent lands earlier. They are also more abundant than in the western districts of Bengal. At Cautella the mean annual quantity of rain is 71 to 72 inches, but at Dacca it probably does not fall short of 100 inches. The heat is excessive at the commencement of the season, and what is called the monsoon heat. The mean annual temperature of Cautella is 79° of Fahr.; that of the hottest month (May) 86°; and that of the coldest (January) 67°. The thermometer sometimes reaches 100°. The climate of the western districts, is not unhealthy for Europeans; but the excessive heat which prevails nearly all the year round gradually enfeebles the constitution. The eastern districts are less favourable to health. The climate changes greatly as soon as the hills of Rajmahal are passed in ascending the northern reaches of the Ganges. The difference between the hottest and coldest season is much greater. Though we are not acquainted with the fact by meteorological observations, it is certain that the greatest heat is not inferior to that of Bengal; but, on the other hand, in the month of December, the thermometer is sometimes known to fall as low as 11°, and January, to 6°, while in the houses. This difference of cold cannot be ascribed to the difference in elevation of the two countries, as Bahar is only from 200 to 300 feet higher than Bengal. It probably has its cause in the directness of the Rajmahal hills, which break the force of the monsoons; and this conjecture seems to be confirmed by the smaller quantity of rain, which at Benares does not exceed 64 inches annually. The rains commence in the beginning of June; it lasts in hot weather, and is not long after its commencement in the month of November; and the most abundant rains are in July. In Tirhut however the rains occur earlier, and they are also more abundant, and form the numerous rain-water lakes, or dils, which, with the forests, render that district rather unhealthy, whilst the countries along the banks of the Ganges in Bahar are considered very healthy. Before the rains commence, Bahar experiences strong western or north-western winds, which raise the thermometer considerably, and occasion an uncommonly hot weather. After the rains the temperature and the climate of the Doab, in respect of climate, is not so great as between Bengal and Bahar, though the difference of elevation is greater, a greater portion of the Doab is raised above 600 feet, and 70° 0' of the mean level of the Doab (November to March) are somewhat colder. In January and February the thermometer sinks below the freezing-point, and stagnant waters are covered with thin ice. In the hot season (April from April to June) the temperature rises gradually to 90°, and to 105°. The difference of state between January and June is 65° Fah. (between 37° and 105°). But both states of the air are of short duration, and do not much affect vegetation. The western districts of the Doab are watered however by those frequent westerly winds which come from the Indian desert. The rains are abundant in the districts between the Himalaya mountains and the Ganges, but much less so in those farther west, and very moderate to the west of the Jumna. Farther to the west in the desert country between the last-mentioned river and the Sutlej they disappear entirely, or are only limited to a comparatively narrow tract along the Himalaya range. The Gangetic plain is the most fertile, the best cultivated, and most thickly inhabited portion of Hindostan. It contains more than one half of all its population, and the number of inhabitants probably exceeds 60 millions. The number of the large villages and towns in this part of the country is 300,000 inhabitants. The lower portion of the plain is inhabited by the people in the article Bengal, and for a description of the largest see CALCUTTA, DACCA, &c. Colna, at the confluence of the rivers Ganges and Jumna. The Sutlej is a rapidly increasing place. In the middle plain of the Ganges, or Bahar, the large towns are also numerous; especially along the banks of the Ganges. Bogipore contains 30,000 inhabitants [BOGIPORE] and Monghir, a fortress with an equal population, is noted for its manufactures of iron. Farther west, about the mouths of the river Sone and Gonduvack, is a very populous district containing the great town of Patna and near it the large towns of Bankipore, Hajipur, and Dwarapour. The towns of the Tirhut have not yet risen to importance, but are rapidly increasing with the extension of cultivation in this fertile district. The largest town is Bellahpur. The next in order are Raipur, and the whole portion of the plain has from the earliest times been the seat of the most powerful empires in India, and it contains several towns which successively have been the capitals of this country. The cities of Rajmahal, especially of Allahabad or the Jumna. On the first-mentioned river are the ancient capitals of Cawnpoor, or Caupoor, Canope and Furrucke.
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bad. Cawnpore is still a large town, extending six miles along the river but it is thinly populated, and the streets are intersected by large orchards and gardens. Cawnpore, which once covered a surface equal to that of London, is now of very little importance. Furruckhabad still has a population of 20,000, and is the capital of the Punjab district of Northern Hindustan.

On the Jumna are the ancient capitals of Calpea, Etawah, Agra, Muttra, and Delhi. [Agra; Delhi.] Calpea is still a considerable place, and carries on an extensive trade in cotton. Etawah is a town of commerce but is not otherwise important. Muttra, or Mathur (the Methora of Arrian, Indic., c. 8), is still a large town, and a sacred city, to which great numbers of pilgrims annually resort, as well as to the neighbouring town of Mathura, one of the most ancient cities of Hindustan, one of the oldest seems to be Hunsupan, near 29° N. lat. and 78° E. long., north-east of Merut, whose ruins covered a great extent of ground. In the Dooh, or country between the Ganges and Jumna, are the towns of Merut and Scharapersan, which in latter times have risen to some importance. In Oude are Lucknow and Fyzabad. In Rohillcund are Shahjehanpur with 50,000 inhabitants, Bareilly with 60,000 inhabitants, and Rampoor on the Kosi river, which is said to have a population of 100,000 inhabitants. Hardwar, which is situated where the Ganges issues from the mountain-region of the Himalaya range, is a place of pilgrimage, and has a considerable trade.

The whole of the Gangetic plain is immediately subject to the government of the Company, with the exception of the kingdom of Oude, which occupies that portion of the plain west of the Kosi river, from the banks of the Ganges to the Himalaya Mountains. Its area may be about 25,000 square miles, or half the extent of England. British possessions are annexed to the presidency of Calcutta and to Allahabad, the river Sone constituting the boundary between them on the south of the Ganges, and the Gundeck for a great part of its course on the north. The arid plain lying between the Jumna and the Sone is the most of it inhabited, and the Seeks, who are under the protection of the Company.

V. The Plain of the Indus.—The Indus, called in its southern course also Sinde, rises on the table-land of Tibet, but its sources have not been visited by Europeans. It is supposed that they are situated at no great distance from the sacred lakes Ravan Hrud and Mansa Sarowar, to the north-north-west in 31° 20' N. lat. and near 80° 30' E. long., on the western declivity of one of the mountain-ranges which form the northern boundary of the Pamir plateau, called the Gangdisi or Kailasa Mountains. Hence it runs north-west passing the town of Gherto to Leh in Ladakh, and it is called by the Chinese, in this part of its course, Sing-he-tso. More than 500 miles on a table-land from 12,000 to 15,000 feet above the sea, it is joined below Leh by the Shayuk, which rises at a great distance north-east in the Karakorum Mountains, and probably exceeds the Sing-he-tso in the volume of water, if not in the length of its course. This affluent of the Indus has not been visited by Europeans, and indeed it is only that portion of the Sing-he-tso which lies between Gherto and Leh that has been seen by European travellers. Nothing is known of the Sampo, or Great River, as the Indus is called after its junction with the Shayuk, until it issues from the Himalaya range a few miles east of Attok. In this part of its course it gradually declines more to the west, and becomes broader, only entering into the Sutlej near the north-western mountain-range of the Himalaya, the Goseatii, or Himalaya, are separated from the elevated mountain-masses of the Hindu Coon. Above Attok its course lies due west, and it is 30 or 50,000, and is one of the most compact tributaries of the Indus which it receives from the west after it has left the mountains. After leaving the high mountains above Attok, it continues its course in a south-west direction for about 70 to 80 miles, and then only begins to decline, while it enters the great plain. This plain however lies almost entirely on the eastern side of the river, as the mountain-ranges which support the table-lands of Afghanistan and Beluchistan are separated by the river in its course as far south as 30° N. lat. South of this there are extensive tracts on the west, but only to a short distance. The Hala Mountains, which run along the eastern border of the table-land of Beluchistan, rise at a short distance from it, at some places within a few miles.

As soon as the Indus has left the mountains it divides into four arms, which run southward with their only branches, and sometimes unite, but separate again, so that the whole volume of its waters is seldom united in one bed. South of 29° N. lat., near the small town of Wittun Cote, it is joined on the east side by the river Panjab, which rises in the Punjab, and changes its southern course to a south-western. It is here 2000 yards wide. It continues its south-western course to Shidulkarpoo and Bukkur, and then turning to the south-east, it reaches a succession of plains on which it divides into two arms and encloses a delta. To the south of these arms, the Fulaii, passes the town of Hyderabad on the east, and flowing farther down in an east-south-eastern and south-eastern direction, enters the Rumm, out of which flows by the wide estuary the coast of the island of the ancient plain or plains of Sinde. This branch of the river has only a great volume of water during the inundation; the greatest part of the year it is dry. Where it approaches the Rumm, a place called Sindree, with an extensive tract of land in its neighbourhood, was plunged into the water by the frightful earthquake of 1819, and at present is a large lake, whose waters are discharged into the Korree, or eastern mouth of the Indus. The estuary of the Korree has 12 feet of water as far as Bussa, but farther inland it is not so deep. The western and principal branch of the Indus divides again south of 31° N. lat. near Jarruck; the smaller or eastern branch, called the Pinyru, runs nearly parallel to the Fulaii, and joins the western branch part of the sea by the mouth called Sir. It is navigable however as far as Gunda for vessels of 30 tons burthen, and it is much navigated, though the merchandise must be transferred into small river vessels from the city of Gath Buner, 40 miles from the sea, the principal branch of the Indus sepa rates again into two branches, of which the smaller, called Buggaree, runs westward, and the larger, the Sata, continues its course in a south-south-western direction to the town of Darsee, which the mentioned branch is by far the larger, being, after the bifurcation, still 1000 yards across, and carrying off the greatest volume of water. It divides into seven arms before it reaches the sea, one of which is only accessible to small vessels on account of its shoals and rapid current. Another of its embouchures, called the Hu jamri, lies farther west, and admits vessels of 50 tons burthen, which may sail as far as Vikur, more than 20 miles from the sea. The Mull mouth of the Sata, which is to the south-east of the Gora branch, may be navigated by vessels of 25 tons burthen as far up as Shah-Bunder. Vikur, as well as Shah-Bunder, exports great quantities of rice. The main branch, as above, called Buggaree, divides again below the town of Darsee into two arms, called Pitee and Piteeans, both of which are navigable as far as their point of separation for small vessels. Darsee has some of these streams, but the two arms have less water than they had formerly.

The Indus receives only one great affluent in its extensive plain, but this affluent unites all the rivers which drain the Punjab, or the five Rivers, the Panjeshanthees of the Greeks. These five rivers, enumerated from east to west, are the Sutlej or Sutru (the Zaruddus of Tomiculo), the Bech or Beas (the Hyphasis of Arrian), the Ravee (the Hydromates of Arrian), the Chenab (the Aeconites), and the Julum or Behut (the Hydaspe). The Sutlej has the longest course. It originates on the table-land of Tibet, in some mountains north of the sacred lake of Rawan Hrud, and it is even supposed that this lake discharges its waters into the Sutlej, although the Sutlej, which it flows in some measure parallel to the Sing-he-tso, or Indus, amounts to more than 150 miles. At Shipkeek, where it enters the territory of Bissar, it is still 10,464 feet above the sea. So little is known of its course from the north to the south-west, that it soon enters the Himalaya range, through which it runs in a narrow valley, with numerous bends, more than 100 miles. It enters the plain, near Ropor, on the west side, whereas it flows into the Sutlej, which it joins by the Beas. The Beas originates in the Paralas range of the Himalaya mountains [Himaalaya], traverses the mountain-region with two great bends to the south and north, and discharges the plain about Nadaun after a course of less than 100 miles. Here it flows into the Sutlej, west, gradually approaching the Sutlej, until it joins it. The united river then takes the name of Gara or Gharra, and continuing to flow in a south-western direction, unites with the Chenab near Oech, below Bhabad. The
Raves does not appear to rise in the highest range of the Himalayas, but on the valley of the Indus, and is called the Santhach Mountains. Its upper course is not known, but it does not seem to be long. Above Kothua or Koha is the plain of the Panjab, where it flows in a south-west direction parallel to the Bigha Ganges until it meets the range of the Himalaya, named the mass of Beas and the mountain-pass of Para-Lahra, and runs for about 100 miles in a longitudinal valley of the mountain-region to the north-west; it afterwards turns gradually to the west, and turns into the town of Khowar, 40 miles and inclining by degrees more to the south, leaves the Himalaya mountains above Jumma, after a course of perhaps not much less than 200 miles. In the plain of the Panjab its course is west-south-west until it has joined the Ravee, when it declines to the south-south-west. The last of the rivers of the Panjab, the Jhilum, rises in the Tibet Panjahl range of the Himalaya mountains [Himalaya], not far from the high peaks of Kalam and Ser. Of the Chenab, it flows last in a longitudinal valley of the mountain-region [Cashmigg] in a north-north-west direction, traverses the lake of Wooler, and issues from the valley by the narrow valley of the Haramule pass. Within the mountain-range it rages near Mooltan and its three branches, which place is 50 miles to the north. Soon afterwards it turns by a bold bend to the south, in which direction it reaches the plain, where it again takes a western course above Pindee Dader Khan. Its course is about 80 miles. The Chenab, the remainder of its course, somewhat more than 100 miles, is mostly directed towards the south, until it joins the Chenab at Trimo, below Jung. After the five rivers have united, they still flow south for 40 and 50 miles, and then fall into the Indus at Mittun Cote. The natives call the united river Chenab, but in the other countries of India it is known by the name of Panjund. All the rivers of the Panjab are navigable where they issue from the mountains, and the Indus itself to Attock, but above that place there is a whirlpool which cannot be passed by boats.

The northern part of the plain of the Indus, the Panjab, or country of the five rivers, extends from the lower ranges of the Himalaya mountains to the confluence of the Chenab with the Indus, between 34° and 29° N. lat., and has the same kind of an isocoseles triangle, whose shortest line, or base, which is indicated on the map lies along the Himalaya, and the equal sides, each about 600 miles, unite at the confluence of the Indus and Chenab. Its surface may be on an average about 1000 feet above the plains of Lahore and Lahore, and is of the same height, 900 feet higher than the Ganges at Delhi. This immense tract of country varies considerably in soil and surface. It contains very fertile and very sterile tracts. Perhaps not more than one-fourth of its surface is under cultivation in the country along the foot of the Himalaya range, and to a distance of about 150 miles from it, has an undulating surface; it is well supplied with water, and has the advantage of more abundant rains, and of a plentiful irrigation. It is well cultivated, and contains a greater portion of cultivated land than the remainder. The Jullander Doab, or country between the Sutlej and Beas, is very populous, and so likewise is the Bara Doab, between the Beas and Ravee as far as Amritlar. But in the Richna and Chintun Doab, between the Ravee, Chenab, and Jhilum, the waste lands are more extensive. The remainder of the Chenab, doabs, or country west of the Indus, a line drawn from Hurree at the confluence of the Sutlej and Beas, through Lahore, and hence to Pindee Dader Khan, has a much smaller portion of cultivated land. It is only found along the rivers from 15 to 15 miles. This narrow tract is level, and not much elevated above the surface of the rivers, so that it is either inundated when the rivers are swollen, or may easily be irrigated. The villages are few, and they are rather built at the place where the inundation ceases, or the farther edge of the cultivated ground. These parts of the country which are beyond the reach of irrigation and inundation are considerably more elevated, and their surface towards the Indus is generally covered with low sand-hills; but between the Chenab and Gharras it is level, and the soil is a hard loam. These tracts are not cultivated, and serve only as pasture-ground during and after the rainy season, for livestock; but the pasturage of grain, as javary, gram, and several kinds of legumes, are imported. The sugar-cane is cultivated with great care, and much sugar is made. Wine and different kinds of fruits are grown in great quantities. As the date-apples are very good fruit south of Lahore. Other fruits are mangoes, guavas, and jambo, and also those of Europe, as peaches, apricots, figs, pomegranates, quince, oranges, lemons, almonds, and pineapples. A great number of the tracts between the Indus and Jhilum, and there are also good and strong mules reared. Cattle are very numerous, though commonly of small size. Melons constitute the principal food of the lower classes.

We are very imperfectly acquainted with the climate of the Panjab, no series of meteorological observations having yet been made there. In Lahore the maximum of heat in July is 102°, and the minimum in January 24°. In Multan it seems to rise still higher; at other places even to 119°. The highest degree of heat is generally accompanied by violent north-western winds or toranos, which sometimes occur several days successively, but do not last more than an hour or two. The climate is divided into four seasons, which are in equal proportions: in July a greater quantity falls than in other months.

The country south of the Panjab is occupied by the great sandy tract of Hindustan, which extends southward to the Aravalli range and the salt-morass of the Runn. Its western border approaches the banks of the Indus, from which it is only divided by a fertile tract of land, from 10 to 15 miles wide. Beyond it the Indus is divided into several channels in this part of its course, of which some penetrate farther into the country east of it, the cultivated tracts extend in some places to 30 miles and more from its banks. This country is divided into small tracts in fertility and productions the cultivated tracts in the southern Panjab, but its seasons seem to be more regular: several months pass without rain, and in others the rains are more abundant.

The Desert of Sind, or the Thurr, which on the north-east is connected with the sterile country which separates the plain of the Ganges from that of the Indus, does not present so dreary an aspect as the Sahara or the deserts of Africa. It is crossed by the return of its rivers, and then extends from west-south-west to east-north-east. In some places these hills, called tubas, are overgrown with coarse grass or low bushes, but they chiefly consist of loose sand and with a very small vegetation, and 900 feet higher than the Sindh. This sandy vegetation lasts only for two months, and the remainder of the year their surface is bare, and exposed to great changes from the winds. Between these ridges occur some lower tracts which have a hard, loamy, or stony soil, and on these the vegetation lasts much longer. They are however generally of very small extent, and rarely contain a tract which can be cultivated; yet they are used as pasture-ground for camels and sheep, but for a small race of cattle, the only domestic animals which are kept here. These small oases, called dehars, are not numerous in the neighbourhood of the Indus, but they increase in number and extent as the approach to the desert range. In the extreme east the more extensive oasis of Jusselmer, and along the Aravalli mountains are the still larger oases of Bikanur, Nagore, Juchapour, and Siroth, which contain a considerable extent of cultivated land, and the natural products are bajery and javary. A little cotton is raised. No fruit-trees grow, but melons are abundant. Irrigation from wells is impossible; soon after the rains, water is conveyed to the above the height of 180 feet or even more. In some places it occurs only at the depth of 480 feet. A small quantity of rain falls during the south-west monsoon, but sometimes there is none. The daily land is usually covered with ice. In summer the heat is oppressive.

The desert of Sinda may be considered as extending over the greater part of the delta of the Indus. All the eastern
part of the delta resembles the desert in fertility of soil, though it is covered with a perfect level, and so low that it is frequently inundated to a great extent. But the water of the Indus does not carry down such fertilizing soil as that of the Ganges. Though the inundated country is covered with grass after the inundation ceases, its soil is not adapted to the production of corn, and it offers only pasture-ground for the numerous herds of cattle, and especially buffaloes, which, as well as their herdsmen, are continually moving from one place to another. Such is the condition of the whole northern part of Sind. Though the ground is not quite so near as in the exception of a narrow tract along the banks of the river where the fields can be irrigated. A great part of the interior between the Fulai and Panjari branches is covered by ridges of sand, and the plain which runs between the Sata branch and the Buggurat, where a considerable portion of the country is cultivated and produces rich crops; yet it does not extend over more than one-fourth of its surface. The cultivated lands do not reach the shores of the sea, being separated from them by a broad belt of country covered with bushy and entirely unproductive. The navigation along the delta is very dangerous. The bottom of the sea slopes very regularly from the shore, and at a distance of one mile and a half from it the sea is only from 12 to 15 feet deep. Farther from the shore are numerous sandbanks, against which the water when agitated by heavy storms breaks with great violence. The spring-tides rise 9 feet at the mouth of the Indus, the tide ascends only 75 miles, and is not perceptible at Tatta. Besides rice, which is the principal object of cultivation, the other dry grains of Hindustan are raised. There are also cotton-growing, chiefly from the Ghur, the Sind, and the Sindh. The exports, except dates, are rare; and timber is imported from the coast of Malabar. Besides cotton, buffaloes, and sheep, the extensive pastures support numerous horses and camels, both on the plains and in the interior. Only in the summer do the pastures yield a shower of rain fall during the year, and sometimes none at all. The rising of the river is only caused by the melting of the snow in the Himalayas, and by the rains which fall during the hot season in May and June. The rainfall increases up to July, and in September the river returns to its usual bed. The heat is great all the year round. In March the thermometer has been observed to rise to 96°; but the climate is considered healthy. The plain of the Indus probably does not contain one-tenth of the population of that of the Ganges; and the number of considerable towns is very small. The most populous portion is the Punjab. Its present capital, Amritsar, is a town on the frontier between the United Provinces and the Punjab. Lahore on the Indus has 60,000 inhabitants, but its commerce is on the Ganges. It is a more advanced town than Chittagong, which has 60,000 inhabitants, and considerable manufactures of silk and cotton. These fabrics go to other parts of India, and to Cabul and Persia. The commerce of this place is considerable. In the southern part of the plain of the Indus is Shikkarpooor, 32 miles from the banks of the river to the west, near 29° N. lat., a town with an extensive commerce, being situated not far from one of the most frequent roads which leads from the plain of the Indus to the table-land of Persia. Hyderabad on the Indus, the capital of Sind, contains 25,000 inhabitants; Tatta contains 15,000, and Curachee about the same number. The last-mentioned town, which lies west of the most western arm of the river between about 30° N. lat., and 70° E. long., is a place of considerable trade. In the Thurr, or desert, are several large towns, as Jassulmer, with 20,000 inhabitants; Jhoud- poor, the capital of Marwar, with 60,000; Palli, a commercial town near the Meara, with 20,000; and Nogore, with 40,000 inhabitants. The Punjab is subject to Runjit Singh, the great chief of the Sikhs, whose dominions extend likewise over the whole of the conquerors of the Sind, including Cashmere. Along the southern banks of the Ghara isNamedddpur, which is subject to an independent Afghan chief or khan, he resides in Bhawalpooor on the Ghara. The southern portion of the plain of the Indus is possessed by the Amirs or Emirs, the descendents of a chief of Belochowk, who conquered this country towards the end of the last century; their country is called Sind. The desert is divided between several Rajput princes, who are protected by the East India Company.
which followed the death of Solomon the trade with Ophir was probably neglected; and till the foundation of Alexandria the trade with India was carried on by the Arabs in the way already mentioned.

The port of India was also imported into Greece by the Phoenicians in very early times. Many of the Greek names of the Indian articles are evidently derived from the Sanskrit. Thus the Greek word for pepper, pepperis (πιπερις), comes from the Sanskrit pipali; the Greek word for emerald is smaragdoi or maragdoi (σμαραιγδος, or μαραγδος), from the Sanskrit marahata. The bhusi sinida (βουσι ανδρος), "fine linen" or "muslin," mentioned by Herodotus (ii. 66; vii. 181), seems to be derived from Sindha, the Sanskrit word for the river Indus. The produce of the cotton plant, called in Greek karpoto- or karkaspo- (καρκαςπος), comes from the Sanskrit karpadeśa; this word we also find in Hebrew (Esther, ii. 6) karpas (כっぱ), and it was probably introduced into Greece together with the commodity by the Phoenicians. That this was the case with the word cinnamon, Herodotus (iii. 111) informs us. The word cinnamon (Greek, kinnamomnon or kinnamos; Hebrew, kinnamon, קינמון) is not found in Sanskrit; the Sanskrit word for cinnamon is guđha trach, "sweet bark." The word cinnamon appears to be derived from the Sinaise kahyā neme, "sweet wood," of which the Sanskrit is probably a translation. We are not however surprised at misusing the Sanskrit word for a language. The languages in southern India have no affinity with the Sanskrit. Tin also appears to have been from early times an article of exportation from India; the Greek word for tin, karstero- or kirşnop- (καρστέρος), although it occurs even in Homer, is evidently the same as the Sanskrit karsa.

It is usually considered that the Greeks obtained their tin, by means of the Phoenicians, from the Scilly Islands or Cornwall. There is no direct proof of this; and it appears probable, from the Sanskrit derived from it, that the Greeks originally obtained their tin from India. The islands Cassiterides however, the position of which was unknown to Herodotus (iii. 115), are supposed to be the Scilly Islands or the peninsula of Cornwall. This location is not very exactly defined by Strabo (iii. 175). Still there can be little doubt that the "Cassiterides" to which the Phoenicians from Gadza (Cadiz) went for tin, and the Romans afterwards traded for the same commodity, were on the south-western angle of Great Britain.

The western nations of Asia appear to have had no connection with India, except in the way of commerce, till the time of Darius Hystaspes, b.c. 521. The tales which Diodorus relates respecting the voyage of the Phoenicians to the Indus, and Semiramis (i. 56; ii. 103, ed. Rhodoman) cannot be estimated as historical facts. The same remark may perhaps apply to the alliance which, according to Xenophon, in his Cynegyres to the Egyptians, the Phoenicians were prevailed on to make by the Persians of Caria (Paschal?), in the northern part of India; that he sailed down the Indus till he arrived at its mouth, and thence across the Indian sea to the Arabian Gulf, and that this voyage occurred 30 months. Darius also, it is said, subdued the Indians, and formed them into a satrapy, the tribute of which amounted to 360 talents in gold. (Herodot. iii. 94.) The extent of the Persian dominions in India cannot be ascertained with any probability. The Phoenicians appear to have been included under the name of Indians, or the people dwelling to the west of the Indus; it seems doubtful whether they ever had any dominion east of the Indus; and it is nearly certain that their authority did not extend beyond the Panjab.

The knowledge which the Greeks possessed respecting India, previous to the time of Alexander, was derived from the Persians. We do not find the name of India or Hindus in antiquity. The opinion prevails concerning the situation of Ophir (Asia, vol. ii. p. 214); but we are inclined to consider it as an emporium of the African and Indian trade in Arabia. The Arabian merchants procured the gold from the Egyptians, the pearls, and peascococ from India. The Hebrew words in this passage appear to be derived from the Sanskrit (see Gesenius' Hebrew Lexicon, under מִשְׁלֹשָׁה, מִשְׁלֹשָׁה). In the troubles...
almost entirely carried on by the merchants of that city, but few ships appear to have sailed from Alexandria to India till the discovery of the monsoons by Hippalus; and the Arabsians supplied Alexandria, as they had formerly done the Phoenicians, with the produce of India. The monsoon, which begins, and is felt by the inhabitants of the islands of the middle of the first century of our aera, since they are not mentioned by Strabo, but in the time of Pliny were well known. Pliny has given us (Nat. Hist. vi. 231) an interesting account of the trade of Alexandria and Alexandria, as it existed in his own time. We learn from him that the ships of the Alexandrine merchants set sail from Berenice, a port of the Red Sea, and arrived in about 30 days at Oeaela, or Coae, in Arabia. Thence they sailed by the wind and Hippalus described the manner and circumstances of the natural productions of Hindustan, such as the cotton plant and the bamboo; but his knowledge was very limited. Gelasius, who lived at the court of Artaxerxes Meneon for many years, has given us a fuller account than Herodotus of the manners and customs of the Indians and of the natural productions of the country. He had heard of the war elephants, and describes the parrot, the monkey, the cochinial, &c.

The expedition of Alexander into India (Alex., vol. i. p. 360), a.c. 326, first gave the Greeks a correct idea of the western parts of Asia, and an insight into the admirability of the Phœnix; but he followed the course of the Indus to the ocean, and afterwards sent Nearchus to explore the coast of the Indian Ocean as far as the Persian Gulf. The Parthian was inhabited at the time of Alexander, and was one of the most important to Koptos, a town in the region of the Ganges, whose king was prepared to resist Alexander with an immense army. After the defeat of Alexander, Seleucus made war against Sandracottus, king of the Prasi, and was the war noise of the principal conquests in India. This Sandracottus, called Sandracoptus by Athenæus (Epit. l. 32.), is probably the same as the Chandragupta of the Hindus. (See Sir W. Jones in Antic. Researches, vol. iv. p. 11; Wilson's Theatre of the Hindus, vol. ii. pp. 127-130, 2nd ed.; Schlegel's Indische Bibliothek, vol. ii. p. 246.) Sandracottus is represented as king of the Gangaridae and Prasi, who are probably the same people; Gangaridae being the name given to them by the Greeks, and signifying merely the people who lived in the neighbourhood of the Ganges; and Prasi being the Hindu name, the same as the Pachell (i.e. eastern country) of Sanskrit writers. Seleucus remained only a short time in the country of the Prasi; but his expedition was followed by another one mouth after another, and there were settlements of the eastern parts of India than they had hitherto possessed; since Megasthenes and afterwards Daimus resided for many years as ambassadors of the Syrian monarch, Priam of Persia (Sanctus, Patnapura), the capital of the Prasi. From the work which Megasthenes wrote on India later writers, even in the time of the Roman empire, such as Strabo and Arrian, appear to have derived their principal knowledge of the country. The Seleucids probably lost all influence at Palathia after the death of Seleucus Nicator, a.c. 281; though we have a brief notice in Polybius (xi. p. 652, ed. Casaubon) of an expedition which Attalus the Great made into India, and of a treaty which was concluded as a result of this expedition with the king of the Hindu kingdom, Subhagasna (? i.e. the leader of a fortunate army), whereby the Indian king was bound to supply him with a certain number of war-elephants. The Greek kingdom of Bactria was annexed by the Seleucids, and the province of Taxila became the seat of a governor or lieutenant of the Syrian monarchs, and which lasted about 120 years (a.c. 256-134), appears to have comprised a considerable part of northern India.

After the foundation of Alexandria, the Indian trade was
We read of embassies to Augustus Caesar, sent by Pandion and Porus, and also of an embassy from the island of Ceylon to the Emperor Claudius. Böhlen, in his work on the Indians (l.c.70), doubts whether these embassies were sent; but as they are both mentioned by contemporary writers, the former by Stobæus, and the latter by Pliny, we can hardly question the truth of their statements.

We may form some idea of the magnitude of the Indian trade under the emperors by the account of Pliny (vi. 23), who states that the Roman market of Alexandria had in a year of at least fifty millions of sesterces (upwards of 400,000l.) for the purchase of Indian commodities. The profit upon this trade must have been immense, if we are to believe the statement of Pliny that the articles sold in Alexandria were sold at twice their cost price. The articles imported by the Alexandrian merchants were chiefly precious stones, spices and perfumes, and silk. It has usually been considered that the last article was imported into India from China; but there are strong reasons for believing that the silkworm has been reared in India from very early times. Mr. Colebrooke, in his "Essay on Hindu Classes" (Miscellaneous Essays, vol. ii., p. 185), informs us that the class of silk-twisters and feeders of silk-worms is mentioned in an ancient Sanskrit work; in addition to which it may be remarked that silk is known throughout the Indian archipelago by its Sanskrit name, Sarī (lecture 2, day 21). Those who wish for further information on the articles of commerce both imported and exported by the Alexandrian merchants, may consult with advantage the Appendix to Dr. Vincent’s "Periplus of the Erythrean Sea," in which he gives his own conclusions and a list of authorities, and the explanations, of the imports and exports of the Indian trade, which are enumerated in the Digest, and in Arrian’s "Periplus of the Erythrean Sea."

An account of the trade between Alexandria and India till the time of the Emperor Justinian, during whose reign an Alexandrine merchant of the name of Cosmas, who had made several voyages to India, but with which he was unable to deal, left a description of the country, with explanations, of the exports and imports of the Indian trade, which are enumerated in the Digest, and in Arrian’s "Periplus of the Erythrean Sea."

The kings of Ayodyha appear to have conquered the Deccan, and to have introduced the Brahmanical faith and laws into the southern part of the peninsula. Such at least seems to appear the most likely commercial time in the East. In addition to which, it must be recollected that a land trade, conducted by means of caravans which passed through the central countries of Asia, existed from very early times between India and the western nations of Asia.

History.—First period: From the earliest times to the Mohammedan Conquest. The materials for the history of this period are very few and unsatisfactory. The only ancient history written in the Sanskrit language which the researches of modern scholars have been able to obtain is a chronicle of the kings of Cashmire, entitled "Raja Taringini," of which an abstract was given by Abu Salih in the "Indica" (p. 165). An abstract of this chronicle was obtained by the first time by English scholars in the present century, and was published at Calcutta in the year 1832: an interesting account of the work is given by Professor Wilson in the fifteen volume of the 'Asiatic Researches.' But though this chronicle throws considerable light upon the early history of Cashmere, it gives us little information respecting other parts of Hindustan. The existence of this chronicle is of great importance, as it is the only inscription which we possess, that the Hindus possessed no native history prior to the Mohammedan conquest; and it may be hoped that similar works may be recovered by the researches of future generations. We may also expect to obtain further information by a more diligent examination of the various inscriptions which exist on public buildings in all parts of Hindustan, though the majority of such inscriptions relate to a period subsequent to the Mohammedan conquest. The Brahmins profess to give a history of the ancient kingdoms of Hindustan, with the names of the monarchs who successively reigned over them, and the principal events of their reigns. But their accounts are derived from the legendary tales of the Puranas. a class of compositions very similar to the Greek theogonies; and, although these, and especially the two principal systems, the Ayur-vana and Mahabharata, are exceedingly valuable in an historical point of view for the information they give us respecting the religion, civilization, and customs of the antient Hindustan, they cannot be regarded as works of history. We have supposed that the Brahmins, and perhaps the Kshatriyas and Vaisyas, were a race of northern conquerors, who subdued the Sudras, the original inhabitants of the country. But whatever opinion may be entertained respecting the origin of the Hindus, it is evident that the Hindustan never regarded the southern part of the peninsula as forming part of Ayur-vana, or 'holy land,' the name of the country immediately to the west (east). It was bounded on the north by the Himalayas, and on the south by the Vindhya mountains (Manu, vi. 21-24); the boun- daries on the east and west cannot be so easily ascertained.

In this country, and especially in the eastern part, there were many cities, as well as other places of note, before the Christian era (the probable date of the Rainyana and Mahabharaeta), which had made great progress in knowledge, civilization, and the fine arts, and of which the antient literature of the Sanskrit language is a memorial. According to Hindu tradition, two empires only existed in the most antient times, of which the capitals were Ayodyha, or Oude, and Pratishthana, or Vitora. The kings of Ayodyha were deified, and their names were inscribed on the monuments of the temple, and their names on the temple of the Sun and of the Moon, are supposed to have been the lineal descendents of Satyavrita, the seventh Manu, during whose life all living creatures, with the exception of man and his family, were destroyed by a general deluge. Another kingdom was afterwards established at Magadh, or Bahar, by Jasaananda, appointed governor of the province by a sovereign of the Lunar race. A list of these kings is given by Sir William Jones in his "Essay on the Chronology of the Veda, and the Gez of the Ancient Cen- tury" (see Journal of Asiatic Society, 14-15). The kingdom of Ayodyha appears to have conquered the Deccan, and to have introduced the Brahmanical faith and laws into the southern part of the peninsula. Such at least seems to appear from the inscription which Rama, an incarnation of Vishnu, and the son of the king of Ayodyha, penetrates to the extremity of the peninsula, and conquers the giants of Lanka (Ceylon). This is in accordance with all the traditions of the peninsula, which recognise a period when the inhabitants were not Indians. We have no means of ascertaining whether these conquests by the monarchs of Ayodyha were permanent, but we know that in the time of Arrian and Pliny the Brahmanical faith prevailed in the southern part of the peninsula, since all the principal places mentioned by these writers have Sanskrit names. We learn from tradition and from historical records extant in the Tamil language (Wilson's 'Descriptive Dictionary of the Tamil Language," 3 vol., London, 1847, Col. Mackenzie, and Taylor's 'Oriental Historical MSS. in the Tamil Language," 2 vol., Madras, 1825) that three kingdoms acquired in early times great political importance in the southern part of the Deccan. These were Pandya, Chola, and Chera, and are all said to have been founded by natives of Ayodyha, who colonized the Deccan with Hindus from the north. Pandya was the most powerful of these kingdoms, which extended from the river Vellar, on the west side of the Ghauts, though in early times it extended as far as the Malabar coast, and on the south and east by the sea: its principal town was Madura. The antiquity of this kingdom is confirmed by Pliny, Strabo, and Hipparchus, who all speak of the kingdom of Pandya, which reigned in the south of the peninsula. Chola was founded on the south by the territories of Pandya, and did not extend farther north than the town of Pulicat; its western boundary is uncertain. The kingdom of Chera was of
some extent the northern limit was originally at Palini, near Bhararipur: it is believed on the east by Pandya and Chola, and on the west by the kingdom of Kerala, or Malabar, which extended along the western coast. This last kingdom was probably founded in later times, since, in the time of Arrian the Malabar coast is said to have belonged to the Pandya kings. The Brahmanical colonists appear to have settled principally in the southern parts of the Deccan: the native traditions represent the northern parts as inhabited by savage races till a much later period, and also with the names of the Greek writers. The names of the places on the upper part of the eastern and western coasts are not Sanskrit. The modern Concan is described both by Arrian and Pliny as the province of the Barbares, but is now inhabited by a savage race called Kirthradas, who appear to be identical with the Kirtasans of Sanskrit writers, who are represented as a race of savage forestiers.

The accounts of the Greeks who accompanied Alexander, and more particularly that of Megasthenes, give us, as we have already shown, some information respecting the northern part of Hindustan in the third and fourth centuries before the Christian era, in this persecution; more known of the history of Hindustan from this period to the time of the Mohammedan conquest. There are only a very few historical events of which we can speak with any certainty, except perhaps those relating to the kingdom of Bactria by the Tatars, a.c. 1286, the Tatars (called by the Greeks Scythians, and by the Hindus Sakas) govern the greater part of the western provinces of Hindustan, which remained till the reign of Vicrama, a.c. 56, who, after adding numerous provinces to his empire, drove the Tatars beyond the Indus. This sovereign, whose date is probably well ascertained, since the years of the Samvat era are connected from his reign, resided at Ayuddy or Canin, and had dominion over almost the whole of northern Hindustan from Casamere to the Ganges. He gave great encouragement to learning and the fine arts, and his name is still cherished by the Hindus, who have compiled the most ancient part of their poems. He fell in a battle against Salvaikanja, rajah of the Deccan. We also read of two other sovereigns of the same name, Viciramaditya II. a.c. 191, and Viciramaditya III. a.c. 441.

The most interesting event in this period of Hindu history is the persecution of the Buddhists and their final expulsion from Hindustan. It is difficult to conceive the reasons that induced the Hindu sovereigns, after so long a period of toleration, to show so violent a spirit of intolerance, especially as the Jains, a sect strikingly resembling the Buddhists, were tolerated in all parts of Hindustan. But this portion of Hindu history has already been discussed in another part of this work. (Budissa, vol. v., c. 6, pp. 320-352.) During the reign of Vicrama, the Indian Archipelago were colonised both by Brahmans and Buddhists; for though the Brahmins were finally successful, yet at first they appear to have been overcome by the Buddhists in many parts of India, and to have been obliged to emigrate to foreign countries. (Crawford, in Asiatic Res. vol. xiii., p. 154.) Sir Stamford Raffles, in his History of Java, ii., pp. 1-65, describes the splendid remains of Hindu art which are still to be seen in that island; and a recent traveller in Borneo remarks that the very inmost recesses of the mountains, as well as over the face of the country, the remains of temples and pagodas are to be seen in similar form in those islands of India. (Dalton, in Asiatic Journal, New S., vol. vii., p. 153.)

Christianity is said to have been introduced into Hindustan in the first century; according to some accounts, in the time of Thomas the Apostle, by missionaries, led by the Apostle Bartholomew. But there is very little dependence to be placed upon these statements. The first Christians who settled in any number in Hindustan appear to have been Nestorians, who settled on the Malabar coast for the purposes of commerce. The turn of the fifth century; and in the sixth century we learn from Cosmas that Christian churches were established in the most important cities on the Malabar coast, and that the priests were governed by the archbishop of Seleucia, and were subject to his jurisdiction. When Vasco de Gama arrived at Cochin, on the Malabar coast, he was surprised to find a great number of Christians, who inhabited the interior of Travancore and Malabar, and who had more than a hundred churches. But these Christians appear to have been the descendants of those Nestorians who emigrated to Hindustan in the fifth and sixth centuries, for there is no reason for believing that any Hindustan was converted by their means to the Christian religion.

Second Period: History of the Mohammedan State.—Some Arabians seem to have settled in Hindustan, which was conquered by the Mohammedans as early as the tenth century; but the earliest invasion of the country by the Mohammedans, of which we can speak with any degree of certainty, was in the third part of the tenth century by Sabuktaghin, a Tartar soldier, who was invited by the army of Ghizni. He passed the Indus at least twice, laid waste the province of Lahore, and returned to Ghizni laden with plunder. But he made no permanent conquests. He died a.d. 997, and was succeeded by his son, the celebrated Sultan Mahmud, who is usually regarded as the first Mohammedan conqueror of Hindustan. The Mohammedan historians celebrate the twelve expeditions which he undertook in Hindostan, and extol religious zeal which prompted him to destroy the idols and temples of the inhabitants. He died a.d. 1028, and was succeeded by his son Masud. Though Mahmud had conquered the entire country from the Indus to the Ganges, yet regular government had only been established in Lahore and the north-western provinces. Masud and his successors were unable to prosecute the empire in this country, in consequence of the formidable enemies they possessed. The Tartar tribes, denominated Seljuvides, from the name of their leader, had been invited by Mahmud to settle in Khurasan. After his death they seized upon Bokhara and Samarcand, and threatened the very existence of the empire of Ghizni. In the year 1171 Yessudan, king of Gaur in Khurasan, conquered all the countries west of the Indus which were subject to the monarchs of Ghizni, and brought to the throne of his ancestors. Lahore was taken by Yessudan, brother of Yessudan, in 1184, and Khorosou II., the last monarch of the house of Sabuktaghin, was put to death.

The Hindus however received no benefit from this change of dynasty. In 1191 Mahommed marched further east, and though he was at first defeated by the Hindu rajus, he finally conquered the greater part of the northern provinces. He appointed Kuttub, a favoured Hindu, and extolled religious zeal which prompted him to destroy the idols and temples of the inhabitants. He died a.d. 1225. During this reign Genghis Khan conquered the greatest part of Asia, but did not penetrate into Hindustan. But the Moguls were soon tempted by the riches and fertility of the provinces of India, which were engaged in constant wars in order to repel their invasions. Mahommed II., who ascended the throne in 1244, and his successor Balin (1266), were two able princes, who frequently defeated the Moguls; but Balin, who was a weak prince, who was murdered in 1268. By his death the Gaurian dynasty ended, after having reigned for 117 years.

The dominion now passed into the hands of the Afghans. During the reign of Firuz II., who succeeded Kai-Kobad, the Mohammedans first undertook the conquest of the Deccan. Deoghir was taken by Ali, the nephew of Firuz; but the entire subjection of the northern part of the Deccan was not effected till the regnal year 1295, when Balin, who succeeded by Ali, in 1295, who, though a cruel, was an able and powerful monarch. He defeated the Moguls, subdued the Rajputs, and, by means of his general Kafur, added the greater part of the Deccan to his dominions, and with his death in 1316 the prosperity of the Mohammedan empire.

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In Hindustan rapidly declined. A succession of weak princes followed, during whose reign many Hindu rajahs in Bengal and the Deccan recovered their independence. The invasion of Timur (Tamur) in 1398 overthrew the already tottering power of the monarchs of Delhi. Timur did not remain in Hindustan more than a few months; but after his departure the country became divided into a number of small independent states, governed by the Moghuls, chieftains, religious leaders, and potentates who reigned over different provinces of the country. Durbar, the capital of the Mogul empire, was founded by Manu, who made it the capital of his empire in 1335. The power of the Mogul dynasty declined rapidly after the death of the first emperor, and the empire was divided into four main sections, each ruled by a son of the emperor. The Mogul dynasty was overthrown by the Afghan ruler Nadir Shah in 1739, who expelled the Moguls from the country and established himself as the ruler of India. The Mogul empire was divided among his successors, who ruled over different parts of the country. The northern and western provinces were seized by the Afghans and the Sikhs, and the Moghul dynasty came to an end.

Moghul was succeeded in 1747 by his son Ahmed Shah. During his reign, which lasted six years, the distribution of the Mogul empire came to an end. The Mogul dynasty was overthrown by Nadir Shah in 1739, who expelled the Moguls from the country and established himself as the ruler of India. The Mogul empire was divided among his successors, who ruled over different parts of the country. The northern and western provinces were seized by the Afghans and the Sikhs, and the Moghul dynasty came to an end.

The Third Period: History of the European Conquests.—The Portuguese were the first nation of Europe that obtained any dominion in Hindustan. Francisco de Gama landed on the west coast of India on the 20th of May, 1498. The Portuguese rapidly acquired extensive power in the country. By the possession of Malacca, which fell into their hands twenty-four years after the voyage of Vasco da Gama, they were enabled to command the trade of the Indian Archipelago; and by their numerous settlements along the Malabar coast, especially at Goa and Diu, they monopolized the commerce with Europe. In the beginning of the seventeenth century, the English and French began to make settlements along the coast; and the Portuguese lost their dominions almost as rapidly as they had acquired them.

The Dutch never acquired much political power in Hindustan; though at one time they carried on trade on the greater part of the Indian trade. The French on the contrary obtained extensive possessions in the Deccan. Their principal settlement was at Pondicherry, of which they acquired possession in the latter part of the seventeenth century. The English and French began to make settlements along the coast; and the Portuguese lost their dominions almost as rapidly as they had acquired them.

The commencing and early progress of the political power of the British in Hindustan have already been described. [Bengal.] An account of the British government, revenues, &c., together with a list of the British possessions, is given under East India Company.

Languages.—The numerous languages spoken in Hindustan at the present time may be divided into two great classes; the one consisting of those languages which are derived from Sanskrit, and which are spoken in the northern and central provinces; and the other comprising those languages which are unconnected with the Sanskrit, and which are spoken in the southern parts of the peninsula.

Languages.—The numerous languages spoken in Hindustan at the present time may be divided into two great classes; the one consisting of those languages which are derived from Sanskrit, and which are spoken in the northern and central provinces; and the other comprising those languages which are unconnected with the Sanskrit, and which are spoken in the southern parts of the peninsula. The work of these languages is altogether Sanskrit, such as that of the Italian or Spanish is Latin, with a comparatively small addition of words which cannot be traced to that source. The Sanskrit, however, is more akin to the Sanskrit, but through the medium of the Prakrit, which is still more akin to the Sanskrit than the vernacular languages of Hindustan, and which became the modern language of the people of Hindustan, is given in the present article. The Mogul power was still further weakened by intestine commotions. Each of the four sons of Shah Alum contended for the throne, which was obtained after a severe struggle by the eldest brother Moez-eddin. He was deposed at the end of a few months by his nephew Farrugh-sir (1713), who was succeeded in 1720 by Mohammad Shah, a grandson of Shah Alum. During his reign the Moguls lost all real dominion in Hindustan. The Deccan became virtually independent of its authority under the vice-royalty of Nizam-ul-Mulk, the vizir of Mohammad; and a considerable portion of the northern provinces was wrested from them by the Rohillas and other tribes who had established themselves in that part of the country, which was afterwards known by the name of Rohilla-khand (Rohilcund). The sanguinary invasion of Nadir Shah in 1739, and the devastation and pillage which it caused, rendered the Mogul empire weak, and tended still further to weaken the Mogul empire.

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that a knowledge of Sanskrit is not alone sufficient for an accurate investigation of the history and structure of the modern languages spoken in the northern provinces, since these languages are immediately derived from the Prakrit, as the Prakrit was from the Sanskrit. An account of the Prakrits of which there are five—Sukrit, Buddhistic, which is also immediately derived from the Sanskrit, is given in another part of this work. [SANSKRIT LANGUAGE.]

The languages derived from the Sanskrit may be said in general, to be spoken in the provinces which lie between the Himalaya and Vindhy Mountains; which, as has been already remarked, is the proper country of the Hindus. But this definition is not sufficiently accurate; since the Sanskrit appears to have been also spoken to a considerable extent in the northwestern part of India. In December, 1881, to have investigated this subject with great accuracy, remarks (Institutiones Linguae Pratritiae, Excerptus, l., p. 12) that the most southerly languages derived from the Sanskrit are the Kunkun, spoken on the western coast, the Oriasan, on the eastern coast, and the Maharastra, in the central parts, and that he thinks that a line drawn from Chichacole on the Bay of Bengal towards the sources of the river Tapily, passing by the city of Beder near the sources of the river Kistna, and thence across the Ghatas to Goa on the western coast, would separate the northern languages from those which are unconnected with the Sanskrit.

The number of Sanskrit speakers living on the northern and north-eastern provinces of Hindustan have no connexion with the Sanskrit, but belong to an entirely different family of languages. Those which are spoken in the countries watered by the Indus are closely related to the Dravidian family, which is almost impossible to draw any line which shall separate the languages of Sanskrit origin from those which are derived from the Zend, the ancient language of Persia.

The following list contains an account of the modern languages derived from the Sanskrit. The arrangement is taken, with a slight alteration, from Lassen's 'Prakrit Grammar.'

I. Languages spoken in the eastern provinces.

1. Bengali. [BENGALI LANGUAGE.]

2. Assamese, spoken in Assam. This language has no literature; the New Testament was translated into it in 1812.

3. Oriyas, or Oria, spoken in Orissa Proper, or Cuttack, has a great resemblance to the Bengali, but is not much cultivated. We know of no original composition of importance in this language, except the epic poem called 'Kanji Kaviri Pobi,' which celebrates the conquest of Anjeversam, one of the most striking events in the modern history of the country. In Wilson's 'Descriptive Catalogue of the MSS. of Col. Mackenzie,' there is a list of several tales in this language relating principally to the passionate and chivalric ideas of the Hindoos. The Bible has been translated into the Oriya language, in 2 vols. 8vo. (Stirling on Oriya Proper, in As. Res., vol. xv.)

II. Languages spoken in the northern provinces.


III. Languages spoken in the western provinces.

1. Punjahi, spoken in the Panjab. The 'Songs entitled Khâta-i-Nâmesheh,' written by Ismagal, published in 1831, claim to have a taste for the vocal music of India, are composed almost entirely in this dialect. (Coblestone's Miscell. Essays, ii. p. 38.)

10. The Wuchi, or Multani, spoken in the provinces of the same name.

11. Sindhi, spoken in Sind as far as the mouths of the Indus. A Grammar of this language has lately been published by W. H. Whaten, which we have not yet seen; but it is said to be in No. 12. Kutchi, spoken in the south-western coast, or Cutch.

13. Gurjarati, or Gujarati, spoken in Gujerat, and along the coast as far as Bombay. (See Drummond's Illustrations of the Grammatical Parts of the Gujarattes, Maharastra, and English Languages, 6th, Bombay, 1882.)

14. Kunkun, spoken in the north-western part of India. This language is said to be vernacular: it is spoken at Bombay, and thence up the coast as far as Goa, where the Tuluva language begins.

V. Languages spoken in the central provinces.

15. Bihara, or Bihar, or Marwar, 17. Jagnopura, 18. Udagopura. These four are the languages spoken by the Rajpoote, 19. Haraft, called by the ancient writs Saravart, which was a dialect of the Prakrit. [SANSKRIT LANGUAGE.]

20. Bhoja Bhoori, or Putia Bhoori, spoken in the Daob on the banks of the Yamuna (Jumna). This language is derived from the Sarasente, one of the Prakrit dialects. The Bhoja Bhoori contains a more than ordinary number of words of Sanskrit origin. Many of the dialects from which the Hindustani was formed.

Mr. Colebrooke (Misc. Res., ii. p. 34) says that "it derives its name from the cow-pens (tarraj) and dares in the forest of Vindh, where Krishna was educated among the wives of his father. He reared his son with the 22. Bundelkhand, spoken in Bundelcund. 23. Mogadha, spoken in the southern part of Barabharat. 24. Parabharat, or Maharastra. The districts in which this language is spoken are accurately defined by Carey in the preface to his Maharastra Grammar: 'A line drawn across the peninsula at the north of the latitude of Vizianagaram (Dejapor) will nearly express the southern limit of this language, and another at a small distance from Ujjain (Oujein) about 24° N. lat. will nearly mark its northern limits. From east to west its extent is also considerable, being reckoned to be spoken from the mountains which separate Bengal, Bihar, and Orissa from the countries immediately west of them, to the western side of the peninsula and the province of Guzerat.' (Coblestone (Miscell. Essays, ii. p. 30) remarks, 'that the Maharastra, like other Indian tongues, contains much pure Sanscrit, and more corruptions of that language, intermixed with words borrowed from Persian and Arabic, and with others derived from an unknown source. The Maharastra possesses many poems in their own dialect, either translated from the Sanscrit, or original compositions, in honour of Krishna, Rams, and other deified heroes. Treatises in prose too, on subjects of logic and medicine, are written in the Maharastra dialect.' The political importance which the Maharastra nation once possessed rendered the study of their language important to Europeans. The first Grammar was published at Rome in 1778, under the title of 'Grammatica Marathana &c.,' published at Rome in 1805. 'Carence de la Langue MARATI, 8vo., Serampore, 1805; Carey's Dictionary of the Maratian Language, 8vo., Serampore, 1810; Dictionary, Murrattah and English, compiled for the Government of Bombay, by J. T. Motesworth, assisted by Thomas and George Cundy, 8vo., Serampore, 1810; Descriptive Catalogue of the MSS. of Col. Mackenzie,' there is a list of several tales in this language relating principally to the passionate and chivalric ideas of the Hindoos. The Bible has been translated into the Oriya language, in 2 vols. 8vo. (Stirling on Oriya Proper, in As. Res., vol. xv.)

VI. Hindustani is not limited to any particular district, but is spoken by almost all the natives in addition to their own dialects in the northern and central provinces of Hindustan. This language appeared to have been formed from
the Beja Bābāk and the Prakrit, which was spoken in the extensive empire in northern India, of which Kānya-kūṭa, or Cano, was the capital. After the conquest of Mahmud this language was adopted as the means of communication between the Mohammedans and Hindus, in consequence of which a considerable number of Persian and Arabic words was introduced into the language. It was called by the Persians 'Prakrit,' by the Moslems 'Za,' or 'Zar,' by the poets Rebbka,' scattered, on account of the variety of languages interspersed in it. The Hindustâni was very much cultivated under Akbar and the following emperors, and it was composed by the Mohammedans as well as Hindus. The language was composed in this language. It was adopted at Delhi and Agra with the greatest purity, but since the downfall of the Mogul empire it has been principally cultivated at Lucknow. The Hindi is the same language as Hindustâni, but differs from it chiefly in retaining Sanskrit words, while the Hindustâni substitutes for them words of Persian and Arabic origin. The Hindi is the dialect which is chiefly cultivated by Hindi poets. The intercourse of Europeans with uneducated natives has tended to corrupt the Hindustâni, and thus a barbarous dialect has been produced which is commonly called Moorish or Moors. Grammars of this dialect have been published by Lebeleff, 'Grammar of the Mixed Indian Dialects, erroneously called Moors,' 4to., Lond., 1801: and Hadley, 'Grammar of the Corrupt Dialect of the Jargon of Hindustan (commonly called Moors),' 8vo., Lond., 1809. The Mohammedans advanced the Valley of the Ganges beneath the great Kanshiravvanagari character in writing Hindustani. 'The affinity of Hindi with the Sanscrit language is peculiarly striking; and no person acquainted with both can hesitate in affirming that they are the true form of the Sanscrit. Many words, of which the etymology shows them to be the purest Sanscrit, are received unaltered; many more undergo no change but that of making the final vowel silent; a still greater number exhibits no other difference than what arises from the uniform permutation of certain letters that rest too, with comparatively few exceptions, may be easily traced to a Sanscrit origin.' (Colebrooke's Miscell. Essays, ii. p. 23.)

The Europeans who wish to commence the study of Hindustan the following works may be recommended:—


There are also many mountainous parts and forests in the north of India inhabited by numerous tribes, which do not profess the Brahmanical faith and which speak a language entirely unconnected with Sanskrit. These tribes, which are known by the names of Bhils, Gonds, Vanish, inhabit the ranges of communication between the Caspian, Malwa, Rajpootana, Gondwana, and the Raja mah hills in Bengal. See Sir J. Malcolm, in 'Transactions of Asiatic Society,' i. 65—91; 'Asiatic Researches,' iv. 31—108; 'History of the Indian Inscriptions,' ii. 140—174. It is remarked by Ellis, in the preface to Campbell's 'Te- loogoo Grammar,' that 'it is extraordinary that the uncivilized races of the north of India should in this respect bear any resemblance to the Hindus of the south: it is neverthe less the fact, that, if not of the Sanskrit derivation, the language of the mountaineers of Raja mahal abounds in terms common to Tamul and Telings.' If this be true, it would afford a strong presumption that the whole of Hindustan was inhabited, before the introduction of the Brahmanal faith and the Sanskrit language, by one race, which spoke a common language, and that the Bhils and other uncivilized tribes which are found in northern India are the descendants of the original inhabitants of the country.

Languages not derived from the Sanskrit.—Colebrooke, in his Essay on Persian, Laza, or Persian Grammar,' miscell. Essays, ii. 28, 29, expressed his opinion that the languages spoken in the southern part of the peninsula were derived from the Sanskrit; but this is incorrect. Mr. Ellis, who has made a great study of the languages of southern India, informs us (Preface to Campbell's Telengoo Grammar) that neither the Telugoo nor any of their cognate dialects are derivations from the Sanskrit; that the latter, however, it may contribute to their polis, is not necessary for the explanation of the word; and that they belong to a distinct family of languages, with which the Sanskrit has in latter times especially intermixed, but with which it has no radical connection. The members constituting the family of languages which may appropriately be called the dialects of southern India are the high and low Tamil; the Telugu, grammatical and vulgar; Carnatic, or Cannidi, antient and modern; Malabarica, or Malayalam, which, after Paulinus à St. Victor, is divided into Gramintha Malabarica and Common Malayalam, though the former differs from the latter only in introducing Sanskrit terms and forms in unrefrained profusion; and the Tuluara, the native speech of the Tuluara of that name. The Sanskrit maps the name of Canara is confined. Besides these there are a few local dialects of the same derivation, such as the Cudagu, a variation of Tuluara, spoken in the district of Cannada of that name.

The groundwork of all these languages is the same; and the remarks which Campbell makes respecting the Telugoo applies equally to all the other dialects. "It will be shown," he says, "that the declension of the noun by particular words added to it is the principal, if not the only, characteristic of the first and second persons conjunctly; the conjunction of the affirmative verb; the existence of a negative, a negative imperative and other negative forms in the verb; the union of adjectives and adverbs in the number and in the plural of the pronouns and verbs; and the whole body of the syntax, are entirely unconnected with the Sanskrit." (Introduction to Telugoo Grammar, p. 23.)

1. Tamil, which occupies the most conspicuous place among the languages of the Deccan, and which possesses a literature of considerable interest, is spoken by a population of more than forty millions, and may be divided into Grantha Malabarica and Carnata. It is not derived from any language at present in existence, and is either itself the parent of the Telugoo, Malayalam, and Carnarese languages; or, what is more probable, has its origin, in common with these, in some antient tongue, which is now lost or only partially preserved in its offspring. In its more primitive words, such as the names of natural objects, the verbs expressive of physical action or passion, the numerals, &c., it is quite unconnected with the Sanskrit; and which is then so largely borrowed, when the Tamul, by intercourse with the more enlightened people of the north, began to emerge from barbarity, has reference to the expression of moral sentiments and of abstract ideas, and are by number of useful terms, be found in the colloquial idiom. In this remarkable circumstance, and also in the construction of its alphabet, the Tamil differs much from the other languages of the south, uncivilized tribes in the north, uncivilized tribes which are found to admit the Sanskrit more largely in literary and poetical compositions than in the ordinary dialect of conversation, and which adopt the arrangement of the Sanskrit alphabet with scarcely any variation. The higher dialect of the Tamil is called the Tamul proper, 4to., London, 192, ii. It is a characteristic of the Tamil and Telugoo, Malayalam, and Carnarese languages and idioms; and the language retains an alphabet which tradition affirms to have heretofore consisted of but sixteen letters, and which, so far from resembling the perfect alphabet of the Sanskrit, wants nearly half its characters, and is peculiar in many of its peculiar properties. (Babington, Preface to the Adventures of Gouroo Paraman- tan, 4to., London, 1822, pp. 1, 2.)

It appears that the Tamil language was not cultivated
before the emigration of the Brahmanical Hindus from the north. We find in the Greek writers that the names of cities, mountains, rivers, temples, &c. are all pure Sanskrit, such as Comorin, or Comari, Madura, Kabeet, or Cavend, &c.; and upon referring to the list of Tamul works in Wilson’s Descriptive Catalogue of the Library of Col. MacKenzie, we find that the greater number of them are nothing but translations from the Sanskrit, which were done by the kings of the Chola, and the kings of the Chola have also independently cultivated with considerable success. This appears to have been in a great measure owing to the college established at Madura by the native princes for the purpose of promoting the cultivation of Sanskrit. The first Tamil grammar is supposed to have been the saint Agastyan (the Agastya of the Ramayana), who is said to have invented the Tamul language. His own works are lost; but fragments of them remain. The first known Tamil grammatical work is the principal grammar now extant is ascribed to Parnavati. It is divided into five parts: 1. On Pronunciation and Orthography; 2. On words; the noun, verb, and other parts of speech; 3. On Syntax; 4. On Prosody and Verification; 5. On Tropes and Figures of Speech.

The original part of Tamul literature consists chiefly of histories of the Chola, Pandya, and Chera kingdoms, of dramatic and moral and didactic poems, and of treatises on philosophy and medicine. A considerable number of the historical treatises has been published in Tamul, with an English translation and notes, by W. Taylor, under the title of Oriental Manuscripts in the Tamil language, 2 vols. 4to, Madras, 1827. The great poet and grammarian, principally written by the Pariyar, persons of the lowest class, and yet enjoy a very great reputation. One of the most popular of these writers is Ayyar, a female. An account of her life and writings is given in the ‘Asiatic Researches,’ by Dr. John, in the ‘Asiatic Researches,’ vol. vii., pp. 339-361. But the most celebrated of these poems is the ‘Koral’ of Tiruvalluvan, or the Divine Valluvan, which was published by Wilson in his ‘Descriptive Catalogue,’ vol. i., pp. 233, 234. Extracts from the ‘Koral’ are given in Wilson’s ‘Tamil Grammar’ in his ‘Specimens of Hindoo Literature,’ pp. 54-59.

The Tamul language is divided into two dialects, named Shen and Kodum, or High and Low Tamul. Almost all the historical works in Tamul are written in the Shen dialect; which has ceased to be intelligible to the generality of the people. Both these dialects have been cultivated by European writers, and a grammar of each was composed by the celebrated missionary Beschi. His Grammar of the Shen language, or a translation of the original Latin was published by Babington under the title of ‘A Grammar of the High Dialect of the Tamil Language,’ termed Shen-Tamil; to which is added, an Introduction to the Indian languages, a brief Grammar of the Sgreed, and a Grammar of the Kodun dialect was published under the title of ‘Grammatica Latino-Tamulica de Vulgari Tamulico Lingua Idiomata,’ Trang. 1738. Babington remarks that Beschi appears to have had a more perfect acquaintance with Tamil literature than any foreigner who ever undertook the study; perhaps than any native of modern times. His voluminous works, both in prose and poetry, composed in Tamil, as well as his translation from it, are held in great esteem; and it is a singular fact, that one of the best of the original grammars of that language now extant is the production of his pen. (Preface to Tamil Grammar, pp. i. ii.)

The Bishop Missionary Walter also published a Grammar entitled ‘Oblica et Provinciis de Vulgare Tamulico Idoma Vulgare illustratur.’ Trang. 1739. The most modern grammar is by Anderson, ‘Rudiments of Tamul Grammar, containing the Rules of Kodun-Tamul, or the High Bantu, and of Shen-Tamul, or the Elegant Dialect of the Language,’ 4to., Lond., 1821. Those who are studying the course of Tamul will find the following works useful: ‘Adventures of the English in the Peninsula, translated into the Tamil language, accompanied by a Translation and a Vocabulary, by B. Babington,’ 4to., Lond., 1822.

2. Telinga, or Telugu. This language is commonly, but improperly, called Telinga. It is spoken in the countrysides of Andhra of Sanscrit authors, and in the country where it is spoken is known by the name of Trilinga, Telinga, Telugu, or Tenagu. The Telugu language is the vernacular dialect of the Hindus inhabiting that part of the Indian peninsula which, extending from the Dutch settlement of Pulicat on the coast of Coromandel inland to the vicinity of Bangalore, stretches northwards along the coast as Chaccaola, and in the interior to the sources of the Tapti. This language is not unknown in the more southern parts of India, for the descendants of those Telugu families which were driven from the kingdom of the kings of Telengana to control their southern conquests, or which occasionally emigrated from Telingana to avoid famine or oppression, are scattered all over the Dravira and Carnataca provinces, and ever retaining the language of their forefathers, have diffused a knowledge of the Telugu throughout the peninsula. (Campbell’s Telogoo Grammar.)

The literature of this language predominantly consists of translations from the Sanskrit; it also contains many original, historical, and biographical works, and a considerable number of poems and tales. According to Wilson (Descriptive Catalogue) ‘the oldest works extant are not of higher antiquity than the end of the 12th century, while its Augustan era, the reign of Krishna Deva of Vajepamar, dates in the beginning of the 16th.’ The first attempt to reduce the usage of the language to rule is said to have been made at the close of the 13th century by Nannya Bista, a Brahman, who composed a Telinga Grammar in Sanskrit. Telinga, like Tamul, is divided into a high and a low dialect. The language of composition is so different from the colloquial dialect, that commentaries are necessary even to the learned in order to understand the best works. To Europeans who wish to begin the study of the Telinga language the following works may be recommended. Dictionary of the Telogoo Language, by Campbell, 4to., Madras, 1819; Grammar of the Telogoo Language, by Campbell, 4to., Madras, 1817; Selections, with Translations and Grammatical Analyse, by J. C. Morris, fol., Madras, 1838.

3. Carnatica, or the Carnatic. The northern limit of that extensive region in which the Carnaticas is spoken commences near the town of Beder, in the latitude of 18° 45', about 60 miles north-west from Hyderabad; and sweeping to the north-west to the edge of the Thar, a distance of nearly as far north as the sources of the Kistna, whence following an eastern, and afterwards a north-eastern course, it terminates in rather an abrupt angle near Beder, thereby described as its northern limit. (Wilson’s Descriptive Catalogue, xlii.) In the present inhabited Carnar by Europeans the Telugu language is spoken.

The Carnatic language is divided into two dialects, antient and modern: the modern cannot be said to have any antient dialect; but that of the modern antient was possessed of several historical documents relating to the kings of Mysore, and many poems and tales. The Hala dialect also contains a very curious class of works, written by the inhabitants of the districts of Mysore and Coorg, containing tales and traditions concerning the actions and doctrines of the teachers and founders of the sect. These works are extravagantly absurd and mostly insipid; but many of them are highly characteristic, and indicate a state of religious practice and belief almost as foreign to the genuine Hindu creed as to common sense and sound morality. (Wilson’s Descriptive Catalogue, p. xiv.) This language appears to have been principally cultivated under the Balas and the dynasty of princes, who reigned at Dwarasamudra, the Dolasahmad of Mohammedan historians, from the 11th to the beginning of the 14th century.

4. Tuluva. In Cumpam from Perumbuzhu near Mangalore to Pudupattanam near Nilesvaram, and in Tulu from Go- carnam to Perumbuzhu, which constitute the district in which in recent times the name of Canara has been imposed, the Tuluva, a distinct dialect, though of the same derivation as the Malava, is spoken by the Tuluva reigns. (Ellis, quoted by Wilson, Descriptive Catalog., p. xiv.)

5. Malayalam, or Malayalam, is called Kerali by San- skrit writers, and usually Malabar by Europeans. The country of Malabar, stretching northwards along the coast of the Indian peninsula, is divided into four provinces. The northern, commencing at Gocarnam and extending south-ward to Perumbuzhu near Mangalore, is called Tuluvarayam, the kingdom of the Tuluva, and is divided into four parts: 1. To Pudupattanam near Nilesvaram the country is called Cuprapayram; 2. to Caneti near Collam (Quillon), Ceralarayam; and thence to Canycumari (Cape Comorin), Muscriaryam. The
Malayalam is at present the language of the two last provinces. The Malayalam is, like the Kodun-Tamul, an immediate dialect of the Shen-Tamul; it differs from the parent language generally in the same manner as the Kodun in the pronunciation and idiom, but more especially in retaining terms and forms of the Shen-Tamul, which in the former are obsolete. But its most material variation from its cognate dialects is, that though deriving from a language superficially abounding in verbal forms, its verbs and verbal usages, still personal and reflexive in their application, the persons being always indicated by the pronoun. It is this peculiarity which chiefly constitutes the Malayalam a distinct tongue, and distinguishes it in a peculiar manner from all other dialects of the Shen-Tamul. The prototype of the language is known by the name of Kathariya. Him whose profession (Veda) consists in commerce, which promotes the success of war for the protection of himself and mankind, and in husbandry and attendance on cattle."  

*Dr. Buchanan also remarks that the Malayala and Kodun-Tamul are both branches of the same dialect, and that his Malars servants and the natives were to a certain extent able to understand each other. The accents are very different, and the Malayala language, containing a larger share of Sanskrit and of the Pāḍā or poetical dialect than the language prevailing to the eastward, is generally allowed to be the more perfect. The character used in Malayala is nearly the same as that used among the Tamuls for writing poetry, and the poetical language of both peoples is very nearly the same.*  

*(Journey from Madras through Mysore, etc., vol. ii., p. 346-7.) The Malayalam has been over much cultivated. It contains some translations from the Sanskrit; but almost the only original work with which we are acquainted is entitled Keralam Upannis, and gives an account of the province of Keralam from the times of the Chera to the reign of Cheruman Perumal, who adopted the Mohammedan religion. An account of this work is given by Mr. Duncan in Artistic Researches, vol. v., pp. 1-36. Buchanan remarks, "This work has been written in a poetical or latinate or poetical language. It is understood with great difficulty; many passages are interpreted in different ways; and some of the copies are said to differ essentially from others. The author is supposed to have been Sanskrit Acharya. (Journey from Madras through Mysore, etc., vol. ii., p. 475.) A Grammar of this language was published by Drummond under the title of Grammar of the Malabar Language," vol. Bombay, 1799.

Caste.—The division of the Hindus into classes or castes, with fixed occupations, existed from the earliest times: the caste is derived from the Portuguese word casta, 'race,' or 'lineage;' in Sanskrit they are called varnas, that is, 'castes.' The most ancient portion of the Vedas alludes to such a division; and in the laws of Manu, the Ramayana, the Mahabharata, and all the other Sanskrit works of the greatest antiquity, we find the existence and distinction of castes well developed. The Greeks who visited the country describe its inhabitants as distributed into certain classes. (Arrian, Indic. c.11, 12; Diodor. Sic., ii. c. 40; Strabo, x. c. 1, pp. 485-8, Casaubon; Philostr. hero., ii. c. 19.) We have no positive evidence of the origin of this institution. Heren supposes that it was founded upon conquest; the first three tribes being a foreign race, who subdued the aborigines of the country and reduced them to an inferior caste, while others trace it "as the result of that fondness of perpetuating, like heirlooms, from father to son, certain offices or the exercise of certain arts and professions, which is so peculiarly characteristic of almost all nations of the Indo-Germanic race."  

All the Hindu writings recognise only four pure castes: Brahmans, Kshatriyas, Vaisyas, and Sudras. Pliny (Nat. Hist. v. 28) appears to have heard of the same number; but Megasthenes, from whom Arrian, Diodorus, and Diodotus Scilus derive their account, mentions seven classes: 1. Philosophers 2. Agriculturists 3. Merchants and Hunters 4. Handicraftsmen and Artizans 5. Warriors 6. Public Inspectors 7. Royal Councillors. It seems that these seven have been identity separated into distinct classes individuals belonging to the same class; the public inspects and royal councillors belonged without doubt to the Brahmanical class, as well as the philosophers, the merchants, and hunters to the Vaisyas; and the handicraftsmen and artizans to the Sudras. The following extract from the Jastimala, a Sanskrit work, shows the continuity of the castes respecting the origin of each caste: "In the first creation by Brâman, Brâmanas proceeded, with the Veda, from the mouth of Brahman. From his arms Kshatriyas sprung; so from his thigh Vaisyas, from his foot Sudras, were produced: all with their females. The Lord of Creation viewing them, said, 'What shall be your occupations?' They replied, 'We are not our own masters: oh, God, command us what to undertake.' Viewing and comparing their labours, he made the first tribe superior over the rest. As the first had great inclination for the divine sciences (Brâhma veda), therefore he was Brahmé. The protection of the country became the Kshatriya. Him whose profession (Veda) consists in commerce, which promotes the success of war for the protection of himself and mankind, and in husbandry and attendance on cattle, became the Vaisya. The other should voluntarily serve the three tribes, and so become a Sudra; he should humble himself at their feet."  

A strong line of demarcation is drawn between the first three castes and the Sudras. The former are allowed to receive instruction from the Vedas; and are considered to have been born again in a spiritual sense, whence they are called regenerate. The emblem of this second-birth is a peculiar kind of girdle or cord, which differs according to the caste; and with which a Brahman may be invested from his eighth to his sixteenth year, a Kshatriya from his eleventh to his twenty-second year, and a Vaisyas from his twentieth to his twenty-fourth year; though in certain cases the investment might be made in any other year respectively. (Manu, ii., 36-38.) A Sudra on the contrary is not reckoned among the regenerate; and would, according to the antient Hindu law, be put to death for reading in the Vedas.  

The Brahman possesses the exclusive privilege of teaching the Vedas, and were in former times in the exclusive possession of all knowledge. Though the sovereign of the country was chosen from the Kshatriya class, the Brahman possessed the real power, and were the real counsellors, the judges, and magistrates of the country. (Manu, viii., 1, 9, 11.) Their persons and property were inviolable; and though they committed the greatest crimes, they could only be punished from (Manu, x., 18) the investigation of the case. (Vedas, vi., 186.) The curse of a Brahman could confound the gods to mankind; and Mahabharata contains numerous instances of the withering effects of such a curse.  

The proper duty of a Brahman is to teach the Vedas, to ordain the society of the gods, to make his name and hol objects. At an early age he is placed under the instruction of a Brahman, called a Guru, whose commands he is bound to obey, and whom he must reverence as a spiritual parent; and when he arrives at years of maturity it becomes his duty to enter on a system of celibacy and contemplation. He ought to be supported by the contributions of the rich, and not to be obliged to gain his subsistence by any laborious or useful occupation. But as all the Brahman could do was to instruct the community, it was found necessary to allow them to engage in other occupations; and it is accordingly provided in the laws of Manu, that a Brahman, unable to subsist by his religious duties, 'may live by the duty of a soldier, and if unable to get a subsistence by this employment, may subsist as a mercantile man, applying himself to trade and attendance on cattle.' (Manu, x., 81, 82.) In seasons of distress a further latitude is given. The practice of medicine and other learned professions, painting and other arts, work for wages, menial service, alms, and usury, are among the modes of subsistence allowed to Brahmanas. (Cleebrack, On Indian Castes, in At. Res., vol. v., Miscell. Essays, vol. ii., pp. 186-7.)  

The Brahmanas still hold the first rank in Hindu society, and are treated with great respect in all parts of Hindustan. But in consequence of the conquest of the country by foreign rulers, and the prevalence of many sects that rejected their authority, they no longer possess the power they once enjoyed. The increasing acquaintance of the Hindus with the English language and literature, and the establishment of the modern system of public schools, are tending still further to diminish their influence.  

The Brahmanas are separated into two great classes, one of which occupies the countries towards the north, and the other the countries towards the south. These two classes of Brahmanas hold in great contempt those from Kasi or Benares, as being men from the north; and would not even admit
them to the honour of eating in their houses. The northern Brahmins are however at least as proud as those from the south, and allege several reasons for holding them in contempt; among which the most urgent is, that the women of the northern race are under a curse of to eat in public.

Buchanan’s Journey from Madras through Mysoor, &c., vol. i., p. 306.) In the Deccan the Brahmins are also divided into Vaidikas, who subsist by charity, and dedicate their lives to study and devotion; Lokikas, who follow worldly pursuits; and Vaidikas, who dedicate in temples and perform menial duties to the idols.

The Gurus, or spiritual advisers, hold the first rank among the Brahmins. In the Deccan many of these Gurus possess local jurisdiction over those who had lost caste and the servants of diocesan bishops in a Christian church. They possess authority over a certain district, in which they have jurisdiction in everything relating to religion and caste. They travel in great state, and receive large contributions from their disciples.

The raja of Tenjore is said by Buchanan (Journey from Madras, &c., vol. i., p. 29) “to give his guru 250 pagodas a-day (91l. 18s. 6d.) when that personage honours him with a visit.”

The Kshatriya, or military class, is said by the Brahmins to be extinct; but the Rajputas and the Nairs in the Deccan in all probability belong to this class, though the Brahmins themselves are in error in confusing us (Journey from Madras, &c., i. 253-254) that the people, who in the language of Karna are called Chittrakara, but who are better known by the Mohammedan appellation of Jinigar, or Jilgar, pretend to be of the Kshatriya class, but their pretense is not permitted by the laws of Manu. It appears as if they do not even allege that their ancestors, on account of some injury done to the Brahmanas, were compelled to follow their present mechanical occupations. The decay of the Kshatriya class may be traced to the frequency of the wars to which the six districts of the Deccan were subject, and their freedom from foreign invasion, and the consequent want of employment for a military class. But according to an ancient tradition the Kshatriya caste was descended from the sixth in the list of the sons of Vishnu, and their land bestowed upon the Brahmanas. The laws of Manu appear to refer to the same tradition in a passage where a list of Kshatriya is given, who, ‘by the omission of their rites and the ruin of their religion, have gradually sunk among men to the lowest of the four classes.’ (x. 43, 44.)

The duty of the Sudra is servile attendance upon the higher classes, and especially the Brahmanas, but he may also follow mechanical occupations, as joinery and masonry, and practical arts, as painting and writing; and although a man of a lower tribe is in general excluded from the arts of a higher class, the Sudra is expressly permitted to become a trader or a trader’s son, On Indian Classes—Miscell. Essays, vol. ii., p. 157.) The statements of Robertson, Mill, and many other writers, respecting the strict hereditary nature of all trades and occupations, are very remarkable. The liberty which is given to the Brahmanas, even by the laws of Manu, has already been remarked; and a similar latitude is allowed to the Kshatriya and Vaisya classes. Mr. Colebrooke, whose opinion, from his extensive acquaintance with Hindu literature, and from his long residence in India, is entitled to the greatest respect, remarks, ‘that almost every occupation, though regularly it be the profession of a particular class, is open to most other tribes; and that the limitations, far from being rigorous, reserve only one peculiar profession, that of the Brahmanas, which consists in teaching the Vedas, and assisting at religious ceremonies.’ (Miscell. Essays, ii. 167.) Even as early as the compilation of the laws of Manu, Sudras had risen to royal power (iv. 61); and in the present day ‘a real Kshatriya prince is not to be found; all the greater princes of India, excepting the Paishyas, a Brahmin, are base-born.’ (Rieckard’s India, vol. ii. 12.) But the Sudras, on the other hand, have been obliged to have recourse to almost every calling in order to support themselves. According to Ward, they have even condescended to the conviction of a woman of an inferior class. ‘Rich Sudras have had no other order employ Brahmanas as cooks; even the Vairagi mendicants procure Brahmanas to prepare the food at their seats.’ (Peter, &c., of the Hindustan, vol. i., p. 95. See The Hindustan, in the Liturgies of the World, vol. ii. p. 166-68.)

It is the opinion of some Europeans who have acquired an accurate knowledge of the manners and customs of the natives, that Europeans in general give too much credit to the assertions of the natives concerning the rules of their caste, which are commonly alleged as an excuse for declining any duty that is disagreeable. (Buchanan’s Journey from Madras, &c., vol. i., p. 306.)

A great portion of the population of India does not belong to any of the four pure castes. The individuals who form what is usually termed the impure or mixed classes, called in Sanskrit Varna-Banks, i.e. mixture or confusion of castes, are either original inhabitants of the country who have never professed the Hindu faith, or persons who originally belonged to one of the pure four classes, and have either lost caste themselves, or are descended from those who have been reduced in marriage with persons of different castes. The faults which occasion a loss of caste, and for which no pardon can be given, are—1 Sexual intercourse within the prohibited degrees of consanguinity; 2. Social intermarriages between persons of different castes. The most important of any prohibited class.

2. Eating forbidden food, or drinking intoxicating liquors;

3. Stealing;

4. Slaying any animal of the cow kind, or of the human species; but a Brahman is permitted to kill his enemy in battle; 5. Eating in company with persons of another caste, or of food dressed by their impure hands; 6. Eating on board a ship food that has been dressed there; 7. Omitting to perform the ceremonies due to deceased parents; 8. Marrying a member of any of the four castes.

The number of the mixed classes has arisen from the intermarriage of persons of different classes. It is not true, as has been frequently stated, that every individual is obliged to marry in his own caste; even Manu sanctions the marriage of a Brahman’s son with a woman belonging to any of the four castes. But the number of such marriages is limited. A Brahman is not permitted to marry a woman of the fourth class, nor could he select his wife from any of the four castes; a Kshatriya from the Vaisyas and Sudras castes in addition to his own; a Vaisy from his own and the Sudra castes; but the Sudra has been permitted to marry a woman of the third class and to take her as his wife. But though these marriages are legal, their offspring cannot be admitted into the caste of either of their parents.

As early as the compilation of the laws of Manu the number of mixed classes had become considerable. (See the tenth chapter, which is principally devoted to an enumeration of the mixed classes, with the respective occupations of each.) The most important of the mixed classes may be divided into two sets.

I. The classes which have sprung from the marriage of a man of an upper caste with a woman of an inferior caste.

1. Mordihabhisheka, by a Brahman from a woman of the Kshatriya class. His duty is teaching of military exercises.

2. Ambashta, or Vaisya, by a Brahman from a woman of the Vaisyas class. His profession is that of medicine.

3. Nishdha, or Pirasaeva, by a Brahman from a woman of the Sudra class. His occupation is that of a fisherman.

4. Mdhushika, by a Brahman from a woman of the Vaisyas class. His profession is that of a musician, astronomer, and attendant on cattle.

5. Ugra, by a Brahman from a woman of the Sudra class. His occupation is that of a musician, astronomer, and attendant on cattle.

6. Carana, by a Brahman from a woman of the Vaisyas class. He is an attendant on cattle.

II. The classes which have sprung from the marriage of a woman of an upper caste with a man of an inferior caste.

7. Suta, by a Brahman from a woman of the Brahman class. His occupation is managing horses and driving cals.

8. Vaidika, by a Brahman from a woman of the Brahman class. His occupation is that of a doctor.

9. Chhindika, by a Brahman from a woman of the Brahman class. He is regarded as the most impure of all the mixed classes. His occupation is that of a juggler, and to officiate in other subjeck employments for the public service.

10. Mngadhya, by a Brahman from a woman of the Brahman class. His profession, according to Manu, is travelling with merchants, but according to the ‘Jatiyama’ he is an encomium or bard.
5. Kshatriya, or Kshattya, by a Sudra from a Kshatriya woman. His occupation is said, by the 'Jatimala,' to consist in killing and driving away the elephants sent to the mixed classes, they have the alternative of following that profession which regularly belongs to the class from which they derive their origin on the mother's side; those at least having the option who live in the direct line of the tribes, as the Mirdhubhishtika, Ambashtha, and others. The mixed classes are also permitted to subsist by any of the duties of a Sudra; that is, by a menial service, by handcrafts, by commerce, or by trade. These classes are formed from the intermarriage of the twelve mixed classes that have already been enumerated. The 'Jatimala' mentions the number of 42 mixed classes, springing from the intercourse of a man of inferior class with a woman of a superior class. A further part of these classes is given in Mr. Colebrooke's Essay 'On Indian Classes.' One of the best known of the impure classes is that of the Pariahs, a corruption of the Tamul name Parivir, in the Deccan. They are called Mahishnada in Telengana, and Waliwar in Carnata. Their number is very considerable, amounting, according to the Abbé Dubois, to one-fifth of the whole population of India (De- scription of the People of India, p. 140); but he gives another statement, which we should think, would be very greatly exaggerated. Most of them sell themselves with their wives and children to the farmers, who make them undergo the hardest work, and to the traders, who inculcate with them a spirit of universal severity. They are likewise the scavengers of the villages, their business being to keep thoroughfares clean, and to remove all the filth as it collects in the houses. Some of the Pariahs do not live in the villages, but are employed to take care of the horses of individuals, or of the army, or of elephants and oxen. They are also the porters and run upon errands and messages. In some parts they are permitted to cultivate the lands for their own benefit, and in others they are entitled to the possession of the produce of the land. (Dubois Description of the People of India, p. 458.)

There are other tribes, which are considered inferior even to the Pariahs. Such are the Pulis and the Pulidas, in the southern part of the Deccan; A further part of these classes is given in Mr. Colebrooke's Essay 'On Indian Classes.' The lower and most inferior castes are divided into left and right hand sides, or Edigaai and Ballagaai; the former class containing nine, and the latter eighteen castes. A few subdivisions of the Vaisyas and Sudra castes are also included in these divisions, and the various castes of the lower classes are so assigned that they are not united by any common tie of religion, occupation, or kindred; it seems therefore to be merely a struggle for certain honorary distinctions. The right hand side of the people being placed in the exalted position as the better class, the twelve pillares in the pundal or shed under which their marriage ceremonies are performed; and that their adversaries in their processions have no right to ride on horseback, nor to carry a flag decorated with the figure of Hanuma.

The left hand side pretend that all these privileges are conferred upon them by the grant of Kali; and that they are of the highest rank, having been placed by that goddess on her left hand, which in India is the place of honour. Furthermore, upon this occasion concerning the use and on such occasions not only mutual abuse is common, but also the heads of the sections occasionally air the lowest and most ignoble of their followers to have recourse to violence and murder by holding out the houses and shops of their adversaries as proper objects for plunder.

'Buchanan's Journey from Madras, &c., &c., pp. 79-80.'

Religion and Philosophy.—A knowledge of the religion of a people is always useful in assisting us in forming an estimate of their civilization. With regard to the Hindus, such a knowledge is indispensable, since every circumstance in the life of the Hindu, from the time of his birth to that of his death, is closely connected with religious observances; and the most insignificant as well as the most important acts cannot be performed without the observance of some religious rites or without a reference to some sacred dogmas. It is erroneous to suppose, as often has been done, that the Hindus have always professed the same faith. The sects into which the Hindus are divided in the present day are of modern origin, and the system of theology taught by these sects differs very much from the antient religion of the people. It is proposed in the following remarks to give a brief account of the antient religion of the Hindus (which is still the faith of the majority of the Brahmins and of the educated part of the community); and afterwards to mention the principal religious and philosophical sects into which the Hindus are at present divided.

The Vedas were composed primarily on the Vedas, which are four in number; the Rig- Veda, Yajur- Veda, Saman, and Atharvava- Veda. The present arrangement of the Vedas, which are supposed to have been composed by inspired sages, is as follows: the Brhad- Aranyaka, which contains the Brahma-sutra, 12 books, only a small portion of them has hitherto been known to Europeans; and our principal information about them is a dissertation by Mr. Colebrooke, in the eighth volume of the Asiatic Journal. A few of the hymns of the Rig- Veda were published, with a Latin translation, under the title of 'Rig- Veda Specimen,' by the late Dr. Rosen, London, 1836; and the whole of the Rig- Veda, accompanied with a Latin translation, which Dr. Rosen was employed in editing at the time of his death, well, it is expected, will be shortly published by the Oriental Translation Committee. Each Veda, Mr. Colebrooke remarks, consists of two parts, denominated the Mantras or prayers, and the Brah- manas or speeches, the latter being the explication of the Mantras (or hymns, prayers, and invocations) belonging to one Veda is entitled its Saktu. Every other portion of Indian Scripture is included under the general head of divine speech, or Brahmanas and Upanishads, which expound religious duties, maxims which explain those precepts, and arguments which relate to theology.

The original worship of the Hindus appears to have been addressed to a multitude of deities, each of which represented a particular sect, which gave the prostration, and arguments which relate to theology.

The Vedas undoubtedly teach the belief of one supreme God. Mr. Colebrooke remarks that 'the duties involved appear, on a cursory inspection of the Veda, to be as various as the authors of the prayers addressed to them; but according to the most antient annotations on the Indian Scrip- tures, there are three chief names of deities: the first is Brahma, the second is Vishnu, and the third is Siva, form the trimurti (that is, 'three forms'), or triad of principal Hindu gods. These deities are sometimes represented singly with their respective attributes, and sometimes with all the gods and the system of theology taught by these sects differ very much from the antient religion of the people. It is proposed in the following remarks to give a brief account of the antient religion of the Hindus (which is still the faith of the majority of the Brahmins and of the educated part of the community); and afterwards to mention the principal religious and philosophical sects into which the Hindus are at present divided.

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list of Lokapalas, of whom a list is given in a note to Wilson's translation of the Viyamapraosi. (Hindu Theatre, vol. 2, p. 219.) Those who wish for further information respecting the Hindu deities, may consult with advantage Moor's 'Hindu Pantheon,' Lond., 1810; Coleman's 'Mythology of the Hindus, Lond., 1832; and Rhode, 'Ueber Religions Bildung, Mythologie und Philosophie der Hindus,' Leipzig, 1826.

The worship of these gods, as well as of numerous others, which was once very popular in Hindustan, has almost entirely disappeared, in consequence of the exclusive worship of Vishnu, which is fast monopolizing all the native religious feelings and a large number of other deities, by the religious sects of the Hindus of the present day. The exclusive worship of these deities does not appear to have arisen much earlier than the tenth century of the Christian era. Each sect maintains that the god with whom its sympathies unite is in his person the actual or the attribute of the deity. The exclusive worshippers of Vishnu, Siva, &c., must not be confounded with the orthodox worshipers of these deities. Few Brahmins of learning will acknowledge themselves to belong to any of the popular divisions of the Hindu faith; they acknowledge the Vedas, Puranas, and Tantras, as the only orthodox ritual, and regard all practices not derived from these sources as irregular and profane. Some of these sects appear to have arisen in great measure in opposition to the Brahmanical order; their teachers are frequently chosen from the lower castes, and the distinction of caste is in a great measure lost in the similarity of sects. (Vid. below, in Astaistic Researches, vol. xvi.) The following is a list of the principal sects:

1. Vaishnavas, who worship Vishnu, or rather Rama, Krishna, and the four principal avatars of that deity. This sect has numerous followers in Bengal and Oriissa, and is distinguished generally by an abstinence from animal food, and by a worship which is less cruel than that of the Saivas. But it must be recollected that the Vaishnavas are subdivided into numerous sects, which often agree only in maintaining that Vishnu is Brahma, that is, the deity. A long and interesting account of these sects is given by Wilson in the sixteenth volume of the ' Asiatic Researches,' where the Hindoos are divided into two branches: the one consisting of the sects of the Vaishnavas, under the name of the Kâbr Panthis, founded by Kabir in the beginning of the fifteenth century. No one, with the exception of Nanak Shah, has produced a greater change in the popular belief than Kabir. He assailed the whole system of idolatrous worship, and ridiculed the learning of the Pandits and the doctrines of the Sastras. Though the immediate effect of his doctrines was considerable, their influence is not yet felt in the nether world; and the popular sects are little more than ramifications of the Kâbr Panthis, and Nanak Shah appears to have been principally indebted to him for the doctrines he promulgated among the Sikhs. This sect is included among the Vaishnavas, because they pay more respect to Vishnu than to any other deity; but it is no part of their faith to worship any Hindu deity, or to observe any of the rites or ceremonies of the Hindu religion.

2. Saivas, who worship Siva, are more numerous than any other sect. Siva is usually represented by the Lingam, which the Saivas worship, some figuratively, others literally. The sectarian mark by which the Saivas are distinguished consists in three horizontal lines on the forehead with ashes, obtained, if possible, from the hearth on which a consecrated fire is perpetually kept; and thus differs from the sectarian mark of the Vaishnavas, which consists in perpendicular lines on the forehead. Siva is said to offer according to the sect to which the individual belongs.

3. Sakhas. The Hindu mythology has personified the abstract and active powers of the divinity, and has ascribed sects to each. The greater number of these sects is devoted to the worship of Siva, which is usually represented by the female organ, as the counterpart of the phallic manifestation of Siva.

4. Sauras, the worshippers of Surya, the sun, are a third great order of Indians. These sects are divided into two classes, which, for want of a better name, may be called clerical and lay. The priests may also be divided into two classes, the monastic and secular clergy, of which the majority belong to the monastic order, since the preference is usually given by the lay part of the community to teachers who lead an ascetic life. These sects usually spend the greater part of their life in travelling from one holy place to another, subsisting by alms or merchandise; and when they are no longer able to pursue this wandering mode of life, they generally become mendicants in some religious house or monasteries, which are scattered over the whole country. These sects, Mr. Wilson remarks, 'vary in structure and extent, but they generally comprehend a set of huts, or huts and a temple, with a master or teacher, and a number of his pupils, a temple, sacred to the deity whom they worship, or the Samadhi, a shrine of the founder of the sect, or of some eminent teacher; and a Dharma Sala, one or more sheds for the lodging of their mendicants, and of the mendicants or travellers who are constantly visiting the math. Ingress and egress are free to all. (Astitic Researches, vol. xvi., p. 39.)

The sects which have already been enumerated profess to follow the authority of the Vedas in all matters which relate to religion and philosophy, though their opinions are in many points quite at variance with the doctrines of these works. But there are other sects which entirely disavow the authority of the Vedas, and which are therefore regarded as forming no part of the Hindu church. The most important of these sects are the Buddhists [Buddha], the Jainas, and the Sikhs. The Buddhists have long since been expelled from Hindustan, and the same to a less extent is now the case with the Sikhs. (Vid. below, in Astaistic Researches, vol. xvi.) The existence of large architectural remains clearly referrible to this sect, from the account of the Brahmins themselves, and from other circumstances, that the Buddhists were once very numerous in Hindustan in ancient times.

The sect of the Sikhs was founded by Nanak Shah, who was born A.D. 1459, at a small village called Talwandi, in the district of Bhati, in the province of Lahore. He attempted to reconcile the tenets of the Mohammedan and Hindu religions by recalling them to the consideration of the tenets in which they both belief, namely, the unity of God. 'I am sent,' he said, 'to the Mohammedans to reconcile your jarring faiths; and I implore you to read the Hindu scriptures, as well as your own; but remember that the Sikhs are only a part of the doctrine taught: for God has said no man shall be saved except he has performed good works. The Almighty will not ask to what tribe or persuasion he belongs; he will only ask what he has done.' (Malcolm's Sketch of the Sikhs, in Ast. Res., vol. xi., p. 275.) Nanak gained many proselytes, and his doctrines continued to spread in peace for two centuries. But in the beginning of the seventeenth century they were adopted by the Mogul government, and from that time the Sikhs may be considered as an armed people. A series of bloody contentions ensued; in which the Sikhs were at first entirely crushed; but their strength was revivified by the introduction of the religion of the followers of Nanak, by the complete abolition of the system of castes, wisely judging that the only means by which he could ever hope to oppose the Mogul government with success was by admitting individuals of every caste to the profession of arms. His plan succeeded to a greater extent than might have been expected; immense numbers of the lower castes joined his ranks; and on the downfall of the Mogul government the Sikhs obtained possession of the greater part of the northern and north-western provinces of Hindustan. Malcolm describes the present faith of the Sikhs as 'a creed of pure deism, grounded on the most sublime general truths; blended with the belief of the relative position of all virtues and vices, and the fables of Mohammedanism.' The Sikhs reject the authority of the Vedas, Puranas, and all other religious books of the Hindus; eat all kinds of flesh, except that of cows; willingly admit the changes introduced by the Sikhs, in the profession of arms the religious duty of every individual. An interesting account of this sect is given in Malcolm's Sketch of the Sikhs. (Astitic Researches, vol. xi., pp. 197-292.)

A belief in the transmigration of souls forms an important tenet in the Hindu faith. It is the great object of Hindu worship to obtain a deliverance from future existence, which is supposed to be modified by the present nature of man with that primitive spirit which pervades all nature, and which receives the souls of men, when they have been purified, into its essence. The prevailing notion of the means by which an individual may accomplish this
object is, by subjecting the body to sufferings and privations, and withdrawing from all intercourse with mankind. It is expressly commanded in the laws of Manu (vi, 2, 3), that a Brahman, when his children have attained maturity, should retire from the world and take refuge in a forest. He is required to spend his time in studying the Vedas and in performing penances 'for the purpose of uniting his soul with the divine spirit.' (Manu, vi, 29.) Making of these, he has studied the abstract sciences with great success; and they have always been considered by the orthodox Hindus as the wisest and holiest of mankind. The Greeks gave to them the name of Gyacondai, the learned, as if that of theologies, ascetics dispensed almost entirely with the use of clothes, and many of them went entirely naked. After remaining in the woods for several years, they at length arrived at the dignity of the priest; and the Brahman, as the name signifies, is that which has been abandoned by all worldly concerns; which is the most perfect state of existence which a Brahman can attain, in which state 'he is not to wish for death, he is not to wish for life; but he is to expect his appointed time, as a hired servant expects his wages.' (Pārva, X, 39.) He must entirely detach his affections from all worldly desires; for should he enrich in his heart the slightest wish for any earthly object, the fruits of his previous penance and all his holiness would be lost.

This doctrine is described in the 'Bhavishya-Gītā,' a philosophical poem, forming an episode of the 'Mahābhārata,' which has been translated into English by Wilkins (Lond. 1687), and into Latin by Schlegel, who has also edited the Sanskrit version. The modern reader is under no obligation, in the present day with a wider signification, to designate all the wandering mendicants of the different Hindu sects. These mendicants are also frequently called Vārdīgya, that is, 'persons who perform holy actions and ceremonies without regard to their results, and who keep their minds fixed upon Brahma or God alone.' (Vaiśeṣika, under 'Yoga.')

The Hindus have various philosophical systems which they consider to be orthodox, that is, in accordance with the theology and metaphysics of the Vedas; and others which are denounced as impious, as incipient signs of the destruction of their holy books. The professional design of all these schools 'is to teach the means by which eternal beatitude may be attained after death, if not before.' The most orthodox of these schools are the two Mīmāṃsā, of which one has been founded by Jaimini, the teacher of the reason with the express view of interpreting the practical part of the Vedas, that is, the ritual of religion and devotion, including also moral and legal. The other is called the Pāṇini-Mīmāṃsā. The latter, Uṭtara Mīmāṃsā, commonly called Vedānta, said to have been founded by Vyāsa, treats of the spiritual worship of the Supreme Being, or soul of the universe. It is founded on a scriptural account of a refined psychology, which goes to a denial of a material world. 'The two together,' Mr. Colebrooke remarks, 'comprise the whole system of interpretation of the precepts and doctrine of the Vedas, both practical and theological. They are parts of one whole. The latter Mīmāṃsā is supplementary to the former, and is expressly affirmed to be so; but differing on many important points, though agreeing on others, they are essentially distinct in a religious and Philosophical view.' There are three other schools of philosophy, the Saṅkhyā, Nyāya, and Vaiśeṣika, which, though not strictly orthodox, are respected by very rigid adherents of the Vedas.

The Sanskāra of philosophy, which derives its name from a word signifying reason or deliberation, because precision of reckoning is observed in the enumeration of its principles, maintains that true knowledge can alone secure peace from the evil root. And this knowledge consists in rightly discriminating the principles, perceptible and imperceptible, of the material world, from the sensitive and cognitive principle, which is the immortal soul. The Saṃkhyā philosophy is divided into two schools: of which the first, founded by Patanjali, recognises the existence of a supreme God, and is therefore denominated 'theistic' (Sāraṇca Sāṃkhyā); the second, founded by Capila, acknowledges no supreme ruler and therefore this knowledge is called 'atheistic' (Nītisāraṇca Sāṃkhyā); the gods of Capila are beings superior to man, but like him subject to change and transmigration; the third school, which has not many followers, may be called 'mythological' (Purnācīc Sāṃkhyā), because the cosmogony contained in several of the Purāṇas agrees with this system.

The Nyāya and Vaiśeṣika systems, said to be founded respectively by Gotama and Caṇḍāla, may be taken generally as parts of one system. The first is chiefly occupied with the metaphysics of logic, whence it derives its name of Nyāya, that is 'the science of logic,' or 'science of the arts'; the second with natural philosophy, that is, with 'particular' or sensible objects, which consists of the science of the 'particular.' These schools contrast with other schools of psychology in promising beatitude or final excellence, and (mokṣa) deliverance from evil, as the only end of life. These are among the first principles which they teach, that is, of truth, meaning the conviction of the soul's eternal existence separable from the body.

An interesting account of the philosophical tenets of these sects is given by Mr. Colebrooke in his essay 'On the Philosophy of the Hindus,' in the 'Transactions of the Royal Asiatic Society,' vol. i., pp. 19-43; vol. ii., pp. 439-361; vol. iii., pp. 1-39; reprinted in his 'Miscellaneous Essays,' vol. i., pp. 227-325: to which we are indebted for the greater part of the preceding remarks. See also Kennedy on the 'Vedanta System,' in the 3rd volume of the 'Transactions of the Royal Asiatic Society.'

Laws.—Works on law form an important branch of Sanskrit literature. Of these the most celebrated is the code generally known under the title of the Institutes of Mānusmṛti, that is, the code or law of mankind, in the antient Hindu laws. Those who are desirous of further information on this subject may also consult Halhed's 'Code of Gentoo Laws,' London, 4to., 1776; Svo., 1777, which was compiled in 1606 by the same choice and distinguished scholars as the previous text, from the choice of the most experienced lawyers selected from every part of Bengal. They picked out sentence by sentence from various original in the Sanskrit language, neither adding to nor diminishing anything in the form of the original text. The articles thus collected were next literally translated into Persian, under the inspection of one of their own body, and from that translation were rendered into English, with an equal degree of accuracy, by the most eminent scholars of the East.

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Several other works on Hindu law have been published at Calcutta, of which the most important are:—'Dvēy Bhāga, a Treatise on Inheritance,' 1814; new edition 1829; 'Dvēy-Crama-Sangrah,' an original Treatise on Inheritance, with an English Translation by P. M. Wynch,' 1818; 'Dvēy Tatva, a Treatise on the Law of Inheritance, by Raghunandana Bhattachārya,' 1828; 'Two Treatises on the Law of Inheritance, under the name of Dvēy Bhāga, and the Mitakshara, translated by H. T. Colebrooke,' 1816. An interesting account of the composition of an Indian court of justice, confounded with the antient Hindu institutions, is given in a manuscript, written in the 'Hindu Courts of Justice,' in the 'Transactions of the Royal Asiatic Society,' vol. ii., pp. 166-196; and a curious instance of a trial of a criminal case in a Hindu court occurs in the Sanskrit play of 'Mrichhaṇāri,' or the 'Toy-curt,' translated in Wilson's 'Theatre of the Hindus,' vol. i., pp. 143-159.

Arithmetic, Algebra, Astronomy, and Geometry.—The reader is referred to the articles Arithmetic; Algebra; Astronomy; Geometry; Struiva Siddhanta; Table of; and Vigna Ganita, in this work.

Medicine.—Professor Wilson remarks (Oriental Magazine, Feb., 1833) 'that there is reason to conclude, from the imperfect opportunities of investigation we possess, that in medicine, as in astronomy and metaphysics, the Hindus once kept pace with the most enlightened nations of the world; and that the knowledge of these sciences is divided into two schools: of which the first, founded by Patanjali, recognises the existence of a supreme God, and is therefore denominated 'theistic' (Sāraṇca Sāṃkhyā); the second, founded by Capila, acknowledges no supreme ruler and therefore this knowledge is called 'atheistic' (Nītisāraṇca Sāṃkhyā); the gods of Capila are beings superior to man, but like him subject to change and transmigration; the third school, which has not many followers, may be called 'mythological' (Purnācīc Sāṃkhyā), because the cosmogony contained in several of the Purāṇas agrees with this system.'
as durability, of their colours were as celebrated among the Greeks and Romans as among ourselves. (Ctes. Indic., c. 21; Strabo, xv., pp. 1018-1024; Pliny, Nat. Hist., xxxv., c. 6.) Silk also, as already remarked, was probably manufactured in India in very early times.

The art of obtaining intoxicating liquors by distillation is mentioned in the Ramayana and the laws of Manu. In the laws of Manu (xi. 95) three kinds are specified; 'that extracted from drugs of sugar, that extracted from bruised apples, and that from the new milk of any of which possess,' according to Sir W. Ouseley, 'the plaintive simplicity of the Scotch and Irish, and others a wild originality pleasing beyond description. Counterpoint seems not to have entered at any time into the system of Indian music.' (Orional Collections, vol. iii., p. 298.)


With respect to the present state of the arts among the Hindus, Bishop Heber remarks (Journal, vol. iii., pp. 252-3), 'Hindu art and science have declined from the general run of European nations. Where they fall short of us (which is chiefly in agricultural instruments and the mechanics of common life), they are not, so far as I have understood, the want of labour and the stimulus in any great degree by the people of those countries. Their goldsmiths and weavers produce as beautiful fabrics as our own; and it is so far from true that they are obstinately attached to, and the schoolmen of, the festoon ex utero are mentioned in Sanskrit works. The reader will find in the essay of Professor Royce above referred to much valuable information on the subject of Hindu medicine.

Hindu Architecture.—Much yet remains to be done before we possess precise information in regard to the style of architecture which has not yet been studied by professional men, they being indebted for what they know of it solely to the accounts of travellers and antiquaries, which, again, either consist of merely verbal descriptions, or, if accompanied with drawings, are not illustrated by delineations of the kind indispensable for obtaining exact and accurate ideas of the structures themselves. Till we shall be supplied with the means of corroborating Arrian's assertion, no external authority can be adduced to us in the 'Peripius,' that diamonds and precious stones of every kind were brought from the interior to the port of Nalunda. Ear-rings of ivory are mentioned by Arrian (Indic., c. 19), and the pearl fish are known to the companions of Alexander (Axlerand, Indic., c. 8).

The degree of perfection to which the Hindus carried the art of weaving in antient as well as modern times is well known. Their country has always been distinguished for the number and excellence of the substances which it contains for dyeing colours: and the beauty and brilliancy, as well

The Ayur Veda,' which originally consisted of 100 sections, of 1000 stanzas each, is divided into eight parts—1. Sutras, which are the 'part of the Ayur Veda,' of which four are 'Atharv Veda.' The Ayur Veda, which originally consisted of 100 sections, of 1000 stanzas each, is divided into eight parts—1. Sutras, which are the 'part of the Ayur Veda,' of which four are 'Atharv Veda.' The Ayur Veda, which originally consisted of 100 sections, of 1000 stanzas each, is divided into eight parts—1. Sutras, which are the 'part of the Ayur Veda,' of which four are 'Atharv Veda.' The Ayur Veda, which originally consisted of 100 sections, of 1000 stanzas each, is divided into eight parts—1. Sutras, which are the 'part of the Ayur Veda,' of which four are 'Atharv Veda.'
ng between them will afford means of direct comparison, while such comparison will greatly facilitate explanation. In the article on Egyptian Architecture we referred rather to points of difference and contrast between that style and the Grecian, than to anything of positive similarity, they being separated from each other by an exceedingly wide interval as to all that regards feeling and taste. The Egyptian and Hindu styles, on the contrary, seem absolutely to come in contact with each other, agreeing most in those points wherein they most differ from Grecian and from modern taste. If there existed no other resemblance between the architecture of the two regions, there would be a decidedly strong one in their hypogeae, or subterranean cavern-structures hewn out of solid rock, works therefore more proper of extrication than of construction, and to which, no doubt, ought to be ascribed the chief peculiarities of the styles originating in them, namely, extraordinary massiveness of bulk and proportions coupled with no less singular capriciousness of form. Where the forms are produced by cutting away instead of putting together and building up, they may be shaped quite arbitrarily, moulded according to fancy alone, because they still belong to one naturally coherent mass; whereas the same forms worked out of separate pieces of material, not only would they frequently be at variance with security and stability, but would occasion an enormous waste both of material and labour; the difference between the process of extrication and that of construction being, that in the former the solids are only left after the operation of taking away, while in the latter they are produced by what is built up. This, in our opinion, goes far towards accounting for the various capricious, not to say unmeaning, shapes we meet with in many of the columns of the cavern-temples of India; and these, again, account for the similar taste which was afterwards manifested in works of construction, a taste so remote from our own that the two can hardly be said to have any sympathy in common.

Of these subterraneous or grotto edifices, whose antiquity at the most moderate computation extends to several centuries before the Christian era, and is by some carried back to periods lost in the obscurity of fabulous, the most remarkable are those on the Island of Elephanta near Bombay (Elephanta), at Kennerch, in that of Salsette; those at Ellora near Dowlatabad; at Perwatham on the Kistna; those near the pass of Ajanti, and those at Carli, about 30 miles north-west of Poona. Many of those excavations are of prodigious extent, being composed of a series of apartments and recesses cut out of the rock, amounting in some instances to an almost incredible number, it being said that in the mountains of the Soubah of Cashmere there are no fewer than twelve thousand. Merely as monuments of human labour and perseverance the works of this class would be truly astonishing, but it is their stupendousness combined with magnificence, barbaric and frequently monstrous, that imparts to them a character almost supernaturally sublime and awful. As if to imitate nature in her most minute as well as her grandest productions, while colossal statues and sculptures display themselves within these cavern-temples and on their walls, elaborate embellishments of detail are frequently given to the columns, which appear composed of fragments capriciously put together, it being impossible to determine where their pedestals terminate and their shafts commence, or how much of these latter belong to the capitals. In fact, what is sometimes described as pedestal supporting the column, might with as much propriety be termed its lower portion, although square or polygonal, while the rest of the shaft is circular. In this respect the Hindu style, at least this earliest class of it, differs materially from that of the Egyptians, where the shafts of the columns have no pedestals, and scarcely any thing amounting to a distinct base, and where, however much the column itself may be ornamented, the capital is plainly distinguishable from the rest. The forms themselves are so singular as to baffle all attempt at verbal explanation, or even comparison, and so varied, that to illustrate them by drawings would be laborious. As far however as a solitary example can be of assistance for such purpose, some idea respecting them may be obtained from those in the temple at Elephanta; which, if the square part is to be considered as a distinct pedestal, are remark-

ably short, whether compared with that or with their own diameter.

It will be seen too that the pillars partake as much of the square as of the circle in their plan, and have quite as much of the baluster as of the column, both in their shape and proportions. Another circumstance to be noticed, as in this instance constituting a striking point of difference from the practice of the Egyptians, is, that they are placed so far apart, so very stragglingly, as to resemble only occasional props, instead of a continued colonnade. In this respect however there appears to have been no fixed system, for in other examples the columns are placed so close together that the parts of their capitals almost touch. This is the case with those in one of the temples on the Island of Salsette, which have flattened globular bases and capitals, and plain polygonal shafts of less massive proportions than usual; owing to which the architecture has a more regular and uniform appearance, a close file of pillars on each side, leaving a lengthened vista between them. Although therefore there is no positive evidence to show which are the earliest works of this description, it is but reasonable to infer that those which display greater architectural symmetry in their arrangement and forms belong to a later period than those which are fashioned more after the manner of natural grottos, in regard both to the number and disposition of their columns and the forms given to these latter. Neither have we anything beyond conjecture to inform us as to either the time it must have taken to execute such prodigious excavations or the mode of operation pursued. Equally matter of conjecture is it whether advantage was
taken of natural cavities in the rock, which were extended and hollowed into more regular shape, or whether such works were entirely artificial and the result of human labour. Probably the latter was the case in some instances, the former in others.

If it be difficult to form any sort of classification, either architectural or chronological, of a vast heap of stones thus shaped and piled, it is one obvious distinction observable in these excavated temples, namely, that in some of them the ceiling is quite flat, as at Elephant; in others, hollowed out so as to resemble more or less a regular vault. Of this kind, one of the temples of Kenereh, Kenneri, or Canara, in Salsette, which is exactly on the same plan as that at Carli, and the principal object or idol is alike in both, and consists, as Moore describes it, of a vast heap of stones, or a pedes
tal of greater diameter, having its convexity sur
douted by a sort of canopy or umbrella of peculiar con
struction.7 The ground-plan of an archetemple of Buddha at Ellora is exactly similar, but there is here a figure of Buddha himself in front of the cylindrical pedes
tal and hemisphere just mentioned.8 In neither of
these three arched caves, says Moore, 'will, I think, be found sculptures referring to the gods of the Brahmanas; and those three are the only caves I have ever seen or heard of constructed with an arched roof. And I presume to hazard an opinion that they are of modern origin relatively with other excavations at Ellora and at Elephant, con
taining only the idols of the Buddha, and the tulsi, worshipped by the Brahmanas.' If the examples just re
ferred to are singular, as being the only instances of vaulted roofs in excavated temples, it is not at all less singular that such form should have been adopted, it being in itself the most obvious, and that fur
nished by natural rock-caverns and grottos. Afterwards
this form of roof appears to have been elaborated with great ingenuity and skill, for that of the temple of Mahadeva at
Naldeo exhibits a perfect model of the most antient style
of dome in the East, and probably anterior to any thing
of the kind in Roman architecture. The stones are placed so as gradually to project one beyond the other, the apex being closed by a circular key-stone. The principle there
fore is that of a horizontal instead of a radiating pressure, and the edges of all these projections being rounded off, the spectator sees, on looking up, a vault composed of gradually diminishing circles or semicircular courses of masonry.

In this respect then even the earlier Hindu style presents a marked difference from that of the Egyptians, whose edif
ces are all covered with flat horizontal ceilings. On the other hand, the affinity between the architectural taste of the two people is strongly marked by the prevalent use we observe, in the edifices of both, of colossal statues placed against piers or walls, sometimes quite attached to or sculptured on them, and which may therefore be consi
dered quite as much to constitute part of the general em
bellishment, as to be specific objects of worship. In both
we find frequent use of Caryatid figures, or such as serve as columns; and either entire figures or the upper parts of them, both human and animal, enter abundantly into the composition of Hindu columns and capitals. A strong similarity of system also observable in the general dis
position of the sacred buildings of the Hindu and Egyp
tians is, that the former, like the latter, have generally an open or unroofed court before them (sometimes formed by clearing away the rock itself), leading to a vestibule, nave, and sanctuary, progressively diminishing in size. Neither is it uncommon to meet with, in the excavated temples, series of chambers or small chapels along their sides, increasing their otherwise strong similarity of plan to those of Egypt. The profusion of inscriptions and symbolic sculptures on the walls affords also another characteristic point of resem
bance.

On proceeding to consider another class of Hindu works, namely, those of construction, that is, edifices erected above ground, we can hardly avoid being struck by the prev
ance of pyramidal masses and forms, as exhibited in pa
godas or towers. Whether the Egyptian pyramid origi
nated in the purpose of constructing an artificial rock
containing sacred chambers and sepulchres similar to those
evacuated in natural ones, is merely hypothesis; neither can we pretend to say that structures of similar outline, among the Hindus, are evidently derived from and imi
tation of towering masses and pinnacles of rock. Resem
blances of this kind afford no positive evidence of intention,
being in themselves too indefinite, and depending chiefly on the fancy of the spectator. Still we may be permitted to observe, there is nothing very extravagant in the notion that the forms alluded to were derived from such natural prototypes. In the infancy of art it is probable that stones were rudely piled up one above the other, converging to an apex, as being of all forms the most stable; or else a monolithic fragment of rock was reared up to serve as a monumental record and object of superstitious veneration; and in these we may be allowed to recognise the first ad
vances towards the pyramid and obelisk. At the same
time it must be admitted that the Egyptian structures of this kind bear a much closer resemblance to such proto
types than do those of the Hindus. The gopuras or pagoda towers erected over the gateways leading to temples are indeed pyramidal in their general form, but infinitely more complex than, not the pyramid alone, but any thing else we meet with in Egyptian architecture; being divided into a succession of stories, sometimes to the number of twelve or even more, with doors or rather windows in each, adorned with balconies and pillars. Neither do they termi
nate in a point or mere platform, but have generally a great deal of ornament bestowed on their summit, which sometimes assumes, not inedgently, the form of a crown, as that of Deo
bahar; and there are also instances of (course compara
tively modern ones) of their being surmounted by a bulbus
dome. Besides this they differ from the pyramid in being of a very much greater height, and also in being the greater number made of brick. As is apparent in the article on
Egyptian architecture, in the pyramids the height measures less than the side of their base; but in these Hindu struc
tures it greatly exceeds the width at the lowest part, being frequently twice as much, or even more. Of a domed termina
tion, if not exactly a dome, we have an example in the
great pagoda at Tanjore, which is considered one of the finest specimens of the kind in India, and from the annexed representation of which their general character may be understood.

Pagoda at Tanjore.

Among the more considerable ones are those at Chalem
baram, Deoghat, Talcoot, and Conjevarum. Those at Deoghat
are grouped together; a mode that seems to have been
practiced on other occasions, for at Benares there is a group of several pagodas, four of which are now standing quite in the river, two upright, and two in a slanting position; and at Bindrubb, on the river, there exists another group of pyramidal structural forms, whose faces, which are ornamented with sunk panels, are neither graduated nor flat, but curved in such manner that their section is not unlike that of a sugar-loaf: the angles between these faces are ornamented with rows of columns or ribs inserted in them. These however are not divided into stories like the usual pagodas, in some of which such divisions are very strongly marked, each story being considerably larger than the one below it, which is a fact that they have in common with their small resemblance to those of the Chinese. And here it may be remarked that Hindu architecture seems to have some resemblance to that of the people just referred to, as well as to certain Egyptian buildings.

Besides the two varieties above described, there is another class of Hindu monuments which calls for some remark, namely, the temples erected by the Jainas, or chief sect of the Buddhists. Some of these were erected long prior to the Chere of the most complicated and exquisite workmanship. Although placed within an area about 250 yards square, the body of the temple, or sanctuary (mandir), over which rises a pyramidal sbh, or roof, is only 21 feet square, but the additions of the cornices, gables, and the principal portion composed of the four superb columns makes the whole 44 feet by 21. The ceilings are elaborately worked, and that of the portico consists of a single block. Facing this temple is a large build ed flsh, or Nuptial Hall, a square of about 40 feet with a double range of pillars on each side forming open colonnades. This sbh is the frustum of a pyramid, each stone of which is elegantly carved, and gradually decreasing in size to the sbh or ball.

In some of the older Hindu edifices (not excavations, but constructions) there is a decided Egyptian physiognomy; and the ruins of Bheemah Chauri in the Mokhumb are considered by Tod to exhibit the link between the two styles, which, though they have very much in common, have also no little that is peculiar to each. Not only do they assimilate in employing the pyramidal form, which of itself gives a great distinction between them and the classical styles of ancient Europe, but the religious edifices of both people have very marked and important features in common, with which Greek architecture offers us nothing at all. The forty polychromed statues of Brahma, and occasional instances of something analogous in purpose. It is true, when we compare them together we are as much struck by the specific differences as by the general resemblance between the propriety of the Egyptian and the propriety of the Hindu temples. For besides being divided into stories, the latter are otherwise far more varied and complex, and display a lavish profusion of detail and subdivision of parts for ornamentation, and have yet been remarkable both in the moral and in the construction of the temples. And certainly not to be found in those of the same class as the one here referred to. In fact, however highly enriched many Egyptian buildings may be, the mode of decoration employed in them is not of a kind to interrupt the simplicity of the outline, it being almost entirely superficiai, that is, merely enriching surfaces, as a pattern wrought upon their walls would; whereas the Hindu seem frequently to have affected the extreme both of massiveness and lightness in the same design, attaching very slender and merely ornamental pillars to enormous pictures. But among the Hindu we may have instances in the padoga at Chalambaram, and in some doors in the choultry at Madura; at which latter place there is also another very remarkable monument of Hindu architecture, namely, the great temple, with its four gigantic porticoes, each surmounted by its own set of figures, each figure of stories, whose faces have projecting breaks; consequently they deviate still more from the simple pyramid form. The Kheepl Kumbum, pillar, or rather tower, of vicinity at Ceylon, is of this kind. It consists of an oblong base in plan, and the breadth of each side 33 feet at the base, and 174 immediately below the cupola. Each story has doors or balconies adorned with pillars, so as to resemble small porticos.

Here we must close this imperfect sketch of the subject, without touching upon that later style introduced into Hindustan after the Mohammedan conquest at the close of the 14th century. Still we cannot forbear advertling to the very close resemblance which this latter bears in some of its features to our own pointed architecture. Hedges refers us to the mosque at Chuna Gur on the Ganges, as a proof of this, and the form and structure of the arch is very different from the character from those in the executed works, and which might therefore be thought to indicate a totally different period of art. They are about forty in number, and partake somewhat of the Egyptian candelabrum shape, although no two are exactly alike. The ceiling is highly enriched with square panels or coffers, containing others in the form of lozenges, enriched with foliage and sculpture, in style not very much unlike our own. The temple of the Jinnau is surrounded by a superb screen of Saracenic architecture, assigned by Tod to the first dynasty of the Ghorsian Sultans. The entrance arch is of that very outline characteristic of the Hindustan style and is peculiar to the Egyptians.

The same writer dwells upon the analogy observable between the details of the columns in this temple and the ornaments of Gothic buildings.

We should also refer to the great temple at Bareilly, as a structure of the most complete and exquisite workmanship. Although placed within an area about 250 yards square, the body of the temple, or sanctuary (mandir), over which rises a pyramidal sbh, or roof, is only 21 feet square, but the additions of the cornices, gables, and the principal portion composed of four superb columns makes the whole 44 feet by 21. The ceilings are elaborately worked, and that of the portico consists of a single block. Facing this temple is a large build ed flsh, or Nuptial Hall, a square of about 40 feet with a double range of pillars on each side forming open colonnades. This sbh is the frustum of a pyramid, each stone of which is elegantly carved, and gradually decreasing in size to the sbh or ball.

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HIP

supracrustaceous strata; one (H. Dubuissoni, of Sowerby) is found in the English crag.

HINZOUAN. [ANZOUAN.]

HIPPA, HIPPA TRIBE, Hippidere of Latreille, Hippodromes of Milne Edwards, the latter of whom thus describes these crustaceans belonging to his family of Pterygura. The tribe is composed of a small number of anomous crustaceans which appear to be especially framed for burrowing in the sand, and which present extraordinary forms. The carapace is longer than it is wide, and very convex transversely, presenting always on each side a great lamellar prolongation, which more or less covers the base of the feet; it is truncated posteriorly, and appears to be continuous with the anterior portion of the abdomen, which is very wide and lamellar laterally. One of the pair of antennae is always very long. The external jaw-feet do not present a conformation like that which is observable in the greater part of the crustaceans treated of in the prior part of M. Edward's system; they have neither flagrum (fouset) nor palps, and their three last joints are very well developed. The sternum is linear, and the feet are imperfectly extensile; those of the first pair are monodactylous, or subcheliform, and those of the two or three succeeding pairs are terminated by a lamellar joint proper for burrowing. The posterior feet are filiform, semimembranous, recurved forwards, and bind between the lateral parts of the carapace and the base of the preceding feet. The penultimate ring of the abdomen is always furnished with a pair of false feet, terminated by two or less oval ciliated blades or laminae; but these appendages have a more solid structure, and are not applied against the seventh segment so as to form with it a fan-shaped caudal-fin, as in the Macrura. The rami are on the first joint of the third pair of feet. The brachiae are disposed on a single line and inserted by a peduncle which rises near the lower third of their internal surface.

This tribe is divided into three genera, which M. Milne Edwards distributes as follows:

1. **Hippus**
   - **Anterior external long, subcheliform**
   - **Genus Remipes**

2. **Ancistrohippus**
   - **Anterior foot subcheliform**
   - **Genus Remipes**

3. **Albunea**
   - **Anterior foot filiform**, not at all subcheliform.

**Hippus**

Most analogous of any of the tribe to the Rannina, as well by their general form as by the disposition of their appendages, which is straight from base backwards, and convex transversely, is only a little prolonged above the base of the feet; it is terminated anteriorly by a nearly straight border, which occupies its whole width; it is in form oval or square, and strongly notched for the insertion of the abdomen. A small mesial point represents the rostrum. The ocular peduncles are large and lamellar, whilst the eyes, situated on their external border, are extremely small. The internal antennae are very large, and they are terminated by a single multi-articulate filament longer than the body, slightly flattened and ciliated on its edges. The external antennae, inserted nearly on the same line as the internal, are short, and terminated in a small stem composed only of from seven to eight joints. The external jaw-feet are more or less pediform; their second and third joints are almost cylindrical, and the terminal portion formed by the three last joints is sometimes as long, and almost as large, as the basilar portion. The feet are short; the first pair are terminated by a large hand rather subcheliform than cheliform, the moveable finger ap Faculty to itself to its anterior border, the lower angle of which is nearly projecting, and consequently does not really constitute an immovable finger. The three following pairs are nearly of the same form, and terminate in a falciform joint. The posterior feet are almost filiform. The first joint of the abdomen is small, and received in a notch of the carapace; the second is, on the contrary, very large, and presents on each side a considerable lamellar prolongation, which rides a little on the carapace. The third and fourth joint of the segment is progressively, but are nearly of the same form as the second; while the fifth, sixth, and seventh are very narrow, and present no lateral prolongation; the sixth supports a pair of false natatory feet, terminated by two oval laminae; and the seventh has the form of a nearly circular lamina. (M. Edwards.)

**Example, Albunea Symmesta.** Length of carapace 10 lines.

**Locality,** the seas of Asia.

**Remipes.** (Latreille.)

Carapace nearly regularly oval, convex, and less than once and a quarter as long as it is wide. Front rather large and truncated. Orbita semicircular, and their external angle much more projecting than the front. The ophthalmic ring is covered above by the front, but is not surrounded by the carapace; the ocular peduncles are composed of two movable portions, one basilar, which is stout and short, the other terminal, cylindrical, slender, carrying at its extremity a very small imperfectly retractile cornes; the eyes, in fact, can scarcely be turned backwards, as in the greater part of the Decapods, but advance and recede a little by the motion of the basilar portion of their peduncle. The internal antennae are inserted below the base of the ocular peduncles, and are very large; their basilar portion is composed of three joints nearly of the same size, and their terminal portion consists of two long filaments which are multi-articulate, stout, and directed forwards. The external antennae are inserted within the internal, nearly on the same line, and under the lateral anterior edge of the carapace; they are short but very large; their first joint is much wider than it is long; the second and the third are nearly of the same dimensions, and the succeeding joints diminish rapidly in volume. The boccal frame is not closed anteriorly. The external jaw-feet are wide and short; their first joint is nearly globular, and carries neither palps nor flagrum; the second joint, which is so large in the Brachyura, is rudimentary here; and it is the third, which, become very large and nearly oval, constitutes solely the species of operculum formed ordinarily by the second and third joints united; the three last joints form a sort of large claw, which applies itself against the anterior border of the third joint. The jaw-feet of the second pair are equal, but constitute the flagrum, but have a filiform peduncle; it is the same with the anterior jaw-feet; their palps are lamellar, dilated anteriorly and disposed nearly as in the Oxystomata. The jaws of the second pair present nothing remarkable; those of the first pair are very small. The mandible, which is strongly dentinate, is furnished with a pair composed of two small lamellar joints, separated from the body of the mandible by a large membranous furrow. The sternum is linear. The anterior feet are long; their second and third joints are enlarged, but the three last are cylindrical; and the last, which is nearly as long as the preceding one, is slightly flattened, pointed,
HIP

and incapable of being bent back upon it. The two following pairs are large, and terminated by a large hastiform lamina; the fourth pair are held by a small nearly conical joint. The fifth pair are slender, long, and membranous, and are bent back upon the lateral prolongation of the carapace. The last thoracic ring, which supports these appendages, is complete, movable, and not covered by the carapace, so that it might be easily taken for the first abdominal segment. The abdomen is very large, and presents on each side a lamellar oval prolongation which rides upon the carapace; its anterior border is notched for the lodgement of the second abdominal ring, which is oval; the third and fourth segments diminish progressively in volume; the fifth and sixth are equally small, but are soldered together; and the seventh has the form of a great triangular lamina, the length of which exceeds that of all the rest of the abdomen. The three first rings in the female are furnished with simple oviferous filaments; the fourth and fifth rings are without appendages, while the sixth ring carries a very large pair of false natatory feet, terminated by two raised oval plates which are ordinarily bent forward. (M. Edwards.)

Example, Remipes testudinarius. Length of carapace about 15 lines.

Locality, the coast of New Holland.

Reimpes testudinarius.

Hippa. (Fabricius.)

When Fabricius established the genus it was much more extensive in its limits, and at present it only contains those Hippas whose external antennae are terminated by a long and stout multi-articulate filament. Body oval, or rather ellipsoid, being rather less wide forward than backward. Carapace truncated posteriorly, very convex transversely, and presenting towards the middle a transversal curved furrow which indicates the posterior tenuity of the stomaschial region; its latero-anterior border is concave, but its latero-posterior border is very convex. The rostrum is small and triangular, and on each side of its base is a notch which exposes the insertion of the ocular peduncles and the external antennae, and which is bounded externally by a projecting tooth which advances above the internal edge of the great antennae. The opthalmic ring, which is covered in its mesial part by the rostrum, is of a horse-shoe shape, and its two extremities are exposed; the ocular peduncles, inserted at its extremity, are composed of three pieces, and of these the two basilar, which are very short, are bent under the carapace in the form of V, and the last, which is slender, cylindrical, and very long, advances between the internal and external antennae, and terminates by a small pyriform enlargement which carries the cornes. The internal antennae are of moderate size, and their basilar joint, which is cylindrical and a little curved downwards, is larger than the succeeding ones, which is furnished on the external side with a strong tooth directed forwards; the third joint is short, and gives insertion to two multi-articulate stemes (tigelles). The external antennae are very large, but easily escape observation, for they are ordinarily bent backwards and hidden almost entirely between the mouth and the external jaw-feet. The first joint of their peduncle is small but little apparent; the second is large and armed anteriorly with two uniform teeth, the external of which is much the strongest; the two succeed-
it is true, have derived this knowledge from much better observations, made within the last hundred years; but we should then have had no proof that this motion remains sensibly the same through a long course of ages; and the observations of Hipparchus, by their number and their antiquity, and in spite of the errors which we are obliged to admit, give important confirmation to one of the fundamental points of astronomy. It is to him that we owe the first discovery of this phenomenon. He also invented the planisphere, or the method of describing the starry heavens upon a plane, and of deducing the solution of problems in spherical astronomy by a method often more exact and convenient than that of the globe itself. He is also the father of real geography, through the happy idea of marking the position of towns in the same manner as that of the stars, by circles drawn through the pole perpendicular to the equator, that is, by latitudes and longitudes. His method, by means of eclipses, was for a long time the only one by which the longitude could be determined; and it is by means of the projection of which he was the author that we now make our maps of the world and our best geographical maps.

HIPPIANS. [Hippa.]

HIPPIAS, HIPPARCHUS: [Pisistratus.]

HIPPO, ALGERIA. [HOMOLIANS.]

HIPPOCERHALODES. By this name Plot and other writers understood the inner cast of certain equi-valued conchifera, especially Trigonia.

HIPPOCHORUS, HIPPARCHUS: [Conchology. [STROMBOIDES.]

HIPPOCRATEACEAE, a small natural order of Exogenous plants remarkable for the presence of three monadelphous stamens in a pentaspermous flower. The fruit consists of from one to three cells, and is frequently extended at the back in a membranaceous manner, so as to resemble the samara, or key, of the ash-tree. The species are woody, and often climbers; they inhabit Africa, the Mauritias, and the tropical parts of America; in general they are of no importance for economical or medical purposes; one species bears an eatable fruit, and another has oily seeds with a sweet taste. The order hardly differs from Celastraceae.

The following summary is from the preface to Delambre's History of Ancient Astronomy, in which work will be found the most complete account of the labors of Hipparchus. The basis of this historian seems to be, to add to Hipparchus some of the fame which has been generally considered due to Ptolemy, for which he gives forcible reasons. [Svetikx.] Let no one be surprised at the errors of half a degree which we attribute to Hipparchus, seemingly with reproach. It must be remembered that his astrolabe was nothing but an armillary sphere, of no great diameter, and with rather small sublunars, of no great degree of centesimal division, so that he had neither telescope, vernier, nor micrometer. What should we do even now if deprived of those helps, and if we knew neither the refraction nor the true altitude of the pole, on which point, even at Alexandria, and with armilis of every sort, an error of a quarter of a degree was committed? At this day we dispute about a fraction of a second: they could not then answer for any fraction of a degree, and might be wrong by a whole diameter of the sun or moon. Let us rather think of the essential services which Hipparchus rendered to astronomy, of which science he is the true founder. He was the first who gave and demonstrated methods of solving all triangles, whether plane or spherical. He constructed a table of chords, of which he made nearly the same use as we now do of our tables of sines. He made many more and much better observations than his predecessors. He established the theory of the sun in such a manner that Ptolemy, 263 years afterwards, found nothing to change. It is true that he mistook the inequality of the sun's motion: but it can be shown that his mistake arose from an error of half a day in the time of the solstice. He himself avows that he may have been wrong by a quarter of a day; and we may always safely suppose that, without imputation of an author's integrity, his self-love may have the error which he is really liable to commit. He determined the first inequality of the moon (the equation of the centre), and Ptolemy found nothing to change in his results: he gave the mean motion of the moon, and that of the apogee and nodes, in which the corrections made by Ptolemy were slight, and of more than doubtful goodness. He had a sight of the second inequality (the ejection); it was he who made all the observations necessary for a discovery of which the honour was reserved for Ptolemy; a discovery which he had not perhaps time to finish, but for which he had prepared everything.* He showed that all the hypotheses of his predecessors were insufficient to explain the two-fold inequality of the planets; he predicted that none would be successful which did not combine the two hypotheses of the excentric and epicycle. He had not the proper observations, because they require more time than the duration of the longest life: but he made them ready for his successors. We owe to his catalogue the important knowledge of the retrograde motion of the equinoctial points. We might,

* The bias above alluded to goes up here a little too much.
HIPPOCRATEA, a genus of the natural family of Hippocratesecae, so named after Hippocrates, and which might therefore be expected to contain many useful or medicinal plants. But it is not so. The species consist of moderate sized trees, which are found in the hot parts of the world, as in the tropics parts of America, in Sierra Leone, the warmer parts of India, and the island of Timor. The genus is characterized by having the calyx 5-seated, but very small. Petals 5, usually hooded at the apex. Stamens 5, usually acutely obtuse, and terminated at the apex. Carpels 3, samaroid, bivalved, valves keeled and compressed. Seeds winged from the funicleus being widely expanded. The fruit of some of the plants of the family is eaten. The use of some of these Hippocrates is mentioned as being of any use; those of H. comosa, being oily and sweet.

HIPPOCRATES was born at Cos, B.C. 460. His family followed the pursuit of medicine for near three hundred years, and produced seven physicians, who attained considerable celebrity, and who are supposed to have written the numerous treatises which are commonly attributed to Hippocrates alone. Before their time the knowledge of medicine was either practised by the priests, who employed their skill in maintaining their influence over the people, and carefully concealed the little knowledge they possessed; or it was merely followed as a subordinate profession. The practice of medicine is far back to the Athenians; it was in the thirteenth of the 24th century that the science of medicine is indebted for a separate existence, and the great progress which it made in their hands after this separation sufficiently proves the wisdom of so distinguishing it.

The most celebrated of the family was the subject of the present notice, Hippocrates, the son of Heraclidès and Phenarete, who is supposed to have been the author of the important revolution in medicine. It would have been extremely interesting to give some details of his personal history, but unfortunately we possess but few authentic materials for this purpose, except some fragments contained in his life by Soranus. His medical studies were pursued under the influence of his father and of Herophilus; and he is said to have had for his masters in philosophy, Gorgias of Leontini, the celebrated sophist, and Democritus of Abdera, whose court he afterwards served. We are told that he spent some time at the court of Pericles, king of Macedon, and visited Thrace and Scythia; and it is probable that these statements are true, as mention is made in his writings of several towns in Thrace (Suidas, l'epigrafie, x. 4. 4). He is supposed to have been in the ravages of a dreadful plague which was raging in the city; but this can hardly be the one which occurred in the second year of the Peloponnesian war, of which such a great part of the attention was called; for the Thucydides suffered from the disease himself, and was a witness of its ravages. He makes no mention of the name of Hippocrates, but on the contrary declares that medical skill was not esteemed in the city.

We have already observed that many of the works usually attributed to Hippocrates were in reality the productions of various members of his family. This circumstance alone would render it impossible to determine accurately the amount and value of his contributions to the science of medicine. But this difficulty has been still further increased by the manner in which his writings were mutilated, and fresh passages interpolated by later editors. This confusion is still so great that we cannot write the time when the Ptolemies were forming their celebrated library at Alexandria, for the high value which was set upon antient writings by these monarchs induced men to collect and forge copies of antient authors, which were passed off for the genuine works of those to whom they were attributed. It appears that in the time of Galen they were able in some degree to distinguish the genuine writings of Hippocrates from those falsely ascribed to him. The writings assigned to Hippocrates are written in the Ionic dialect, but he does not adhere so closely to its forms as Herophilus.

The principles of Hippocrates were those of rational empiricism. He did not attempt to form his theories from a priori reasoning, but he observed the phenomena of nature and deduced from them such conclusions as these phenomena would justify. That he adhered to this principle in all cases is evident, for it is not to be supposed that the body is composed of four primary elements—fire, water, earth, and air; that these elements, variously combined, produce the four cardinal humours, and these again the different organs of the body. These doctrines are principally developed in the treatise 'On the Nature of Man'; and Galen asserts that he was the author of this treatise, although it is more generally ascribed to the genius of Plato. His knowledge of anatomy seems to have been very limited. The superstition respect which was paid to the remains of the dead among the Greeks prevented the undertaking of this treatise, the subject by dissection of the human body. He gives such descriptions of the bones as show that he had indeed studied the subject, but not acquired any very accurate knowledge.

The term phlebras (phlebra) is applied indiscriminately to the veins and arteries, while the term kymon (kimon) is confined exclusively to the trachea. His description of the venous circulation is referred to the course of some of the larger ones, without expressing any opinion as to their origin. He does not seem to have supposed that they originate either in the heart or liver. These views were first expressed in the school of Alexander. Under the term nereus (nereus) he confounds all the white tissues of the body, the nerves, properly so called, the tendons, and ligaments. According to Hippocrates the skin is allowed to be a part of the external conditions of the organs, and sweats, moisture, food, upon its phenomena, and those of disease. He recommended that particular attention should be paid to the constitution of the seasons.

Among the doctrines of Hippocrates, that of critical days, upon which the supposed evacuation of the morbid matter when concocted to take place, is the most remarkable. In his Præmonitiones he says, feverse come to their crises on the same days, both those which turn out fatally and those which turn out well. These days are the fourth, the seventh, the eleventh, fourteenth, seventeenth, and eighteenth. The next stage is of thirty-four days, the next of forty, and the next of sixty. It appears very doubtful how this theory was derived from actual observation, but it is possible that it may have been more nearly true under the treatment of Hippocrates, which was not usually very active, than under the more energetic treatment which is employed nowadays. The experience drawn from examination of the pulse Hippocrates was not aware, and the word ephygymus (epygymus) is usually employed by him to denote some violent pulsation only. It is however upon the accuracy with which he observed the phenomena of diseases, and the vividness of his speculations, that the fame of Hippocrates is principally and justly founded. Nowhere is the peculiar power of the Greeks in expressing their conceptions more strikingly shown. We have extracted one or two of the most marked descriptions from his Præmonitiones. 'If the appearance of the patient be different from usual, there is danger. If the nose be sharp, the eyes hollow, the temples collapsed, the ears cold and contracted, the breath is cold and short, and the mouth is dry; if the mind is hard, dry, and stretched, and the colour of the face pale or black or livid or leaden, unless these appearances are produced by watching or diarrhœa, or under the influence of accumulated phlegm, this is a certain sign of fever. If fever be obtained the title of Facies Hippocrates. Again how well does he recommend us to observe the position of the patient in bed? 'If he lies upon his side with the neck and arms and legs slightly bent, and his body upright, is he comfortable, since the position of health, it is well; but if he lies on his back, with the legs and arms extended; and still more if he keeps sinking towards the bottom of the bed, or tosses his arms and head into unusual posture, our anticipations must be most unfavourable. And if, in an acute disease the hands are waved before the face, as if seeking something in the air, or brushing and picking notes from the walls or bed-clothes, the prognosis must be the most unfavourable. And if, in the remainder of this treatise he goes through the different evacuations from the bladder and
the bowels, by retorting and by expectoration, describing their characters and appearances, and the conclusions that may be drawn from them; he observes the change in the appearance of ulcers before death, that they become pale and dry or livid and dry; and of pus, he says that it is best when white and uniform and smooth, and with as little bad odour as possible; the truth of which has been fully supported by experience. His directions for the examination of a patient supposed to be labouring under empyema present an example of sound and cautious investigation. If there be any injury of the chest wall, we must examine the patient, and learn whether he has pain in one side, and if one side be hotter than the other; while he is lying on the sound side, we must ask if he feels any weight hanging from above. For if this be the case, the examination is too late; the disease is one which we must watch over with anxious care. We may recognize the presence of empyema by these general signs:—if the fever does not remit, but is moderate during the day and increased at night, and considerable perspiration occurs, and there is great inclination to cough and but little expectoration; while the eyes become hollow, the cheeks are flushed, the finger-nails curved, and the fingers hot, especially the tips, and the feet swell, and pustules are formed over the body—these symptoms denote chronic empyema, and may be greatly relied on.

We must not forget that Hippocrates asserts that auscultation may be employed to distinguish between the presence of pus and serous fluid in the cavity of the pleura. No attention seems to have been given to this until the time of Laenec's great discovery, by whom the passage is noticed and referred to. The statement of Hippocrates is in itself incorrect, but the fact of his having actually observed the change in the body which is demonstrated by the presence of serous or of purulent fluid in the cavity of the pleura is worthy of mention, as a remarkable instance of foresight. An observation which was to be taken up by Laenec, and which was afterwards to be still further extended, as we have seen, by Bichat who says that the human body is a perfect microcosm, and that the difference in the animal and vegetable life is merely one of degree.

Hippocrates appears also to have introduced, some valuable improvements in the treatment of disease. During his reign he recommends that the diet should not be too exact, lest any unavoidable change should bring on disease. He says that wine must not be taken pure during the summer, but in the winter he allows a more liberal use of it. In his treatise 'On Diet' he claims to have been the first to recognize the importance of diet in the treatment of disease, which has been confirmed by all philosophers and physicians; and in this statement he is in some measure borne out by the authority of Plato (De Rep., iii. 14), who praises the antient physicians for having neglected it; whereas the modern ones, by this system, convert life into a tedious death. However he attributes the introduction of the new system of Heroicus. In fevers and acute diseases he confined his patients to a liquid diet, but not so strictly as some other philosophers. But in the treatment of injuries, he observed the change in the body which is demonstrated by the presence of serous or of purulent fluid in the cavity of the pleura. An observation which was to be taken up by Laenec, and which was afterwards to be still further extended, as we have seen, by Bichat who says that the human body is a perfect microcosm, and that the difference in the animal and vegetable life is merely one of degree. In the time of Hippocrates the distinction between medicine and surgery had not been made, as we find among the works usually attributed to him, and contained in the list of Eusebius, Strabo, and Zosimus, but wounded by the head. In the latter he was in the habit of employing the trephine, and gives directions for its use. However, in the oath of Hippocrates the pupil is made to swear that he will wash the abomination of claret from his hands, and give it up to those whose business it is to perform it. In the treatise 'On Injuries of the Head' he remarks that convulsions usually take place on the side of the body opposite to the injury. It is probable that convulsions were not then known to be the result of injury, but he says that a physician ought not to be ashamed to call in the assistance of another, if he finds himself at a loss in the treatment of his patient. The oath which he adminis-
of the mouth. This is denied by some of the West Indian settlers, but is undoubtedly true, according to the elder Jacquin, and to the more recent testimony of Mr. Schomburgk, who suffered severely from having tried the experiment of eating the fruit. Jacquin however asserts that to sleep beneath the shade of the manchineel-tree is not dangerous, as is commonly reported. But Mr. Schomburgk says that if rain passes through the branches and drops upon the skin of a person below them, it produces severe inflammation, and that the dew which falls at night causes the same effects, as he saw in certain cases which came beneath his own observation; but he adds that it acts differently upon different persons, he himself not suffering any inconvenience from rubbing the juice on the skin. But while the dangerous qualities of this tree are thus undoubted, it is very uncertain whether the poisonous quality which, it is believed in the West Indies, the land-crabs acquire from the manchineel-tree is really owing to that cause. Jacquin denies it, and Mr. Schomburgk could obtain no proof that it is so; all that is certain is, that land-crabs are frequently found under the shade of manchineel woods, and that those animals are often poisonous. The wood of this tree is represented to be of fine quality, handsome, and well suited for cabinet-makers' purposes.

Dental Formula.—Incisors 4 Canines 1 — 1 : Molars 2 — 1 .

6 — 6 = 38.

Cuvier remarks that there is no animal that requires to be more studied at different ages than the Hippopotamus, in order to acquire a perfect knowledge of the molar teeth, which change their form, their number, and their position; and in his "Oeuvres Posthumes" he goes into minute details of those changes.

In the upper-jaw the first incisor is conical, straight, and a little worn on its internal side; the second is equally conical, but curved inwards. The canine-tooth is short, and cut, as is were, obliquely, in consequence of its abrasion against its opposite. The four molars which succeed the canine are strictly false molars. The first is very small, is shed as the animal advances in age, and is not reproduced; it is separated by an interval from the rest of the molar teeth. These, nearly of the same size, are also shed during the youth of the animal, are replaced by others, and the first teeth are more complicated than the second. When these, the true and permanent molars, are worn by use, they exhibit the form of a trefoil on their crowns. The three last resemble each other generally: they are composed of four large tubercles approximated in pairs, and conical before the points are worn by attrition consequent on mastication. After the first effects of abrasion, they each present, by the contour of the enamel, the figure of a trefoil, or, in other words, three-lobes disposed more or less regularly in the form of a triangle; but as the abrasion proceeds and the tooth is farther worn down, they exhibit the form of a cross with a disk in the middle.

In the lower-jaw the first incisor is long, subconical, terminated in a point, and a little worn on its external side. The second is of the same form as the first, but much smaller. The canines are enormous tusks sharpened into a somewhat chisel-like edge, the polished and abraded internal surface of which presents a shape inclined to elliptical. The molars form a continuous series; the first and the second are false molars, the first being the smallest, and dropping as the animal advances in age, never to be replaced. The four succeeding teeth exhibit the same general forms as those of the upper-jaw. The first, which is smaller than

**HIPPO’NÖÈ, a genus of Dorsibranchiate Annelids, considered by MM. Audouin and Milne Edwards to approach the genus *Amphinome*. *Hippomoea* is deprived of a caruncle and has only a single packet of bristles to each foot and a single cirrus.

**HIPPO’PODA,** a genus established by MM. Quoy and Gaimard for a marine floating mollusk which M. De Blainville considers identical with *Protopterus* of Lesueur's MSS., and places under his (M. De B.)'s *Physeograda*.

**HIPPO’PODIUM,** a genus of Conchifera Dimyaria proposed by Mr. J. Sowerby in the 'Mineral Conchology of Great Britain.' It includes only one British species, *H. ponderosum*, which is found in the isles.

**HIPPO’POTAMUS,** the Roman name for the River-horse ('ἵππος στέρημα' of the Greeks), and retained by modern zoologists as the generic appellation of the animals of that Pachydermatous form.

Teeth of Hippopotamus. (F. Cuvier.)
the others, has an anterior isolated tubercle: the succeeding teeth are nearly of the same size, and have also an isolated tubercle, but it is posterior. (Hippopotamus of S. Africa.)

Cuvier makes the first section of his second family of Pachydermous Mammifers (Ordinary Pachyderms) consist of those which have four, three, or two toes; and these he separates into two great genera, the Hippopotami and the Hogs (Suidae). The Hippopotamides are further characterized generally as having on all their feet four toes, which are nearly equal and terminated by small hoofs (sabots), an immensely massive body destitute of hair, very short legs, a belly trailing against the ground, an enormous head, terminated by a large tumid muzzle which encloses their great anterior teeth, a short tail, and small eyes and ears. Their stomach is divided into many compartments. They live in rivers, on roots and other vegetable substances, and are ferocious and stupid. The genus is placed by Linnaeus among his Bovinae, between Equus and Sus. Mr. Gray brings it under the Elephasidae, his third family of his fifth order, Ungulata, as a genus of his subfamily Hippopotamina, and inquires whether the form be not allied to the Halicorides. (Annals of Philosophy, 1825.)

Organization.

Skeleton.—The skeleton of the Hippopotamides approaches that of the ox and of the hog; but it presents differences which distinguish it from that of any other animal. The skull, whilst in the connexion of the bones and the arrangement of the sutures, it bears great similitude to that of the Suidae, has its own peculiarities, which render its form extraordinary.

The number of vertebrae are 7 cervical, 15 dorsal, 4 lumbar, 7 sacral, and 14 coccygial = 47. The atlas and the axis, besides the ordinary articular facets, have each two others also towards their dorsal aspect; but taken as a whole, the cervical vertebrae approach nearest to those of the hog. There is nothing very remarkable about the rest of the vertebrae, except that their bodies are rather flat. There are 7 true and 8 false ribs of a side = 30, nearly as much arched as those of the Rhinoceros, but distinguishable from them, as well as from those of the Elephant, in as much as they are much wider and flatter at the part nearest to the vertebrae than at the opposite end. The anterior part of the sternum is compressed into a ploughshare-like shape and very much prolonged into an obtuse point below the first rib. The rest is depressed, and the number of pieces is seven. The scapula may be easily distinguished from those of the Rhinoceros and Elephant, being larger than that of the first and less than that of the second, and also differing in form. In its general aspect this bone reminds the observer a little of the scapula of the Hog, but approaches nearer to that of the Ox in the more essential characters of the spine and articulating surface. The humerus bears a singular resemblance to that of the Ox; while there is some similitude to that of the Hog, which is however less in proportion towards the bottom. The radius and ulna are enchasyled at an early age, leaving on the outside only a rather deep furrow which occupies only three-fourths of the length of the radius, and on the inside a simple aperture towards the upper fourth part. These bones of the fore-arm resemble those of the Ox very much, but those of the latter are more elongated, and the articular facets of the lower head of the bone are, in the last-named animal, less oblique. There are in the carpus points of resemblance to the Hog; but its characters distinguish it both from that quadruped and the Ox. In the metacarpus, all comparison with that of the Hog ceases. The pelvic leg.
east easily distinguishable from those of the Elephant and Rhinoceros, from the smaller width of the ilia in the Hippopotamus and other differences. The Ox perhaps approaches it more closely in these parts; but, besides other discrepancies, the lower part of the pelvis and especially the oval holes are much more elongated in the Hippopotamus. The sacrum is very large, but the bones of the pubis project but very little. The femur, which possesses a ligamentum teres very prominent and straightening throughout, regularly cylindrical anteriorly. The great trochanter, which is compressed laterally, does not exceed the height of the head of the bone; the small trochanter is moderate; there is no third, as in the Rhinoceros and possibly the Equus. One principal difference is to the femora of the great ruminants; though the upper head of the bone is much more detached and more spherical, and the lower head is much wider, especially behind. These differences will assist in distinguishing it from the femur of the Ox: that of the Giraffe, which, being of the same size, might more readily be mistaken for it, may be known by its more approximated upper head, its relatively larger condyles, and the more extended and projecting internal edge of the lower articulating surface. The femur of the Hog more resembles that of the Hippopotamus in the upper part, but much less below; and its dimensions prevent the possibility of this animal being misjudged for a male of this species. The tibia is beyond that of any other quadruped, especially at the extremities. It approaches nearest to that of the Ox, but the latter is more elongated, and differs in other respects. The tibia and fibula are more elongated in comparison, and this offers other discrepancies. The fibula is very slender, and is throughout very distant from the tibia, except at the two extremities. The malleolar bone is anchylosed to the lower extremity. The tarsus is framed principally on the plan of that of the Ox.

Digestive Organs.—From the structure of the teeth we are led to the inference that the quantity of vegetable substance submitted to the action of the digestive organs of the Hippopotamus must be very great in proportion to its nourishment extracted from the mass. The principle on which the jaws and teeth are constructed seems to be a principle for rudely tearing and dividing, but not comminuting the hard and tough vegetables which compose the staple food of the animal. The jaws are so constructed that the process executed by them is more a bruising than a grinding process. The food therefore transmitted to the stomach has undergone but little alteration, and that organ is employed in extracting from the coarse and ill-prepared load the greatest amount of nutritious matter. The stomach of a full-grown Hippopotamus is said to be capable of holding five or six bushels, and the large intestine is of a size commensurate with such a capacity, for it is stated to be eight inches in diameter. The Hippopotamus mentioned by Mr. Burchell (‘Travels in South Africa’) was considered to be only half grown, but three hectares of dried vegetables were taken from its stomach and intestines.

Reproduction, Food, Habits.—The time of gestation is stated to be nine months; but this does not seem to be accurately ascertained. The birth takes place on the land; and on the slightest alarm both parent and young take to the water. Thunberg, during his visit to Caffraria (1773) was assured by an eye-witness that he, having watched, when on a hunting party, one of these animals which had gone up from a neighbouring river to calve, lay still with his company till the calf was produced, when one of the party fired and shot the mother dead. The Hottentots imitated the steps of their hind-quartered action, and with their lives in his existence, but its instinct saved it, for it made for the river, and escaped. The food of the Hippopotamus consists of water-plants and those which grow on the banks of the rivers which form one of its principal food in the hot night, and these enormous animals, which when they occupy the neighborhood of cultivated lands, do incalculable damage, not only from the quantity they actually consume, but the still greater amount from which they spoil and lay waste by their crushing bulk. As they pass up and down the surface of the water for some time, there must be some muscular arrangement for closing the nostril, as well as seen in the Siren Hassiastic, on the authority of a credible person who lived twelve years in the hide of a full-grown Hippopotamus; it is a load for a camel. 2. That the River-horse is an inveterate enemy to the Crocodile, and kills it whenever he meets it. 3. That the River-horse never appears below the catacarts in Egypt," wherefore the inhabitants of Upper Egypt only can give any account of it. The Egyptians, he adds, very seldom bring the hide of it to Cairo and, he continues, it is impossible to bring thither the living animal. 4. The River-horse does much damage to the Egyptians, in those places he frequents. He goes on shore, and in a short space of time has some description of food. When he first begins to eat, he is very good, and the least verdure as he passes; for he is voracious and requires much to fill his great belly. They have a curious manner of freeing themselves, in some measure, from this obstruction. As they eat, their intestines apparently grow, and most, and there lay a large quantity of peas; when the beast comes on shore, hungry and voracious, he falls to eating what is nearest him, and filling his belly with the peas, they occasion an insupportable thirst; he then returns immediately into the river, and drinks. To these large draughts of water, which suddenly causes his death; for the peas soon begin to swell with the water, and not long after the Egyptians find him dead on the shore, blown up, as if killed by the strongest poison. 5. The often the River-horse goes on shore, the better hopes have the Egyptians of a sufficient swelling or increase of the Nile. 6. The Egyptians say, they can almost distinguish the food of the hippopotamus from that of the horse (a point of observation that regarding the peas, for instance) may be considered as bordering upon the marvellous, but there are others which there seems to be no good reason for doubting. 7. The meat of the Hippopotamus is esteemed by the Crocodile can hardly be considered to be well founded.

In Professor Smith’s Journal (Tucker’s Narrative of an Expedition to explore the River Zaire, usually called the Congo, in South Africa) we find it stated that they landed in a bushy and a fruitful sandy cave behind a long projecting point. It is called Sandi-Sundi. An immense number of Hippopotami were seen here. In the evening a number of alligators were also seen. This river is navigated only by dugouts. Captain Tucker also says, ‘The Hippopotamus and Alligator appear to be numerous.’ The usual mode of capturing the animal is by a pitfall, by the natives at least, but the crocodiles of the river are generally caught. Zerenghi, in the year 1606, frequented the neighbourhood of the Nile, near Damietta. He stationed men upon the Nile, who, having seen two of these animals go out of the river, made a large hem in the bank, and waited till they passed, and covered it with thin planks, earth, and herbage. In the evening, when returning to the river, they both fell into the ditch. Zerenghi immediately hastened to the water’s edge, and killed both the beasts by pouring three stones into the head and the back of the crocodile. They almost instantly expired, he adds, after uttering a cry which had more resemblance to the bellowing of a buffalo than to the neighing of a horse. Captain Tucker also observed that the hippopotami with their mouth open, snorting in the air. In another part of his ‘Narrative’ he says, ‘Many Hippopotami were visible close to our tents at Condo Yang, where we were obliged to halt and to wait some time for a canoe to pass. No use of firing at these animals in the water; the only way is to wait till they come on shore to feed at night. During the night they kept a continual grunting like so many hogs, but none of them came on shore, though we had a constant watch on the beach.’ Sparrman, who gives a ludicrous account of the terror which seized him and some of his companions on the rush of one of these animals towards him from the river, describes another instance of how to take this formidable animal: ‘Great Fish River:—At half an hour after eight, it being already very dark, a sea-cow began at intervals to raise its head above the water, and utter a sharp, piercing, and, as it were, very angry cry, which seemed to be between grunting and neighing. Perhaps it may be expressed by the words heurk, hurk, heuk-heuk: the two first being uttered slowly, in a hoarse but sharp and tremulous sound, resembling the grunting of other animals; while the third, hurk, is compounded, its exact expression is not unlike the neighing of a horse. It is true, it is impossible to express these inarticulate sounds in writing to any great degree of perfection; but perhaps one may make nearer
for he says that it is a five cubits in length, and in bulk approaches to that of the elephant; but he still leaves to the animal the cloven hoof and the horse's tail.

Pliny says of it (book viii, c. 25), after treating of the Crocodile and Scincus, that "the animal is not only a

universally good beast, but also an observer of the progress of the hippopotamus under water at Great River. 'This river,' says he, 'contains many hippopotami; on all sides I could hear them bellow and blow (mugir et souffler). Anxious to observe them I made my way into the river, and I saw one walking at the bottom of the water (marcher et se promener au fond de l'eau). But I remarked that its colour, which when it is dry is greyish, and when it is only hummed, is much more violet, and seemed then to be of a deep blue. I killed it at the moment when it came to the surface to breathe. It was a very old female and my people in their surprise, and to express its surprise, killed the animal itself."

"Voyage."

Mr. Barrow, in his journey into the interior of Southern Africa, when he reached the mouth of the Great Fish River, saw towards the evening a vast number of Hippopotami (Sea-Cows of the Dutch) with their heads above the surface. Several paths made by these animals led from various parts of the river to a spring of fresh water about a mile distant. To this spring they went in the night to drink; the water of the river for some distance from the mouth is salt. According to Damper and others, the Hippopotamus, when wounded or irritated, is violently ferocious, and has been known to sink a boat by its bite.

"History."

For a long time it was considered that there was but one species of these animals. Making the Calabar and the Senegal the only species of the Hippopotamus. The opinion now seems to be that there are at least two. Before we enter into this part of the subject it may be expected that we should give a slight sketch of the history of the Hippopotamus. Fewer animals were known more accurately than the Augustus of ancient writers on occasion of his triumph over Cleopatra. (Dion."

Lit.) Not to weary the reader with the descriptions of the antients, we shall only further refer to that of Achilles Tatius (book iv, c. 2), which is, notwithstanding some errors, perhaps, as corrected, the most correct version which the text of the Bible, 'imprinted at London by Robert Barker, printer to the King's most excellent Majesty' (1613), is the one in which the description of the beast is thought to be of the elephant, or some other which is unknown.'

Bochart, Ludolph, Scheuchzer, and many others, hold that the Hippopotamus is the animal meant; while not altogether they have written in support of the elephant. Cuvier and others think that though we may believe with Bochart that the Hippopotamus is intended, the description in the book of Job is too vague to embrace it. Good comes to the conclusion that some extinct part of the hippopotamus resembles the animal, and have lately even gone so far as to contend that Behemoth and Iguanoodon of geologists are identical.

Aratus (ii. 71) gives a most incorrect description of what is meant, and from the context and other evidence, as the Hippopotamus. This description is borrowed almost entirely by Aristotle, who has not however given to the animal a horse's tail, which Herodotus bestowed upon it, adding, correctly enough, that its size was that of the largest oxen.

Aristotle (Hist. Anim. book ii, chap. vii) thus describes the Hippopotamus:—'The Hippopotamus of Egypt has a mane like a horse; a bifurcated hoof like the ox; a large visage or muzzle; an astragalus like the animals with cloven feet; projecting teeth which do not show themselves much; a tail of a hog; the voice of a horse; and in size is said to be one-quarter of a skene plane. A mouse is not made of it.' Now, though there is enough in this curious description to lead to the conclusion that Aristotle meant no other than the Hippopotamus, there is quite sufficient to show that he never saw the animal, and that he trusted to the wild accounts of others. We trace however the descriptions of Herodotus and Aristotle in many of the figures of the animal which were published after the time of the lates, where it is stated as a fact, and notwithstanding the highly erroneous descriptions of ancient authors, some of whom must, one should think, have had an opportunity of seeing the animal, the portraits of it by ancient artists, &c., &c., are, almost without exception, far from bad representations of the animal shall return to the antient authors.

Diodorus (book i.) comes much nearer to the truth in his description, at least so to the size of the Hippopotamus.
the amusing book on Egyptian Antiquities observes, the designer sometimes placed on one animal a part taken from another, and that mentioned by Belzoni was a calf with the head of a hippopotamus. Though the details of the teeth and fact are not correct in the figure on the plinth of the statue of the Nile formerly in the Vatican, and afterwards taken to the French Museum, its general contour is good; and the animal occurs in other sculptures and in mosaics very characteristically represented. Some of these, the more ancient and more simple, may have given rise to the story of the enmy borne towards the crocodile by the hippopotamus, which in that sculpture holds a crocodile in its mouth. On medals and coins of the Romans there are sometimes crocodiles with the crocodile, sometimes without. Those of the emperors Trajan, Hadrian, and Philip, or rather of Marcia Otacilia Severa, Philip’s wife, will occur to some of our readers.

In modern times we have the descriptions of Isidore of Seville, Vincent de Beauvais, Albertus Magnus, James of Vitry, and all more or less fabulous; but Aballatifi gives a very good account of the animal. Belon and Gillius however seem to have been the first among the moderns who actually saw, or at least who have recorded that they saw, the animal alive. They both saw it at Constantinople; and they say the same. Bonnini seems to doubt whether the animal which Belon saw was a hippopotamus (Travels in Upper and Lower Egypt, vol. iii.), and quotes Matthioli, who speaks very slightly of Belon; but a perusal of that accurate observer’s account will show that he was at least not the worst storyteller. Still, I think he spoke of a living hippopotamus; he even alludes to the differences between the figures of that animal on ancient works of art and the specimen which he had before his eyes, and rectifies the errors in the figure on the plinth of the statue of the Nile, which has five toes instead of four. Of the teeth indeed he only remarks that they approach to those of a horse. Gesner does little but quote Belon, and without taking the liberty of the description of Zorenghi, which is above alluded to, which were good, or the compilation of Aldrovandus, who did not use the figure of Zorenghi, but another sent to him from Padua (Cuvier thinks, by Prosper Alpinus), or the good description and more accurate representation given by Fabius Columba, we come to Ludolph, who in his History of Ethiopia” gives an entire figure on a large scale. This is the best which had hitherto published; but the teeth are exaggerated, and a great deal too much exposed, and the ears are rather long. Beside this is a figure of the sea-horse, putting up his head above the water; whence called the river-horse by the Greeks. The head and neck alone are visible; but the exaggeration and excellence of the creature continued, lengthening the neck, head, and ears, has given a much more horse-like character to the figure. Thenenot, in his Voyage to the Levant,” very fairly describes an individual killed near Gharib, and sent to Cuvier.

The date of the last of these authors is 1689, but in 1735 the work of Prosper Alpinus was published, and Obscuré the subject again by giving a representation of two stuffed skins, one of a large female animal, and the other of her fatten, which he had seen in the house of the Pacha of Cairo. These were the skins of two Hippopotami, but the skulls had been withdrawn, and the absence of the projecting teeth led Prosper to the conclusion that he had at last found in this, which he took for a distinct creature, the animal represented by the antient artists, forgetting, or more probably not knowing, that when the Hippopotami of the present day keep their mouths closed no tooth is visible.

We need not detain the reader with a reference to the figures and descriptions given by other zoologists,* but shall come at once to Linnaeus, and this will bring us to the question of the geographical distribution of the genus, and of the number of species.

Linnaeus, in his last edition of his Systema Naturae,” gives only one species, Hippopotamus amphibius, and places it in the genus Rhinoceros, et ad ostia flavinsur Asia.” First we will advert to the Geographical Distribution.—Africa appears to be the only quarter of the globe in which this form exists; and though Dr. Richardson, in his Journal across the Hippopotamus in the Indus, Strabo (690, 707, C585) seems to

* Grew, A. Jussieu, Desmots, Palma, Buffon, &c.

prefer the testimony of Aristobulus in contradiction of the fact, and Pausanias (iv. 34) agrees with Strabo. Cuvier, who has collected almost all the learning on this subject, well observes that no traveller of credit has reported that it has been found on the continent of India. He remarks that Buffon gave no credence to the testimony of Michael Boy, who states China to be one of the localities; he observes that it is nearly without authority that Linnaeus says the animal to occur in most parts of the rivers of Asia, and is of opinion that M. Faujas, upon being well authorized in denying that it is to be found on the continent of India.

Marsden includes the Hippopotamus among the animals of the islands of Sumatra and Java; but Cuvier (Oeuvres des Saisies) enters into an interesting discussion, well worthy of the perusal of the reader, to show that Marsden is mistaken, and, in addition to his arguments, he brings forward the fact that MM. Daudin and Horsfield, who travelled over a considerable part of Java and Sumatra in different directions, could not find a Hippopotamus, though they succeeded in obtaining two species of Rhinoceros and a Tapir. Upon the whole evidence at present known, it seems to be established that the geographical distribution of this pachydermatous form is confined to the great rivers and lakes of Africa.

Species remains to be considered how many species of Hippopotamus at present exist.

M. Desmoulins (Journal de Physiologie, &c. par M. Magendie, tome v) gives osteological reasons, drawn principally from the differences in the skull, for distinguishing at least two species, one of which he designates as the Hippopotamus of the Cape (Hippopotamus aethiopicus), and the other as the Hippopotamus of Senegal (Hippopotamus Senegalensis), are as strong as those on which Cuvier founded his specific separation of the fossil Hippopotamus from that of the Cape. M. Desmoulins is quite correct in all this; but M. Cuvier holds that the Hippopotamus of the Nile differs specifically from the other two. The external differences do not appear to be considerable, if any. M. Desmoulins indeed remarks, that of forty Hippopotami which passed through his hands upon the Nile, two or three were bluish-black, all the others reddish; and M. Desmoulins even hints that there may be two species in that river. The latter add, that of the two Hippopotami of the Cape possessed by the Paris Museum, one is black, the other reddish; but he considers that the numerical disproportion observed between the individuals of the two colours in the Nile can hardly admit of a sexual solution. We have examined several skulls of Hippopotami, and some of them were very close to each other; but it should be remembered that safe inferences as to specific distinction can only be drawn from a very extensive examination of skeletons, combined with unquestionable data as to the locality from which they were taken to Cuvier.

With regard to the supposed two Nilotic species we, with all due submission, have our doubts; nor do we give much weight to the alleged difference of colour. The animal in the water and out of it presents a very different appearance; and, to say nothing of the possibility of a difference in the case of sex, there is every probability that some change in the colour may take place as the animal advances in age. We have seen the remark of Le Vaillant as to the difference of colour when the skin is dry, when it is only moist, and when the animal, in full life, is walking at the bottom of the river.

It need hardly be observed that the Romans must have derived their Hippopotami from Northern Africa; and as we have given Sparrmann’s description, among others, of the noise made by the southern animal, we may be excused perhaps for remarking that Burchardt (Travels in Nubia) describes the noise of the Hippopotamus as a sound, like the cracking or groaning of a large wooden door. This noise, he says, is made when the animal raises its huge head out of the water, and when he retires into it again. We may also advert in this regard to the allusion by Cuvier of the Hippopotamus from Lower Egypt, that, as Cuvier remarks, the French Savans attached to the expedition to Egypt, who ascended the Nile above Sene, did not meet with one.

Utility to Man.—We have adverted to the damage done by the Hippopotamus to cultivated grounds; but when we
look at the enormous ripping, chisel-like canines of the lower jaw, and the lower incisors formed for uprooting, we cannot but think that such an animal must be an active agent in clearing rivers from the greater water-plants which might in time, if left undisturbed, go far to convert the running stream into a sluggish swamp. With regard to minor details, the flesh of this *Water Ochse* is much esteemed as an article of food. In the first catalogue of the African Museum we read that it is much in request both among the natives and the colonists, and that the epi-
cures of Cape Town do not disdain to use their influence with the country farmers to obtain a preference in the matter of Sea Ox's Speck, as the fat which lies immediately under the skin is called when salted and dried. Nor are the
whips which are made of the skin of the Hippopotami of the Nile thought lightly of in the neighbouring coun-
tries. They are said to be made by cutting the fresh skin into triangular stripes some five or six feet in length: one extremity of the strip is pointed, and it gradually widens till the breadth at the opposite extremity is equal to the
intended circumference of the bulk of the whip. The strip is then rolled up so as to form a sort of conical pipe, is firmly tied to keep it in place, and dried in the sun. When all is finished a light and elastic whip is produced. But there is no part of the Hippopotamus in more request than the great canine teeth, the ivory of which is so highly valued by dentists for making artificial teeth. No other
ivory keeps its colour equally well;* and these canine teeth are imported in great numbers to this country (where more are sent in the first instance than anywhere else perhaps) for this purpose, and sell at a very high price. From the
closeness of the ivory, the weight of the tooth, a portion only of which is available for the artificial purpose above men-
tioned, is heavy in proportion to its bulk, and the article fetches, or did fetch, upon an average, about thirty shillings, more or less, per pound. One of the specific distinctions pointed out by M. Desmoulins is the comparative abrasion of the canines in the supposed two species; and we would call the attention of the curious who deal in these teeth to this circumstance and the papers above quoted.

Fossil Hippopotami.
The remains of fossil Hippopotami occur abundantly in the tertiary series. They are most common in the Pliocene period of Lyell, and are frequently met with in the super-
cial beds of gravel, clay, and sand, termed by some diluvial, in the ossific caverns, oseous breccia, &c. They are also found in some of the beds of the Miocene period. The following species are named: *Hippopotamus major* (Nesti and Cuv.); *Hippopotamus minutus* (Cuv.); *Hippopotamus medius* (Cuv.) and *Hippopotamus dubius* (Cuv.). A comparatively small species was detected by Mr. Clift among the fossil remains found on the left bank of the Unavaddi, and presented to the Geological Society by Mr. Crawford. Re-
 mains of Hippopotamus were also abundantly present in the large collection of bones obtained by Captain Cautley among the ruins of fallen cliffs, and partly in situ in the sands tone of the Sewalik mountains, at the southern foot of the Himalayas, between the Surtej and the Ganges. (Geol. Proc.)

HIPPOPUUS. (TRIDACNIDAE.)
HIPPOTHERUM, the name of an extinct quadruped allied to the horse, found and described by Professor Kaup, from the strata of sand at Eppleshein, near Altzey, about twelve leagues south of Mayence, referrible to the second or Miocene period of the tertiary formation.

* Passau in vil. 46) mentions the name of Diodorus whose face was formed of these teeth instead of elephant's ivory.

* This is the catalogue of M. Hermann von Meyer. M. Lemon gives the following list of fossil species: *Hippopotamus cylindraceus* (Cuv.); *Hippopotamus minor* (Cuv.); *Hippopotamus medius* (Cuv.) and *Hippopotamus minima* (Cuv.).

Hippothoe (Lamouroux), a small cellulosiferous cor-
alline attached to marine plants in the Mediterranea.
It is capillary and branched, the branches articular;
the articulations are single fusiform cells, with a round poly-
ferous opening near the summit. (Tableau Methodique.)

HIPPURIC ACID. When the urine of horses and cows is mixed with muriatic acid in excess, a precipitate is obtained, which, when purified by boiling with cream of lime, a little chloride, and with animal charcoal, is rendered nearly inodorous. The solution is again to be mixed with hot muriatic acid, from which hippuric acid separates in prismatic crystals on cooling, which are perfectly white.

Hippuric acid is analogous in its characters to benzoic acid, and was at first supposed to be that acid modified by the presence of animal matter; but it is stated by Liebeg that it is distinguishable from benzoic acid by the nature of its salts, which are less soluble in water, and also in contain-
ing azote, which benzoic acid does not.

It is composed of

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<tr>
<th>Substance</th>
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<tr>
<td>Nine equivalents of hydrogen</td>
<td>9</td>
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<tr>
<td>Twenty</td>
<td>carbon</td>
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<td>Six</td>
<td>oxygen</td>
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<tr>
<td>One</td>
<td>azote</td>
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Equivalent 191

It is stated that this acid, when scented by subliming with a little benzoic acid, is substituted as an article of com-
merce for benzoic acid.

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HIPPURITES (in Zoology), a name given by Knorr and Schroter to a fossil coral (Cystophyllum ceratites, Goldfuss) of the Eifel transition limestone. Guettard also used this title for a lamelliferous coral.

By Lamarck, Desmoulins, and other writers, this name is given to a somewhat problematical group of fossils found in limestones of the oolitic age which flank the Alps in the Unterburg, near Salzburg, at Regensburg, &c., in the chalk of Perigord, &c., etc.

Lamarck places hippurites with blemnites and ortho- ceratites, among the cephalopoda. (\'Conchyliologie,\' Nouv. Dict. des Sciences Nat.) Latreille takes nearly the same view as Lamarck. (\'Familles Naturelles du Regne Animali\'.)

Raffi also places them in the class of the Cephalopodes, and amplifies of Sowerby (which is certainly a lamelliferous coral), introduces the genus among the acephalous rudista, according to the views of Dailainville.

The exact position of the genus studied by M. Ch. Des Moulins and M. Deshayes, and the location of hippurites in that group may, on their competent authority, be definitely adopted. Considered as a bivalve shell, whose valves are very thin, and the latter may be described as cylindrical, conical, or curved; the other as flat, or tumbid externally, and opercularly. The lamina of the large valve is sometimes separated, as in some spondylids, and subsequently on the surface of the circumstance so as to cause the appearance of longitudinal stripes immersed in the shell. These are arguments, and very insufficient ones, for comparing hippurites with cephalopods. The shell is rather formed by a six-sided figure, in a longitudinal direction, which have been compared to the cellular structure of the shells of Balanus. The shells are sometimes attached side by side, as two pieces of a bivalve.

The intersection corresponding to the external figure of the shell, and the cast in this cavity has been called Birostrites.

The abundance of these fossils in certain calcareous beds of the chalk or top of the oolite, or limestone in the Pyrenees, the Unterburg near Salzburg, the Bellunese, &c., is extraordinary, so that particular strata receive from the circumstance the name of Hippurite Limestone.

HIPPTAGE, a genus of plants of the family of Malpighiaceae, but sometimes classified with the former by Schreber in honour of the celebrated Gaertner, though the name assigned by himself, as prior, is now allowed admitted. The genus contains only two species: one, H. Malabarica, figured by Sonnerat under the latter name (Voy. i., t. 135), which is common in the forests of many parts of India; the other, H. obusifolia, is found in China, but commonly cultivated as an ornamental plant in India. Both have a somewhat remarkable for their large size as climbers, ascending to the tops of the highest trees, and hanging down in elegant festoons of white flowers.

HIPPODAUS. [LEMMING.]

Hippopotamus amphibius, is in some sense similar to butyriene, which exists in goat's fat and in mutton suet, combined with olein; its name is derived from hepshus and is obtained from the fat of the goat by a process similar to that by which butyric acid is procured, from which it appears to differ by yielding hiricic acid, by treatment with the caustic alkalis.

HIRE, L. A. [LAHIRE.]

HORTUS, AULUS, born of a patrician Roman family, a pupil of the study of rhetoric, and became intimate with Cicero, who speaks highly of his oratorical talents. There is a letter of Hirtius to Cicero in Ep. ad Att. xx. 6. Hirtius served with distinction under Caesar in the Gallic War. He is generally supposed to be the author of the eighth and ninth Commentaries of Caesar (Suetonius Caesar, c. 56), as well as of the books of Caesar's Alexandrian and African campaigns, which are averredly written by the same person as the eighth book of the Commentaries. With regard to the letter of De Bello Hispanico, it appears to have been written by a different and an inferior hand, and it has been attributed to some C. Oppius, another friend of Caesar. (Vossius, De Historica Latinitate.) Hirtius remained attached to Caesar till his death, after which he took the part of the senate against Antony, and was named consul with C. Vibius Pansa. The two consuls had an engagement with Antony, whom they defeated near Mutina (Modena), and he was killed in the battle.

HIRUDINIDÆ. [LEECHES.]

HIRUDINELLA, a name given by M. Bory to a genus of Microzooa.
which being burnt in the dry season, whilst the cattle take to the forests or the mountains, serves as a manure to the new grass, which is cut and dried in the rain.

The coast, which is about 1200 miles in length, has a great number of harbours, which admit vessels of moderate size: some of them are spacious, deep, and safe. Near Cape Canavera, which is about 70 miles long, and capable of holding an immense fleet. Ships of the largest size may safely ride at anchor, sheltered from all winds, the harbour being surrounded on every side by mountains, which are not more than 300 feet high. The climate of Spaniard is spacious, and though not so well sheltered, offers good anchorage. At the eastern extremity of the island is the bay of Samana, which is very capacious, and affords anchorage both to large and small vessels, it also lies to the north of it, and which is united by a low neck of land to Hispaniola, is low and swampy, and on that account nearly uninhabited. The harbour of the town of St. Domingo is very indifferent, one being too much exposed to the southern winds; but the ground is good for holding. In the bay of Guanaves are the ports of Port au Prince and Gonaive. Port au Prince has two harbours, formed by some islets, which offer good and safe anchorage. The port of Gonaive is open, and excellent in point of security, being formed by a little island, which leaves a narrow channel, but with sufficient depth of water.

The climate of Hispaniola differs considerably from that of the other Antilles, as a consequence of the diversity of the parts of the year on the southern and northern coasts. On the southern it agrees with the rainy season of Jamaica, beginning with gentle showers from the south at the end of April, and continuing during the whole summer; the rains are rarely heavy and are followed by dry weather, which lasts six weeks or two months. In July begin the abundant rains, which continue through August, September, and October, and cease in November. In March there are occasional showers, and the weather varies from hot and dry to cool and overcast.

The climate of the north is altogether different. In June and October, and in November the rains cease for a time, but in December and January they descend in such quantity that the shores are not visible, and are covered with a deep layer of water. The heat of the summer is incredibly great, and the northern winds are the only thing that relieves it. The hurricanes are more frequent on the coast as in Jamaica, but they occur rarely on the northern shores.

Fifty years ago Hispaniola was noted for its extensive plains, fertile, well watered, coffee, and cotton, but they have now all almost entirely disappeared, except those of coffee, which are much reduced. The present population having few wants, and valuing their ease more than anything else, employ their time in cultivating maize, melon, cassava, plantains, sweet potatoes, &c. Besides coffee and pineapples, their gardens produce the fruits of the south of Europe, as figs, oranges, pomegranates, and almonds. The principal commodities which are exported are sugar and molasses, and molasses are large and strong. Game abounds in the forests. At the arrival of the Spaniards gold was collected near the mountains of Cibao; but this branch of industry was soon abandoned.

The aborigines are now extinct, though it is stated that in 1717 there were 250,000 blacks and negroes. But a considerable part of the present population consists of their descendants, mixed with the blood of Europeans and negroes. The number of mulattoes, or descendants of Europeans and negroes, is about 250,000, and in 1806 it was stated to be not less than 1,200,000 souls. Before 1791 it was thought not to exceed 700,000 souls. It is remarkable that though the commerce of the island has decreased considerably since that date, its population has constantly been on the increase; but this increase is easily explained when we consider the abundance of fertile land which is still unoccupied, the limited wants of the people, and the facility with which the bare means of existence are obtained.

Port au Prince, the capital and seat of government, is situated between the large plain of Cul de Sacs and a more narrow one, extending along the coast. The town of Gonaives is about 15,000 inhabitants; it carries on some trade with the United States. S. Domingo, on the southern coast, is the oldest European establishment in America, having been built by Christopher Columbus in 1504; the town of Isabella, which was erected on the northern coast in 1493, was abandoned. The population of S. Domingo is about 15,000 souls; and it formerly carried on considerable trade with the Chinese, and with Cuba, especially in jerked beef; but its trade is now very limited.

Hispaniola was discovered by Columbus in his first voyage, at which time he called this name. The Spaniards formed settlements, first at Isabella and then at S. Domingo. For nearly half a century these settlements received much attention, and rose to great prosperity, until different parts of the American continent were discovered, and the monies were quickly spent. From that time Hispaniola was neglected, and as the natives had been nearly exterminated, the island soon became depopulated, and the northern and western districts were nearly a desert. The habitations were nearly on the island of Tortuga, opposite Cap France, and also on the coast. Perceiving that they would be driven away by the Spaniards, they voluntarily submitted to France, and Lewis XIV. sent them in 1634, a small body of people to be obliged to give up the western districts, or nearly one-third of the island to France. The French, who considered their portion of Hispaniola as the most valuable of all their foreign settlements, began to cultivate it with great care. In 1791 the agricultural produce of the French portion only was valued at more than eight millions of pounds sterling. In 1794 the negro slaves were declared free by the National Convention, a declaration which was followed by a general insurrection among the negroes, who compelled all the white inhabitants to emigrate who had not been massacred. One of their chiefs, Toussaint L'Ouverture, established in 1801 a kind of republic, but was obliged to submit to the French armies in 1802. In 1803, Napoleon crowned Louis XVIII.; he was afterwards deposed by the people. In 1806, Bonaparte and called himself emperor; in 1806 he was murdered.

After his death the French portion of Hispaniola was divided into two states; the northern coast was formed into a negro republic under Christophe, who in 1811 also took the title of emperor; the plans about the Bay of Guanaves became a mulatto republic under Petion. Conflagrations was carried on between these two republics. After the death of Christophe (1813) he was succeeded as president of the republic by Boyer. Christophe having killed himself on the breaking out of an insurrection in 1820, Boyer united the whole under his authority. In the meantime the Spanish part of Hispaniola had been ceded to France in 1795, and the negroes were in 1803. The following year however it declared its independence of the Spanish government, and remained in an unsettled state until 1822, when it was subjected to the authority of Boyer, who declared himself president of Haiti in 1822. According to the constitution promulgated in 1816, Haiti is a republic governed by a president, chosen for life, and assisted by a legislature consisting of two houses, a senate and a house of representatives. It is to be considered as a despotic, the chief being chosen by the army, but some republican forms are added. The government is anxious to promote education, and to encourage the settlement of whites; but they enjoy the same privileges as the coloured people. The French
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Another example of history in a limited sense, and one which brings us to the subject, is the life of an individual. That branch of the historical art which treats of the life of an individual has long since obtained the specific name of biography. The reason why this species of composition has always given so much pleasure, is because the interest, the joy imparted, and the curiosity to know, are almost always true. To desire to know the past, to ascertain how that now is became what it is, and the successive steps of its development, is an active principle in our intellectual and moral condition. It is this which gives such a glisten to his minute investigations into the phenomena which present themselves on the surface of this globe. He labors, if not with the hope of finally attaining a complete view of the successive stages which have carried the actual state of things, with yet the reasonable certainty of learning something, and of being rewarded by a more exact and comprehensive view of the whole present condition of society. Such is the interest which some few individuals can create for themselves in branches of investigation which to mankind in general are distasteful or repulsive. But everything which concerns a human being excites the universal sympathies of mankind, and when we of those who have greatly dared or suffered, of those who by their talents and virtues have been the benefactors of mankind, or by their voices have inflicted misery on thousands of their own and succeeding generations; to know the minute circumstances of the sources, the causes, education, and life of such individuals. We desire to know how they finally became possessed of that character which distinguishes them from other men, and how they finally accomplished that for which their names are remembered. The study of the individual is so far like the history of a nation, that it involves a progress from a beginning to a certain definite point; and though the life of an individual cannot be viewed detached from that of his age and country, we are free for all the purposes of instruction a sufficient analogy to the life of a nation. The commencement of the national life is generally held in the obscurity and the meanness of its birthplace; and it is in reality as distinct as that of an individual death, but its condition at any one stage, like that of an individual, is to be deduced only from a full comprehensions of all the preceding circumstances of its existence.

We may then conclude that the history of any nation is a statement in chronological order of the various actions and events by which the society which constitutes that nation has attained and is in its actual state; meaning by the actual state (so far as such a term is capable of definition), its aggregate means of happiness. But though such a statement as we have just mentioned of actions and events, when they are judiciously arranged, well composed, and written in the art, which is the subject-matter of the history, has been brought to its present state. Such a history then is nothing more than the explanation of the present condition or state of any given thing, by connecting it with an explanation of all the events of the cause of the actual state of the same thing. But whatever propriety these may be in such an explanation of the world history, it is obvious that a bare narrative, however complete, of the successive mechanical or accidental devices by which the steam-engine and the printing-machine have been advanced from their first rude beginnings to their present perfection, cannot sufficiently the desire of knowledge when it is once called into operation; and of such successive mechanical improvements were not connected with social progress, the scientific exhibition of such development, though it might interest the few, would not command the attention nor excite the sympathies of the many. And this leads at once to the conclusion that the various steps and processes by which every art and science has been brought to its present state, cannot be viewed simply by themselves, without relation to each other, and without relation to their effect on the happiness of mankind. All such special history then is viewed by us, though often unconsciously, as nothing more than an exhibition of the progress and perfecting of essential or necessary ingredients which help to make up that entirety which is called society—a word which expresses the aggregate of human beings and the infinite relations which unite them.
as influencing and being influenced by the new elements which from time to time enter into the composition of society, and so to show at each stage of such progress, not only the condition of society, but the causes which determine such condition—such may be called a philosophic exhibition of history, or, in other words, a determination of the general principles which govern any given society, and the consequences which flow from them.

As this determination of general principles and of their effects forms the scientific part of the subject of history, so the mere accumulation and existing of such a material will be enough to form an artistic part. No exact rules can be laid down for the treatment of history as a branch of art. It may be simply said that while the main object is to instruct, it is also an object to please, independent of the pleasure given by the mere contemplation of knowledge: that a number of events which mark the progress of society, a few are often sufficient for the purpose of the historian, and that in the selection of the most appropriate he will show his judgment and tact; while he clearly points out those principles which have had most influence on the condition of society, he will not overload his work with reflections which the matter will suggest to the reader; and he will often not do more than put him in the way of following out a train of thought. His art will often teach him to conceal his purpose of instruction, when his work will not be prejudiced by his apparent forgetfulness of the dignity of his subject.

To enumerate among the historian's qualifications those of industry, integrity, and sound knowledge, or to detail all the qualifications for executing his task in the best possible manner would be fruitless. We will instead of this, briefly consider the value of his labours when complete, and the advantage which his readers will derive from a careful perusal of his work and an examination of the materials he has given.

It is a common remark that all history is uncertain, and if the remark were true to the full extent, there would be little use in attempting to show the value of that which cannot be known with certainty. But though many events, or even many of the actions of such men as are the most valuable part of history rests upon monuments which have no uncertainty in their character. The positive institutions of every civilized nation, its laws and its literature, and so to show at each stage of its progress, not only the condition of society, but the causes which determine such condition—such may be called a philosophic exhibition of history, or, in other words, a determination of the general principles which govern any given society, and the consequences which flow from them.

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next resistance of accumulated ages, embodied in the habits, opinions, and institutions of the actual generation. The anticipation of universal change and complete reformation of social habits and opinions is indulged in for a few short years, sometimes mingled with contempt of those who pertinaciously look behind them, instead of embracing the offered means of perfection and throwing away all doubts as to the future. An instructive lesson is all that remains of these brilliant expectations in the general follies of wrestling with a power which we have not duly estimated, and of opposing to opinions and habits hardened by the growth of centuries, the soundest conclusions of our philosophy, when unaided by the experience of history.

HOBALDEY, BENJAMIN, born 1767, died 1761; an English clergyman, successively bishop of Bangor, Hereford, Salisbury, and Winchester. Pleasingly, a prominent feature of Hobley's character, and his relation to the times in which he lived, he is to be regarded, 1st, as a principal writer among the divines of the English church who are called Rational, that is, who have renounced the system of traditional reasons, the popularity of which constitutes proper Calvinism, and have advanced more or less near to the opinions which are comprehended under the term Unitarianism: not that it would be just to them to rank them among Socinians, or in the modern sense of the word, called Unitarians, for they had abandoned opinions which are supposed to be the most opposed to those of Unitarians, such as Election and the other distinctive doctrines of Calvinism. His "Plain Answer, to all the Dowager Duchess's, his and many others on the Terms of Acceptance," show how rational was the view which he took of Christianity, its requirements, and its ordinances. They are still much read, and greatly valued by those who are establishment-haters, but are antagonistic to Low Church principles, a species of Wighism in ecclesiastics, in opposition to the high pretensions sometimes advanced by the church or particular churchmen. It was in this character that he was connected with the English bishops of Bangor, who presented him with the rectory of St. Peter's Poor with the rectorship of St. Mildred in the Poultry. In 1710, when the Tory influence was becoming predominant in the councils of Queen Anne, and he was suffering from that and from the popular High Church doctrine of the private council, Mrs. Howland, of Streatham, who was connected with the noble house of Russell, presented him with the rectory of Streatham. The queen died in 1714, and the accession of George I brought with it a great change in the politics of the court; of course this was most apparent in the appointment of the bishop of Bangor, to which Hobley was appointed in 1721. He was translated to Hereford, and from thence in 1723 to Salisbury. In 1734 he was made bishop of Winchester. In a letter which he wrote in 1761 to his brother, he speaks of his situation that as bishop of Bangor, he was to the queen as if he were ; his situation was such as to make it impossible for him to be re-elected. In 1764, he was made bishop of Winchester. A letter which he wrote to a correspondent of the time in which he considered his position at Bangor, may be read in the "Biographia Britannica." Dr. Benjamin Hobley, a physician, author of a once popular play, entitled 'The Suspicious Husband,' was his son.

HOATZIN. [Crassic., vol. viii., p. 131.]

HOBBARTOWN. [Tasmania.]

HOBBES, THOMAS, was born at Malmsbury, in Wilshire, on the 5th of April, 1588, and was the son of a Protestant clergyman of that town. At the age of fifteen he was sent to Magdalen Hall, Oxford, and after he had gone through the usual university course, he became in 1608 private tutor in the family of Lord Hardwicke, some years afterwards created earl of Devonshire. In 1610 he went abroad with his pupil Lord Cavendish, and made the tour of France and Italy. After his return he came to mix with the learned classes in London, and in 1615 published a pamphlet on the "history of his travels." This work established him as an intimate associate of Sir Robert Cotton and of the earl of Devonshire, with the men most distinguished at that time for learning, as well as with others conspicuous by their high station. He enjoyed the familiar friendship of Bacon, who is said to have been assisted by Hobbes in the translation of the "Organum," and of his works of the "Reflections" and "Treatise of the Calendar of the Sun." At the publication of the translation of the "Treatise of the Sun," he was elected a fellow of the Royal Society, of which he was one of the first members. He died in 1679, and was buried in the church of St. Mary's inrawtypes
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Harlizt remarks, speaking of Hobbes's style of writing, which has been so offensive in the context of

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as he himself tells us with characteristic frankness, and in characteristic style, of other books of

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the spirit of free inquiry in Europe.

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and for this reason he walked out and climbed any hill within his reach; or, if the weather was not dry, he fattened himself within doors by some exercise or other, to be in a sweat. After this he took a comfortable breakfast; and then went round the lodgings to wait upon the earl, the countess, and the children, and any considerable strangers, paying some short addresses to all of them. He kept these rounds till about twelve o'clock, when he had a little dinner provided for him, which he ate by himself without ceremony. Soon after dinner he retired to study, and had his candle with ten or twelve pipes of tobacco laid by him; then shutting his door, he spent the evening looking, thinking, and writing for his work. We are told that he was tidy and particular in conversation, more particularly in his latter years, and that he did not easily brook contradiction. And there can be no doubt that his independence was often displayed in that excess in which the height of his pride is shown, one of his boasting, for instance, 'that though physics were a new science, yet civil philosophy was still newer, since it could not be styled older than his book "De Cive."' Such indeed was his usual tone in speaking of his own performances. Another proof of his arrogance is supplied by his mathematical controversies. But after all there is something that we cannot resist admiring in independence of others' opinions, when carried even to the excess in which his character displays itself. 'There is an air of grandeur,' as Mr.
There is no doubt that in Hobbes's views, as we have stated them, there is some error. His hypothesis of a covenant as the origin of government, for instance, is a fiction which has now long been exploded in this country. But this is an error solely speculative, and of little importance; for all the valuable conclusions which Hobbes seeks to derive from his fiction may be got at, without its aid, by moderate reasoning. It is, however, a fact, that the doctrine of the obligation under which Hobbes has so long laboured, are from a work which, both as regards thought and style, is one of the most masterly that modern times have seen. The authors of the antipathy that worked such notable service of the commonwealth and the Presbyterian clergy of the Roman Catholic church, the High Church clergy of the Church of England, and the Presbyterian clergy of the true blue complexion. In matters ecclesiastical (a phrase of uncertain meaning, and therefore of measureless compass), independence of secular authority was more or less affected by churchmen of each of those factions. In other words, they held that their own church was co-ordinate with the secular government; and that the secular government was not itself supreme, but rather partook in the supreme powers with one or more of the clerical order. Hobbes's unifying loyalty to the present temporal sovereign was alarmed and offended by this act, and it became a matter of the highest reason and an aptness and pungency of expression which the aspiring and vindictive priests did bitterly feel and resent; accordingly they assailed him with the poisoned wares of witchcraft, and was in a cowardly panic. All of them twisted him (agreeably to their wont) with flat atheism; whilst some of them affected to style him an apostle of tyranny or miracle, and to rank him with the perverse writers (Machiaveli, for example) who really have an applied tyranny which is real, and by colour and currency. By those calumnies, those conspiring and potent factions blackened the reputation of their common enemy. And so deep and enduring is the impression which they made upon the mind of the public that it was not until the next century that his theory of the Pernicious Errors to Church and State in Mr. Hobbes's book entitled Leviathan; and Culworth, in his treatise on 'Eternal and Immutable Morality; and Bishop Cumber- land, in his Latin work on the Laws of Nature.' Bishop Bramhall published a book called 'The Catching of the Leviathan,' to which Hobbes replied. We may also mention Archbishop Tenison's 'Cred of Mr. Hobbes examined,' and Dr. Echard's 'Dialogues on Hobbes.' And, in addition to direct and professed attacks on Hobbes, there are numer- ous references to his views for the purpose of censure in Harrington's 'Ocean,' and in Henry More's writings. But although Hobbes's writings excited so much controversy, and enflamed so many passions of public feeling, the name is, it is clear, from the very few editions which have been published of his works, and from the circumstance that those few are old, that they have not for a long time been the object of abuse. The path which he has trodden has been trodden by many more. It is the conclusion of the hostility with which his name is regarded.

HOBBIMA, MINDERHOUT, one of the most eminent of the Flemish landscape painters, was born at Antwerp, and died at Amsterdam. The press now with controversy, but we believe, conjectured by whom he was instructed, but his works evince the most assiduous and successful study of nature. His subjects are in general simple country scenes, the trees, the banks of a forest, a winding path leading to a distant village, or some ruin, building, or piece of water, often carrying the eye to an almost evanescent distance; such are the materials to which, by accurate perspective, clearness, and fullness of colour, and the most careful execution, with a free and light of pencil, he gives an unrivalled charm. His pictures are sought after and eagerly bought. Some of his very finest productions are in England, in Sir R. Peake's collection, and the Grosvenor Gallery. The largest and, in the opinion of Dr. Waagen, the finest of his works is in the possession of Mr. A. W. N. Pugin, who has refused 3000l. for it.

HOCHÉ, LAZARE, born in 1726, was the son of a very humble parentage, enlisted in the French Guards at the age of sixteen. When the Revolution broke out he warmly espoused its cause, obtained a lieutenant's commission in a regiment of dragoons, and had distinguished himself in several risings. Having distinguished himself he was rapidly promoted, and at the age of twenty-four was made general in command of the army of the Moselle. He opened the campaign by seizing and burning a large number of the best houses of Strasbourg, taking the place, however he failed. In concert with Pichegru he then attacked the Austrian army under Wurmser, and drove it out of Alsace. Upon incurring the displeasure of St. Just, the terrorist commissioner of the Convention, he was ar- rested and thrown into prison at Paris, when his life was saved by the timely overthrow of Robespierre in July, 1794. The Convention restored him to his rank, and sent him against the insurGENCY of La Vendée, where he showed much firmness mixed with considerable address and tact. This position to conciliate, instead of driving the royallists to despair. He defeated the emigrants who had landed at Quiberon in July, 1795, and having obliged them to sur- render their commander, he captured a ship of the line, and not only should be punished, and the rest be spared; but the Convention ordered a general massacre. Hoché, upon this, gave up the command of that district to General Lemoine, and returned to Paris, having completely restored the authority of the Revolution in that quarter. But Hoché did not escape the operations in Vendée Proper, where he succeeded in putting down the insurrection, and seizing Charette and the other leaders, who were put to death. By a decree of the Directory, July 1796, he was declared to have well deserved of his country.

Hoché now conceived the bold idea of effecting a landing in Ireland, and a fleet having been equipped at Brest with great secrecy, he embarked his troops in December, 1796, not being separated by a storm from the rest of the fleet, he was obliged to return to France without effecting any thing. [Bantry Bay.]

Upon the Directory giving him the command of the army of Summe et Meuse, he crossed the Rhine near Neuwied, in presence of an Austrian army, defeated the Austrians in several battles, and advanced as far as Wetzlar, where he heard of the truce of Leoben concluded between Bonaparte and the Archduke Charles, which put a stop to hostilities. In the quarell which was then begin- ning to manifest itself between the Directory and the Legis- lative Councils, Hoché took the part of the Executive, as he believed the Directory to be not strong enough in its measures, but with a strong government in order to repress the factions and restore order, and he began to direct some of his forces towards Paris in order to support the Directory in the mea- sures which it was preparing to take. For this he was denounced by the Councils, and Bonaparte meantime having offered the support of his own army of Italy, the Directory declined Hoché's services, and made use of Augereau to effect the coup d'état of Fructidor. [Augereau.] Hoché seems to have taken to heart this slight against Directory, and he re- turned to his head-quarters at Wetzlar, where he was seized by a sudden illness, of which he died on the 15th of September, 1797. The symptoms of the disease give rise to sus- picion of poisoning or an attempt to poison him. His funeral at Champ de Mars with great magnificence. Hoché was one of the most distinguished generals of the Revolution, not only for his military but for his political abilities, and his character as a man. He had long lost the affection of France that had had he live might have exercised great influ- ence on the destinies of that country, and have proved a formidable rival to Bonaparte. His life has been written by Rousselet de Launay, 6v. [HOCHESTADT. [BLENNHEIM.]

HOCCO, a name employed by Buffon, Latham, and others, to designate some of the Curassow birds. [CRACIDE, vol. viii.]
HODGESDON. [HARTFORDSHIRE.]
HOKEIDA. [ARABIA.]

On the 1st of January, 1659, at Oldcombne, in Somersethire. He was educated at the University of Oxford, took his degree of M.A. in 1662, and was elected in 1664 a fellow of Wadham College. In the same year he published a 'Dissertatio concerning Historiam Arateae de LXX. Interprebus,' which was well received by most of his learned contemporaries. Vossius however published a reply to it in an appendix to his edition of Pomponius Mela. Hody was probably unknown among his contemporaries were those which he published respecting the bishops who had been deprived of their bishoprics during the reign of William and Mary, for refusing to take the oath required of them. The first work which he published on this subject was a translation of a Greek treatise, supposed to have been written by Nicephorus in the latter end of the thirteenth or the beginning of the fourteenth century, in which the writer maintains that 'although a bishop was unjustly deprived, neither he nor the church ever made a separation, if the successor was not a heretic.' The original Greek work, as well as the English translation, were both published in 1691. Amongst the numerous works published in reply to Hody, the most celebrated was written by Dodwell, and was entitled 'A Vindication of the Depri ved Bishops,' (London, 1692). Hody published another work, entitled 'The Case of Sees Vacant by an Uncanonical Deprivation,' (4to, London, 1693), in which he supports the opinions of Nicephorus, and replies to the arguments of his opponents. These excursions of Hody in favour of the establishment of bishops in the Church of England were not the only duties to which he gave his attention. He was appointed domestic chaplain to Tilloston, archbishop of Canterbury, which office he also held under his successor. He was presented with a living in London, and in 1699 was appointed a judge of the Court of Oxford. In 1698, and archdeacon of Oxford in 1704. He died on the 20th of January, 1766. He founded ten scholarships at Wadham College, in order to promote the study of the Greek and Hebrew languages.

Of the other works of Hody, the most important are:—
1. 'De Bibliorum Textibus Originalibus, versionibus Graecis et Latina Vulgata, libri iv., Oxford, 1704, fol., which is said by the Marsham to be the first work on the Septuagint.' The first book contains the dissertation against the history of Aretas, which has been mentioned above. The second gives an account of the real translators of the Septuagint, and of the time when the translation was made. The third book gives a history of the Hebrew text and of the Latin vulgate; and the fourth, of the other ancient Greek versions. 2. 'The Resurrection of the (Same) Body Asserted,' 8vo, London, 1694. 3. 'Animadvertences upon a Book lately published by Collier, 8vo, London, 1696.' Sir W. Perkins and Sir J. Friend had been executed in 1659 for treason against the government; but previous to their execution had been absolved of their crime by some non-juring clergymen. This act was condemned by the ecclesiastical authorities, but was justified by Collier in two pamphlets which he published on the subject. 4. 'De Graeci Is Illustrius linguae Graecae litterarum humanorum institutoribus,' Lond., 1742. This work was published several years after the author's death, by Dr. Jebb, who has prefixed to it an account of Hody's life and writings, to which we are indebted for the greater part of the preceding remarks.

HOE, HORSE-HOING. The hoe is an instrument used in gardens and in the fields for loosening the earth, and destroying the weeds between plants. It has various forms. The most common hoe consists of a blade or flat piece of iron, with an eye in which a handle is inserted at an acute angle with the blade of the blade. This hoe is used by striking the edge of it down into the ground, and the earth is moved by drawing the handle towards the worker. The double hoe is very obtuse in angle, and is used by pushing it forward and cutting off the weeds an inch or less under the surface of the ground. Hoes are made of different sizes and shapes according to the work which is to be done. The one is to be used when the land is to be hoed, the other when the land is to be cultivated. The double hoe is pointed, so that the smallest weed may be taken out close to the growing plant. When the distance is considerable, the hoe is wide, and sometimes compound of several hoes, in order to stir a greater width of earth at once.

One of the greatest improvements in practical agriculture has been the introduction of the hoe into the field for every kind of crop. Peas and beans were probably the first crops which were sown in rows for the purpose of hoing the intervals; potatoes, turnips, and carrots were probably the next, and the good effects produced on these crops, by stirring and hoing the intervals between the plants, have led to the drifling of every other kind of produce which is apt to be injured by weeds. Hand-hoing not having been found sufficiently expeditious on a large scale, a hoe has been invented of a larger form to be drawn by a horse. The rows have in consequence been widened, and this has introduced the horse-hoing of bands, which, half a century ago, was so much an important discovery as to receive the name of the New Husbandry. The great promoter of this system was Jethro Tull, a gentleman from Hungerford in Berkshire, who having observed the good effects of stirring the soil around plants, imagined that tillage might supersede all manuring, and that by keeping the soil free from weeds and continually stirred and pulverised, an inexhaustible fertility might be produced, and successive crops of the same kind might be raised without limit. The horse-hoe was the chief agent in this system, which imitated that of alternate crops and fallows; for the intervals between the rows in which the seed was sown were kept in a constant state of ploughage, and thus allowed for the reception of the seed for the next crop. Although these high expectations were not fulfilled, the hoeing of the intervals has caused a very great increase in the produce of the land, especially when the land is not just in its natural state, but has been improved by ploughing and manuring, and a proper succession of crops.

The simple horse-hoe is an instrument with a beam like a plough, and two stults or handles, but much lighter; in this beam is inserted, instead of a coulter, the end of an iron hoe, of the proper breadth to stir the whole surface between the rows. A small wheel is generally added to keep the hoe at a proper depth in the soil.

A horse draws the instrument, which is held and guided like a plough. When the space to be hoed is considerable, the iron of the instrument is sharpened differently. The hoe is narrower in the blade, and the instrument resembles a wheel-barrow more nearly than a plough.

From these simple instruments a variety of others have been invented of a more complicated nature, but the object of them all is the same, viz. to stir the ground between the rows, and destroy the weeds as fast as they appear.

The horse-hoe is now chiefly used in the cultivation of peas, beans, potatoes, cabbages, turnips, and carrots. It has been found that the required distance for the horse-hoe to act properly is too wide for rows of corn, and that the narrow hand-hoe is a more effective instrument in keeping these crops clean.

The effect of hoing is remarkable in very dry weather. Although the stirring of the soil would seem to extract what little moisture there might be in it, and the weeds wither on its surface, it soon appears that, on the contrary, moisture is attracted or produced, and the plants which had before appear refreshed and invigorated. This is probably effected by a chemical action of the air on the vegetable portion of the soil and on the roots of the plants, which have the power of combining the gaseous principles in various ways.
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ducing that combination of oxygen and hydrogen which forms water, while the power of vegetation in the plant it-off can combine hydrogen and oxygen from atmospheric sources. Whatever be the mode in which it acts, experience has proved that the more the earth is stirred around plants the better they thrive.

Where a very great perfection has been attained in drainage, it is often necessary to have the soil perfectly equi-
distant and straight, an instrument may be used which shall hoe ten or a dozen rows at once, without danger of cutting up the growing plants. Such an instrument has been invented in Bohemia, but the rows are so wide, however, that it is very generally used. It is called the inverted horse-
hoe, because the hoes are so placed as to present the back part of the hoes, which are rounded, towards the growing plants, so that the ground can only be touched so as not to cut them down. The points of the hoes are all in the middle of the intervals, one pointing to the right and another to the left. When the intervals are very wide, as is the case where potatoes, turnips, or cabbages grow in rows, a light plough, with one horse, going up and down the interval answers the double purpose of a hoe and plough. It stirs the ground to a greater depth, and can be guided nearer to the growing plants than the common horse-
hoe. It turns the furrow into the middle of the interval, from which it may afterwards, when it has been improved by exposure to the air and rains, be thrown back towards the roots and stems of the plants.

The hoeing cannot be performed too soon after the plant has shot out its roots, because the ground may then be stirred very near the young plant without danger, and the roots will spread readily in the newly-stirred soil.

In stiff soils it is often very difficult to use the horse-hoe owing to the hardness of the surface, which rises in lumps, the reverse of what is intended; but a little attention to the water will largely contribute to the results generally give a visa-

it this difficulty. If the soil is bound at the surface, it is a proof that the preceding tilling has not been so perfect as it ought; that the ground has not been stirred to a suffi-
cient depth by the horse-hoe, or that the soil is very dry, and it wants underdraining. There are few soils which may not be made mellow and crumbling some time or other in spring; and if the proper time be chosen for the first hoeing, the surface will scarcely ever become so compact as to rise in large clods. In this case of a very tenacious soil the small-skilled roller, described [Bran] in vol. iv., p. 82, may be had recourse to, and after using it a few times in dry weather, the surface will be left in a flat state for the common horsehoe and the plough to be used in its proper place. The horse-hoeing in the cultivation of the maize or Indian corn in Lombardy. The rows there are about 27 to 30 inches distant; as soon as the plant would strike downward to the depth of moisture. Turn-

ips may be partially covered with earth from the inter-

calves, and will be protected from the frost by this covering. By attending to the growth of any plant we may soon discover when it is advantageous to move the earth from the roots and when it is best to divide them, or bind them together. With respect to the destruction of weeds, there can be no doubt as to its great importance to all crops. It is generally supposed that every time that wheat is hoed judiciously, more than a bushel of ore is added to its weight, and this same, the benefit which the land receives by eradicate the weeds. Two or three good hand-hoes will often so completely clear a field of weeds, as to render superfluous the follow which would otherwise have been necessary and thus save all the expense of following and the loss of one crop in four or five.

A great oversight is often committed when a field is hoed. The parts nearest to the fences and the sides of the banks, where the plough has not been able to go, are seldom hoed; but these parts become by neglect prolific nurseries of all kinds of plants, which when it has become necessary to disem-
nate them all over the field. No part of the surface should be left unhoed; and when the hoers leave a field, they should be able to defy any one to pick up a growing weed in it.

Those who employ labourers to hoe a field, at a certain price per acre, should be careful to see that the whole ground between the rows and the plants has been stirred; for it is a common trick to throw the earth over the growing weeds, and bury them only, without cutting them up by which, instead of being destroy, they flourish more vigorously.

The best time for hoeing stiff soils is when they are neither wet nor dry; when the surface is slightly caked, but there is moisture below it, and when the weather is dry after some rain. Light soils can be hoed at any time, and require it often than the heavy, especially in showery weather.

HOF, a district in Upper Franconia, in the kingdom of Bavaria, has a population of about 19,000 inhabitants. The chief town, of the same name, called also Stadt-
Hof, is a place of great antiquity, and was early admitted as a free city of the empire. It has 6000 in-
habitants, who carry on extensive manufactures of woollen, cotton, muslin, leather, paper, &c. The breweries are also prolific. There are three churches, a gymnasium, with a large library, a rich hospital, and other public institutions. There are quarries of fine marble and iron-works in the neighbourhood. Of 697 houses, 262, with the fine church of St. Michael and the town-hall, were burnt down in 1823.

The town is supplied from the river Hofer, and the regularity of the new buildings has greatly improved its appearance. It is joined to Ratisbon by a bridge over the Saal.

Hofmann, Friedrich, was born at Halle in Saxony, in 1669, of a family which had been engaged for two centuries in the practice of medicine. After having graduated and received his diploma at Jena, he established himself as physician at Minden in 1680. In 1684 he trav-
elled through Holland and England, and on his return was appointed physician to Frederick William, elector of Brandenburg, and to the garrison at Minden. In 1698 he removed to Halberstadt, and having gained considerable celebrity both by his successful practice and his writings, he was invited by Frederick III., elector of Saxony, after-
wards king of Prussia, to take the chief professorship of medicine in the University of Halle, which had just been founded. He wrote and published on the statutes of the Institution, and retained the professor-
ship with a reputation scarcely inferior to that of his great colleague Stahl, till 1742, the year in which he died. As a man of letters he was practical, and his name is associated only to that of Boerhaave, who was the contemporary pro-
fessor of medicine at Leyden; his works were well known and esteemed throughout Europe, and he was admitted a member of the scientific societies of Amsterdam, Pari-
ters, and other cities. He was a most voluminous writer; his collected works form six thick folio volumes, and the titles of his treatises occupy thirty-eight 4to. pages in Haller's Bibliotheca Medicinae Practicae.

Of the details of all Hofmann's writings however little is now known. He assisted considerably, by the mass of evidence which he collected in his practice, in establish-
ing the doctrines which had been first advanced by Van Swieten and Van Helmont, and were more graphically main-
tained by Stahl, that the phenomena of living bodies are not explicable by the laws of inanimate matter, but depend on the constant action of a peculiar principle of life. This vital principle was conceived by Stahl to be in the brain, was supposed to be accumulated in the brain, whence it was eliminated and conveyed along the nerves to all parts of the body, carrying with it life and energy. He thus as-
cribed to the vital principle the benefit which the land receives by eradicate the weeds. Two or three good hand-hoes will often so completely clear a field of weeds, as to render superfluous the follow which would otherwise have been necessary and thus save all the expense of following and the loss of one crop in four or five.

A great oversight is often committed when a field is hoed. The parts nearest to the fences and the sides of the banks,
as the result of the changes which he observed in the doctrines supposed to explain the essential nature of disease. The humoral pathology, which ascribed all diseases primarily to a morbid condition of the fluids, which by their action on the solids produced secondary changes in them, had prevailed in all the schools, and had been almost ineffectually opposed by Glisson and Baglivi; and the only subject of dispute had been whether the primary disorder of the fluids consisted in an alteration of their physical or their chemical properties. Whatever the cause of the change, it was often the primary seat of disease than the fluids. He believed that all their disorders were attributable to an alteration from the healthy degree of action, or, as he called it, tone, which constitutes the natural state of the moving fluids. In any case, he considered that the tissues of the body; if this tone were increased, spasm was said to result; if it were decreased, stony or relaxation was produced; and those opposite conditions occurring in one or other of the chief systems of the body, the nervous or the vascular, produced, he thought, every variety of disease.

Hoffmann's theory has itself long ceased to be studied, but it formed the basis upon which many others, more nearly approaching to accuracy, were founded. Cullen acknowledges that his own doctrines were in a great measure founded upon it; and Brown's hypothesis of exhausted and accumulated excitability, upon which that of Rassori, still regarded as the best of the school, is based, was another modification of the same theory of Hoffmann. In this country some of his terms alone are preserved to express similar and rather indefinite ideas. In the applications of his theory, he was extremely simple, and, by comparison with modern physiologists, tempering and inefficient. In accordance with his theory, most medicines were deemed by him to be either as tonics or as antispasmodics; the former class including all stimulants, and the latter all depressing agents; but he also admitted alteratives and evacuants. His knowledge of the use of chalybeate springs was such as to owe to him the discovery and first introduction of the Seidlitz waters and the purgative salt obtained from them.

The best edition of his complete works is that published at Geneva in 1748, in 6 vol.; and his best treatises are the 'Medicina Racionalis Systematica,' which comprises the first 3 volumes, and the 'Consiliorum Medic.' (Life prefixed to his works; Broussais's Examen des Doctrines Medic.)

Hoffmann, Christian Gottfried, born in 1692 at Lauben, in Upper Lusatia, studied at Leipzig, where he took his degrees. In 1718 he was made professor of law in that university, and afterwards appointed to the chair of natural and civil laws, the latter of which he retained till his death. He was also appointed counsellor to the king of Prussia, and member of the Academy of Sciences at Berlin. His principal works are: 1. 'Historia Juris Romanjus Justini.' 2. 'Specimen Conjecturatum de Origine et Natu Religiose Germanici.' 3. 'Introductio in Jurisprudendiam Canonie-Pontificia.' 4. 'Nucleus Legum Imperii et Novissimarum Pacificationum.' 5. 'Prontissimae de Origine, Progressu, et Natu Jurisprudentis Criminalis Germanic.' 6. 'Novum Volumen Scriptorum Rerum Germanicum, in primis ad Lusatiam et vicinas Regiones spectantium.' 7. 'Novi Scriptorum ac Monumentorum, quae usque ad se temporis fere perdeserunt, reeditum.' 8. 'Epistolae Americanae.'

The class to which his attention was first of all directed was that of the pauper, whose depressed condition was a subject of great concern to him. He found them nearly as ignorant as the oxen that they drove, and able to avail themselves of but few of the advantages which nature offered them for improving their condition. The idea struck him that an estate might be so managed as to constitute not only a source of profit to the proprietor, but a means of rescuing the peasant from a state of brutish ignorance, and make him, in some measure, as comfortable in his circumstances, more happy in himself, and more useful to his country instead of an incumbrance. The theory which he devised he also executed; young, full of energy, by birth a patrician, and possessed of a fair proportion of wealth, thirty-six years before he terminated his life, he had become a gentleman of few can command—nor has his seal flagged. From that time to the present he has been occupied in improving and perfecting his first design, which a long experience has proved to have been justly conceived with reference to the wants, the powers, and character of man.

The chief characteristics of the peasant school are:

1. The combination of industry with instruction. As in nearly all occupations the largest proportion of a peasant's time, it is made to occupy the larger proportion of the day in the education in this school. Intellectual instruction occupies only a comparatively short period, so as to be continuous in a manner similar to that of the school. The industrial employments are varied with the ages and strength of the children, and are superintended in such a manner as to secure the habit of performing each skillfully. Indeed the very practice of the institution is a character to permit the children who are largest to receive instruction in various arts which must necessarily be of service to them both in the economy of their own cottages and in making them more valuable as labourers and servants. Thus the use of carpenters' and smiths' tools, the management of a garden, the care of horses and cattle, &c., each in its turn engages the attention of all the children, thus giving them independence by rendering them capable of supplying their families with articles which they otherwise would not purchase, while it enables them to occupy with advantage many a long winter's evening, or day, when employment for wages is not to be had, which would otherwise be spent in idleness, if not in mischief, not in mischief.

2. The reference of the intellectual instruction to the industrial employment.

Beyond the usual routine of reading, writing, and arithmetical, the children are to occupy an accurate acquaintance with all those properties of bodies by which they are surrounded as can be turned by them practically to account. Mechanics, chemistry, so far as it relates to agriculture, natural history, botany, geology, mensuration, geography, &c., form a part of the school; and under the title of chemistry, natural history, &c., as facts relating to the bodies by which they are surrounded, which is necessary for them to know in order that they may avoid pernicious errors. The pedantry of knowledge belongs only to man studying for display, not to man studying because knowledge is a power of which he stands in need.

Drawing and music are also taught. The first, for its great utility in conveying ideas as to which words can give but inadequate information, in correcting the eye, and in assisting in the close observation of external appearances; and the second, for the relief which it affords to the mind, which is cheerful and soothing, is also innocent, and is of no mean value in aiding the moral training.

3. The profits of the labour of the children being made available for the benefit of the education.

There are about 100 children in the poor school, who are boarded and clothed at the expense of M. de Follenberg. In order to secure a return from them which will remunerate him for his outlay, he stipulates that they shall remain with him until twenty-one years of age. Thus their labour in the latter years repays their previous expenditure during their youth.

Besides the school the sons of peasants there was also, when the writer visited it about five years ago, one for girls of the same class, for whom an education similar in character to that of the boys, but adapted to the sex, was given. This school, we have learned, is no longer in existence.

The farmers have also their school, in which the scientific
part of education is carried much farther than in the
peasant school. Great attention is now paid to agriculvore,
both in theory and practice, while the pupils are
expected to labour in all the departments of the institu-
tion in the same manner, although not for so long a
portion of the day. The children in this school pay a
small annual sum for their education, as the quantity of
labour which they perform is not sufficient to repay the
cost of their education.

A sort of children which we have mentioned there is
also another for the higher classes of society. At the time
when the writer of this article visited Hofwyl, there were
about 100 children in it, thirty of whom were English. The
name of the institution at this house is the Imperial.
As in the other schools, bodily labour forms a part of
the occupation of the day; while in the peasant school
labour is the chief part, here it is only a relaxation.

For the purpose of attending to the various depart-
ments of agriculture that is nearest to the dwellers there are no less
than thirty professors, who live in a house apart; several of them
are individuals of considerable eminence.

In addition to these schools the founder, at his own
expense, receives and gives instruction, for a certain period
of the year, to all the schoolmasters of the peasant schools
of the canton of Berne.

The estate around the institution is so managed as to
feature home-grown produce. All the most approved
agricultural implements invented in England, Scotland,
Belgium, and other countries, are manufactured at the
institution for sale to the agriculturists of Switzerland.
Consequently, attention has been paid to the breeding of
horses and cattle.

It is with regret that we have to state that M. de Fel-
lenberg has met with much opposition from his own
constituents, and has been forced to leave his plans.

HOG. (Zoology.) [STRIDE]

HOG. The hog is one of the domestic animals which is
most widely dispersed through the world, and yields to no
other animal the same variety of food. It lives and thrives on every kind of
food, vegetable or animal. It can eat anything; the ox, and
will even eat hay; and its stomach can digest what few
other animals could swallow with impunity. The sow bears
two litters in the year, having from eight to twelve, and even
sometimes fourteen young. No animal converts a given quantity of corn or other nutritive food so
soon into fat, or can be made fat on so great a variety of
food.

The food of the hog in a wild state is grass, roots, acorns,
beech-mast, and wild fruits. He is active and ferocious;
and the boar-hunt, from the danger which attends it, is well
adapted to excite those who are of a warlike disposition.

The varieties of the hog include:

The brindled hog most nearly resembles the wild species; but
although the flesh is savoury, he does not fatten so soon,
nor is he so profitable as the more indolent and softer
skinned hog, which has great qualities of digestion; the more rapidly he fattens, and the earlier
he can be made to increase in flesh without increasing in
bone, the better is the breed. Some of the small hogs which
are brought from China are remarkable for this quality, as
well as for their prolific nature; and when, by judicious
crossing, the size is increased, they are a very profitable
breed. The Chinese pig is short in the head, with ears
pricked up and pointing backwards. The Chinese hog, in the creek,
high in the chin, and short in the legs. When a sow of this breed is heavy in pig, her belly generally drags on
the ground. The young pigs of the Chinese breed, especially
the white variety, are excellent for roasters, at three weeks
or a month old. They are small and fat, with little bone,
and their skin is very delicate. They also make excellent
porkers at about three months old, and you know that a pig is
fattened by boiling or steaming in an apparatus conveniently placed,
and the greatest cleanliness and regularity should be main-
tained. It is a great mistake to suppose that the hog loves
the dirt. If the hogs are kept in rooms, and the floors are
washed after the porkers have been removed, and nothing makes them thrive so quick, or plesases them more,
than being washed and curriled regularly. If the hogs are
not closely confined they will always stay their dung at a
distance from the hogs, and remove it from where they sleep.

The Essex breed is mostly black
and white. The pure breed however is said to be quite
black, and is so nearly allied to the smooth Neapolitan
breed, which has scarcely any hair, that we cannot help
suspecting a consanguinity between them. When crossed
with the Neapolitan they produce a breed which fattens at
a very early age, and to an astonishing degree. A breed
of this cross, carefully selected by Lord Harborough, has
gained the first prizes for fat pigs at the Smithfield annual
Christmas shows for several years past. They were fed ex-
travagantly, but at twelve months old they were so completely covered with fat, that their feet were
scarcely to be seen; and if they could stand, which is doubtful, it is certain that they could not walk.

The Netherland Drove, with its long hair, very
plump, with pricked ears. No breed can excel it in the
aptitude to fatten. The sows often become so fat on very
scanty food that they will not breed: they are extremely
tender; and if they happen to have litters in winter, it is
difficult to save the young pigs from dying in cold nights.
A cross of the Neapolitan with some of our hardier breeds
greatly improves their usefulness, without injuring their
aptitude to fatten: the best cross is with the Berkshire,
which is a very well shaped breed, with short legs, small
ears, broad chins and loins, and good hams.

From the prolific nature of the hog it is not difficult
to select the best individuals to breed from. In every litter
there will be a few better formed than the others. By careful selection of these any breed may be soon much
improved without crossing; but experience teaches that
when the sows and boars are too nearly related the fe-
nedibility gradually diminishes; and as the hogs are
from the same stock the sows at last produce only two or
three diminutive pigs at a litter. Hence the advantage of
frequent crossing. To restore fecundity no breed is so effectual
as the Chinese. A breed brought from China. The Berkshire, Chinese, and Neapolitan, may, by careful selec-
tion, produce every quality which can be desired: numerous
litters, early fattening, and fine hogs for bacon at
fifteen months old, are the result of care and
judicious breeding.

The black hogs are preferred on the whole. They are
much less subject to diseases of the skin than the white,
and the sun affects them less in summer. For sucking
pigs or porkers, they may prefer the Chinese for the
appearance; for the black skin is in general the finest.

There are some very large breeds, which have been recom-
manded under the idea that in a large hog the bone and
fat are less in proportion to the flesh than in a smaller
but these large breeds do not come so soon to maturity.
They cannot be profitably put up to fatten till eighteen
or twenty months old, or more; and although some of them
may make up to 40 or 50 lbs of clean meat, they are so long fasting, and require so much food, that it is
very doubtful whether they pay for it as well as the smaller.
For delicate bacon the hogs killed at a twelvemonth old,
and weighing ten or twelve score, are much preferred, and
we are inclined to think that they are most profitable.

When hams are the principal objects the hogs should be
killed before they are so fat as they might be: and the
carcass is then cut up and pickled instead of being con-
verted into dry bacon. To keep hogs profitably, a regular
system should be pursued both in the breeding and feeding.
Proper hogstoves should be constructed, with chambers in
which the pigs of different ages and the breeding sows may be
kept separate. They should be kept warm, and cleaned by
boiling or steaming in an apparatus conveniently placed,
and the greatest cleanliness and regularity should be main-
tained. It is a great mistake to suppose that the hog loves
the dirt. If the hogs are kept in rooms, and the floors are
washed after the porkers have been removed, and nothing makes them thrive so quick, or plesases them more,
than being washed and curriled regularly. If the hogs are
not closely confined they will always stay their dung at a
distance from the hogs, and remove it from where they sleep.

When a sow is near the time of farrowing, which is four
months after she has been taken the boar, she should be put
in a sty by herself, with a moderate quantity of straw, for if
there be too great an abundance she is apt to lie down on
the young pigs when they bury themselves in the loose straw. Some grow so fast that they cannot lie down close to the wall; and if a young pig should be accidentally behind the ledge, he can take refuge behind the ledge, and thus escape being lain upon. When no precautions are taken, one-fourth of a litter is often lost in the first day, and they are by no means a profit to the farmer, inasmuch as the expense of keeping their young pigs as soon as they drop; good feeding will prevent this in most measure, but attention at the moment of farrowing is the safest and surest preventive. When once the young pigs have sucked much of the danger is past.

A sow with many pigs should be well fed; bran and barley-meal with milk or whey is the best food; grains, where they are at hand, are excellent; and it is useful to let the sow go out to graze in a meadow or clover-field for an hour or two every day, shutting up the pigs during that time till they are a fortnight or three weeks old, when they may then accompany the sow, and live many weeks and bring numerous litters, and the older she is the better nurse she is in general. When a sow has ten or twelve pigs at a litter, and two litters in the year, one in spring and another in autumn, she can in reality support and rear, fed, valued, and looked after, as much as that of a maiden pig. Whenever a sow does not bring a sufficient number of pigs, or is not a good nurse, or has ever eaten any of her pigs, she should be spayed and fattened immediately. The young pigs intended to be kept for store, and fed on a porker, or to be kept for bacon, are castrated or spayed at a month or six weeks old. The males are then called *barrow* pigs, and when fattened make the best bacon. They are usually put up at a twelvemonth old and fattened in three or four months, paying a large price. At first they have tough pores and require to be rind or boiled, mixed with bran, or bean-meal, or they have dry beans and water. After they are half fat they should only have peas-meal or barley-meal and water, unless in a dairy, where they have the skimmed milk or whey. Hogs fattened on potatoes only do not make such good bacon as those which are fattened on corn. This is the reason why the home-cured bacon sells so much dearer than the Irish. When a piece of raw bacon is put into the pot and allowed to boil, it is a sure sign that the hog has been well fed; if it shrinks, it may be concluded that he has been fattened chiefly on potatoes. The labourers in the country, who live chiefly on bacon, know this well, and always purchase the best fed bacon, even at a much higher price, finding it most economical. Potatoes are an excellent food for store pigs, and may be given boiled and mixed with meal in the early part of the fattening process; but beans and peas make the firmest flesh, and barley-meal the sweetest. Before a hog is killed he is usually fed for some time on barley-meal and water alone, given as thick as porridge, and very little, if any, water is given to him. This last rule is often carried to too great an extent. Much water will make the food pass through too rapidly, and it will not be digested, but the hog should never suffer from thirst, or he will not thrive. Before a hog is killed he should be kept without food for twelve hours at least. He may however have water. He should be killed without giving him more pain or causing more struggling than is necessary, by a resolute stab with the knife in the lower part of the neck, where the large vein and artery run directly from the heart. The blood should be allowed to flow freely till it is all out of the body. The hog, if intended for salt pork, must then be scalded with water not quite boiling. The skin should be helped to take off with the cuticle; but for bacon it is best to singe the hair by burning straw over the body, and then scraping the skin. Care must be taken not to allow the skin to be burnt so as to crack. The hog should be hung up, and Immediate care must be taken to keep the air filtered, and the waste of the boiler washed clean with a cloth or sponge dipped in water, that no blood may remain, and the next day the hog is cut up. The head and feet are cut off; the chine is taken out, and the upper part of the ribs, with the backbone, are cut out, leaving as much flesh as possible adhering to the fat outside. The small ends of the

The curb remains attached to the bacon. The curing of bacon has been described. [Hampshire—Agriculture.]

*Hog-stye.*—Much of the profit of breeding and fattening hogs depends on the economy of labour in preparing their food. Any place is often thought good enough to lodge a pig in, and a sty is a word synonymous with a filthy place. But in every well arranged farm-yard there should be a convenient place for keeping hogs and feeding them, which may be erected at a small expense, and which will soon repay the outlay. There should be a place to boil and mix the food in, with one or more large copper vaselines and a steaming apparatus. The food should be mixed in square brick tanks sunk in the ground and cemented, that there may be no filtrations. If there is one only tank, there should be an immediate communication with the feeding-styes, under cover, if possible. Each sty should open into a small yard behind, which should communicate by a door with the principal farm-yard, where the barn is situated in which the corn is thrashed, and be enclosed with a low wall or paling. There should be separate styes for breeding-sows, for pokers, and for fattening hogs. Not more than three or four of the latter should be in one sty. The food should be given in troughs, in a separate compartment from that in which the hogs lie down, and no litter should be allowed there. The floor, which should be of brick or stone, should be freely washed, clean, and the troughs should be cleaned out before every meal; any of the food left from the last meal should be taken out and given to the store-pigs. A very convenient contrivance for keeping the troughs clean is a flap or frame, which can be hung horizontally over the trough so that it can swing, and alternately be fastened by a bolt to the inside or outside edge of the trough. When the hogs have fed sufficiently the door is swung back and the trough is easily cleaned out. It remains so till feeding time, when the food is poured in, without any impediment from the greedy hogs, who cannot get at it till the door is swung back. This

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**HOGG'S LAKE.**

**HOGGART, WILLIAM,** was born in the parish of St. Bartholomew the Great, in London, in 1697, and baptized
in the parish church on the 29th November. His father Richard Hogarth (or Hogart, as the name seems originally to have been written and pronounced) died in 1719, leaving two daughters and one son, William. Of William Hogarth nothing is known; but we may conclude that it was slight from the frequency of his errors in grammar and orthography. 'My father's pen,' writes Hogarth himself, 'like that of many other authors, did not omit mistakes for my own good, and the shifting for myself. As I had naturally a good eye and a fondness for drawing, shows of all sorts gave me uncommon pleasure, and mimicry, common to all children, was re-enforced by the sight of these studies.' I drew my attention from play, and I was at every possible opportunity employed in making drawings. My exercises when at school were more remarkable for the ornaments which I brought home than the things themselves. In future I soon found that blackheads with better memories would soon surpass me, but for the latter I was particularly distinguished.'

It was at his own wish that he was apprenticed to Ellis GM, born of Glassman in Cranbourne-street; but he soon found this business too limited, and its scope insufficient for his fancy. 'The painting of St. Paul's Cathedral and Greenwich Hospital,' he writes, 'at this time going on, ran in my head, and I determined to become an engraver, which should be followed by me no longer than necessity obliged me to it. Engraving on copper was at twenty years of age my utmost ambition.' In 1718 Hogarth ceased to be an apprentice, and began to engrave, being twenty years old; and, according to Walpole, he attended Sir James Thornhill's academy in St. Martin's-lane, where he 'studied drawing from the life, in which he never attained great excellence.' His technical skill was acquired by engraving arms, crests, ciphers, shop-bills, and other similar works, until the year 1724, when he published his first original engraving, now called the 'Small Masquarade Ticket, or Burlington Gate.' Illustrious prints, such as the Traveller's Guide and such books, were supplied by him in 1725 and the following year, which, with the help of some small etchings of scenes of town life and folly, replenished his purse, and gained him a moderate reputation. He now paid his addresses to Jane, daughter of Sir James Thornhill, to whom he was united in 1735, without the consent of her parents. Her father represented the marriage as a degradation to his daughter, and was not reconciled to her until two years after it had taken place. The facility which Hogarth had gained in the use of the brush now induced him to attempt portrait-painting; but although he was not unsuccessful in the treatment of many of his subjects, the style did not satisfy his mind: the work was not promising, as it was, for ingenuity and invention, to compensate for the drudgery. He accordingly abandoned portrait-painting, and entered upon that original style on which his fame rests. 'The reasons,' he says, 'which induced me to design, were, that I thought both writers and painters had, in the historical style, totally overlooked that intermediate species of subjects which may be placed between the sublime and grotesque.'

Before he had done anything of much consequence in this walk he entertained some hopes of succeeding in the higher branch of historical painting. 'He was not,' says Sir Joshua Reynolds (Discourses, vol. ii., p. 163), 'blessed with the knowledge of his own deficiency, or of the bounds which were set to the extent of his powers.' After he had invented a new species of dramatic painting, in which he probably will never be equalled, and had stored his mind with Dante materials to explain and illustrate the domestic and familiar scenes of comic life, which were generally and ought always to have been the subject of his pencil, he very imprudently, or rather presump tuously, attempted education nothing has been received; but we may say the habits had by no means prepared him; he was indeed so entirely unacquainted with the principles of this style that he was not even aware that any artificial preparation was at all needful for it.

After this failure as a historical painter, he resumed his former manner, engraving, as had been his custom, the pictures which he had painted. The eager demand for these engravings induced the counterfeiters to imitate them; and the profits of the piracies so diminished the profits of the author that he applied to parliament for redress: in consequence of his application a bill was passed in 1735, granting a copy-right of a print for fourteen years after its publication. The reputation of Hogarth was now established, and he continued to paint with undiminished ability. At the age of forty-eight he was in easy circumstances, and rich enough to keep a coach and four of his prints was his principal source of income: the price of his pictures kept pace neither with his fame nor with his expectations. We find that in 1740 he sold by auction nineteen pictures, including one of himself, to a purchaser in a way that was sum most unequal to their merits. Some conditions which he had very whimsically annexed to the sale appear to have diminished his profits. In 1753 he published his 'Analysis of Benaissance, or the Neighbouring Painters, in the Dignity of beauty and grace consists in a flowing serpentine line; he cites numerous examples; and though his conclusion is unsound, his arguments are both amusing and ingenious in the execution of the thing itself. In future I soon found that blackheads with better memories would soon surpass me, but for the latter I was particularly distinguished.'
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la Mode, whose high authority we consider altogether decisive. 'What surprises me,' he says, 'is the eminent merit of these works as paintings, since Hogarth's own countryman Horace Walpole says he had but little merit as a painter. All the most delicate shades of his humour are here marked in his hands with consummate skill and freedom, and every other part executed with the same decision, and for the most part with care. Though the colouring on the whole is weak, and the pictures, being painted in dead colours, have no charm any more than the look of water-colour than of oil paintings, yet the colouring of the flesh is often powerful, and the other colours are disposed with so much refined feeling for harmonious effect, that in this respect the pictures stand in a far higher rank than many of the productions of the celebrated painters he has been compared with, its glaring inharmonious colours.' (Waagen's 'Arts and Artists in England,' German edit., vol. i., p. 230.) Hogarth appears to have avoided high colouring, lest the attention of the spectator should be drawn more towards the look of the public taste, and it went through many editions, both in this country and in America, in a few years. The author never attained the life, or even the polish, of this early work in anything he has written. These songs were very easy imitations of the fine old popular poetry of his country, and both in the in passages of his prose fictions, there is often a humour rich, vigorous, and original, though we may desist and his inconsequent extravagance. Of the rest of his works, the chief are (besides contributions to 'Blackwood's Magazine' and other periodical publications), in poetry, 'Madoc of the Moor,' 'The Pilgrims of the Sun,' 'The Sonnet, in praise of pieces on the subject of living poets,' and 'Queen Hynde,' beside his collections of pieces by other poets, partly original, partly collected, entitled 'The Jacobites Relief of Scotland,' 'The Border Garland,' 'A Selection of Songs,' and 'The Forest Minstrel'—in prose, 'The Brownie of Loch Eck,' 'Winter Evening Tales,' 'The Three Perils of Man,' 'The Three Perils of Woman,' 'The Confessions of a Justified Sinner,' 'The Altrive Tales,' 'The Domestic Manners and Private Life of Sir Walter Scott,' and 'Little Lay Sermons.' His mental taking place at his house of Altrive, on the 31st of November, 1835. Wordsworth's noble lines suggested by hearing of that event, but in which the mention of the 'Shakespeare' is omitted, 'The Poetry' merely serving as blank verse to the free and general. The part he has given to our language one of the finest examples it possesses of the Doric simplicity and grandeur in poetry.

HOUGHTON, an antient measure of liquids, which, not being mentioned in the act 5 George IV., cannot now be considered as having any legal existence.

The hoghead of wine was 2 wine barrels, or 63 old wine gallons; the London hoghead of ale (barrel) was 14 ale barrels, or 48 ale gallons; the London hoghead of beer was 14 beer barrels, or 54 beer gallons; and the ale and beer hogshead for the rest of England was 13 barrels, or 51 gallons. All Excise measurements being now made in gallons, the term hoghead remains in use only as the name of a large cask.

HOUGUE, LA., otherwise written HAGUE, or HOUQUE, a cape forming the north-western extremity of the peninsula of Cotentin, in France, now the department of Manche, 19° 46' 46" W. lat., 49° 29' 26" L. long. A great battle was fought near the Cape in a.d. 1692, between an English fleet, under Marshal de Tourville, and the combined English and Dutch fleets, under Admiral Russell. The allies possessed a decided superiority of number, consisting of nearly eighty vessels, the French of thirty. The battle lasted three hours. The contest was however maintained throughout the day, but ended in the entire defeat of the French, fifteen of whose ships were destroyed.

HOHNENLOEB [BONAPARTE.]

HOHENLOHE [L.AXT.]

HOHENSTAUFEN. [GERMANY-History, Literature.]

HOHENZOLLERN, a sovereign principality in Germany, so called from the capital, situated on the original seat of which was the ancient castle of Zollern, or Hohenzollern. The oldest known ancestor of the family
HOLBEACH, PAUL THRY, BARON D'... 1723 was de... toiled, at one time Diderot, Rousseau, Mar... Montes, Galani, Grimm, Damival, Morellet, Helvetius, and others. This... at Madame Geoffrin's; but that lady not only had not enough to think of, they transferred their meetings to... dance, to have a coterie of literary men, including at one time Diderot, Rousseau, Mar... Montes, Galani, Grimm, Damival, Morellet, Helvetius, and others. This... the Abbe Morellet, of Madame d'Epina... Correspondence,* and... serious, so not very impartial work of Ma... d'estates, and knowledge. D'Holbach was well acquainted with the French; he was born in... he translated into French several useful German... of the articles to the *Encyclopédie.* He wrote, either wholly or in part, several hundred, which... be found in Holland under fictitious names, and of which those which made most noise at the time are: 1. *Le Système de la Nature,* a system of pure materialism, and which Voltaire was characterized as a contrary to all... works on those subjects. He also contributed many articles to the *Encyclopédie.* He wrote, either wholly or in part, several hundred, which... is that of Bergier, in the *Essays du Matérialisme.* 2. *Moral Universelle,* ou Desir de l'Homme fondé sur la Nature,* a vol. the *Encyclopédie* of the moderns, a vol. The... the precepts, the precepts are generally good... and the tone is calm, rational, and tolerant; for a proof of which... the Christianisme devoi... attributed some to Damival; and other works against sealed religion, which are now mostly forgotten. D'Holbach died at Paris in 1789. He seems to have been a man of moderate talents, rather credu... of a generous disposition, and a pleasing host and table companion. He was as much praised by his friends as he was abused by his enemies; among others by Rousseau, who chose to quarrel with him, as he quarrelled with every body else.

HOLBECH. [LINCOLNSHIRE.]

HOLBRIN, JOHN, or HANS, is considered by the Germans to be the painter next to Albert Dürer, whom he however excelled in nothing but the one, namely, a very... cathedral, and about 3000 inhabitants, of whom nearly 700 are Jews. The inhabitants of the country are Roman Catholics, with the exception of 700 or 800 Jews. The town is called Hechingen; there is a representative assembly of twelve members.

Neither of the principalities keeps any troops, except the contingent to the army of the Confederation, of which Hechingen furnished 145 men, and... Hohenzollern-Sigmaringen 356 men, and which form part of the reserve. In the full council (or plenum) of each of the principalities there is one vote. In the close council they are... Lippe-Detmold, and Waldeck, holding the sixthteenth place, with one collective vote. The succession is regulated by family compacts of the years 1575 and 1821, in the latter of which the king of Prussia joined as head of the family. It is hereditary in the male line; so that if the male line in one of the principalities becomes extinct the other successor line in that state becomes extinct, Prussia succeeds; and it is not till the extinction of one of the three houses that the succession can come to the females and their descendants. (Johler, Geschichte Land- und Obrigkeit der Fürstenhüber Hohenzollern.)

Hofrat, A. Paul, of the court of Derenhoven-Koblenz, was elected Bishop of M. Agassiz to include species once ranked as Spatangi. Spatangus subglobulosus (Leske), Sp. planus (mantel), and Sp. semihemispheericus (Phillips), are examples. The species occur almost throughout western Europe. Hölzke, was himself a great admirer and disciple of Diderot. The baron was fond of the society of conviviality, and he gave good dinners: for nearly forty years he assembled round his table every Sunday a coterie of literary men, including at one time Diderot, Rousseau, Mar... Montes, Galani, Grimm, Damival, Morellet, Helvetius, and others. This coterie was... to Madame Geoffrin's; but that lady not only had not enough to think of, they transferred their meetings to the house of the Baron d'Holbach, who was a free-thinker of the freest kind, and with whom they had no reason to disavow... articles to the *Encyclopédie.* He wrote, either wholly or in part, several hundred, which... the Christianisme devoil... attributed some to Damival; and other works against sealed religion, which are now mostly forgotten. D'Holbach died at Paris in 1789. He seems to have been a man of moderate talents, rather credu... of a generous disposition, and a pleasing host and table companion. He was as much praised by his friends as he was abused by his enemies; among others by Rousseau, who chose to quarrel with him, as he quarrelled with every body else.

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HOLBECH. [LINCOLNSHIRE.]
England in 1596. Sir Thomas took him into his house, and after having employed him for three years, invited King Henry VIII. to see the pictures which Holbein had painted for him. The king was so delighted with them, that he gave them some hundreds of gold, which gave him ample employment, for which he recompensed him with royal munificence. The favour of the king and his own extraordinary merit concurred to bring him into vogue; so that notwithstanding his not being a native, and rapid execution, he was so fully engaged in painting portraits of the nobility and eminent public characters, that he had no leisure in England for historical painting. Of him, he had rendered himself so well before he left Basel, and many of his pictures are still to be seen in that city. It appears however that he adorned the walls of a saloon in the palace of Whitehall with two great allegories of the triumphs of the arts and riches and poverty. He likewise executed large pictures of various public transactions, such as Henry VIII. giving a charter to the barber-surgeons, and Edward VI. giving the crown to the Earl of Devon. He was, in short, a man of such a character that even his name is well known, and his fame has been immortalized in history, biography, philosophy, politics, all employed his pen; in turn, and to such extent that it would occupy too much space we are to specify several of his writings of this class. As it suffices it then for his 'History of Denmark,' 'Church History,' 'History of Unions.' Would be the exact amount of all that he wrote, if printed in a uniform series, we know not, but his select works alone, as edited by Rubbek, 1696—14, extend to twenty-one octavo volumes. Nor is it our wonder that his death is mourned by persons who forget that in refined feeling for nature, accurate delineation of the parts, and vigour of style, his best portraits have an honourable place beside those of the greatest masters. He died in 1543.

HOLBERG, BARON LUDVIG, or LEWIS, who is considered as the father, or, as he has been styled by some, the Colosus of modern Danish literature, was born at Bergen in Norway, in 1684. So far from being the inheritor of title or patrimony, he was of obscure family, his father having been originally a common soldier, though afterwards promoted to the rank of colonel. His death however, which befell when he was but a child, left him a helpless orphan. In the first year of his father's death, his uncle, who was a captain, determined to take the child with him. But soon after, another occasion he contrived to proceed as far as Rome, journeying for the most part, like Goldsmith, on foot. On his return to Denmark, he made a maintenance by teaching Latin and Greek for a window. He was in 1707 Professor of Eloquence. He was now in tolerably easy and improving circumstances, and had for the first time leisure to apply himself to his pen, and turn to account that Multifarious stock of learning which he had picked up in the course of his unsettled life. He had now passed his youth, nor had he given any symptoms of a talent for poetry, when he astonished and delighted his countrymen by the pieces he then wrote. He published in 1736, to the title page of his poetry, his 'Peder Paars.' This production has acquired for its author the title of the Danish Butler; nor however on account of any similarity of subject with 'Hudibras,' but merely as being a national and popular work of the same genus. With less estatment of wit and learning than its English rival, 'Peder Paars' is far more lively and diverting, and replete with humorous incidents from beginning to end. The most formidable rival to the author of 'Peder Paars' is Holcroft; no imitator ever equalled the original. Holcroft is the poet only his secondary title to fame. These productions, amounting to nearly forty, and composed between 1723 and 1746, are very strong graphic and comic pieces. A modern critic, Mr. Lytton, considers the writers of all nations, assure us there are only three comic poets who really deserve the name—Plautus, Molière, and Holcroft. Yet it must be acknowledged that his dramas are not entirely free from defects, although they possess such vigour and spirit that we cheerfully excuse them. His 'Metamorphoses,' in which he has reversed Orvid's system, transforming animals into men, instead of men into animals, is ingenious in idea and happy in execution. But that to which he has contributed the most is his very popular comic opera, 'Niels Klims' Subterraneous Journey,' first published in 1741, and written in Latin, but translated not only into Danish (by Rahbek), but into almost every other European tongue. Notwithstanding the philosophical satire, Holcroft has shown himself perhaps the imitator, but also the rival, of Lucian and Swift. These works would indicate no little industry, yet they constitute but a small part of his works. He was a master of the French style, whose pen was as prolific as that of Voltaire, there being hardly a department of literature which he left unessay, if we except tragedy. But if, in regard to this latter, we see Frenchmen sometimes a theme to fame not shared by the Dane, Holcroft's comedies prove him his superior in dramatic talent. The annals of literature afford no parallel instance of a comic author so admirable, and also so prolific. The history of literature, biography, philosophy, politics, all employed his pen; in turn, and to such extent that it would occupy too much space we are to specify several of his writings of this class. As it suffices it then for his 'History of Denmark,' 'Church History,' 'History of Unions.' Would be the exact amount of all that he wrote, if printed in a uniform series, we know not, but his select works alone, as edited by Rubbek, 1696—14, extend to twenty-one octavo volumes. Nor is it our wonder that his death is mourned by persons who forget that in refined feeling for nature, accurate delineation of the parts, and vigour of style, his best portraits have an honourable place beside those of the greatest masters. He died in 1749. Holcroft was one of the most illustrious ornaments of his reign and the public benefactor of his country. Frederick only created a baron. Holcroft had created a national literature.

HOLcroft, THOMAS, born December 10, 1745 (old style). His father kept a shoemaker's shop in Leicester Fields, and occasionally dealt in horses. The first six years of his life were spent at his birth-place, but some change in his father's circumstances brought him into Berkshire, and at last to a vagrant life. When very young he became a stable-boy in racing-stables at Newmarket, and continued in the service of training-grooms till the latter part of his youth, after which time he entered upon the life of a schoolmaster and schoolmaster till twenty, when he married. About this time he had proceeded far enough in self-education to dare to commit his performances to the columns of the 'Whitehall Evening Journal,' and in 1780 he had also written a play, and in a short time he found himself an actor. In 1789, having been some time on the London stage, he turned author, producing first a novel, then a comedy, and afterwards some poems, which were followed in their turn by a series of plays, and by translations of various French works, of which those most remembered at present are—'Tales of the Castle,' and 'The Marriage of Figaro.' In 1789 he lost his wife, and in 1792 his health. Four years afterwards he was implicated in the political trials relative to the Society for Constitutional Information. From this time his life presents no tangible points: he seems to have spent the greater part of his time in writing and cultivating the fine arts. He lived much in Germany and occasionally in Paris, and of this residence his 'Travels into France' was the fruit, a book which has probably been depreciated below, as his plays were less admired abroad, the real merit of which was not understood. He died March 23, 1809.

Holcroft's chief merit lay in translation. As a translator he will probably be remembered; as an author, probably he will not. His style was the most of that of a half-educated man. It possesses much occasional vivacity, mingled with mistakes of a character which we should not expect to see if we did not remember how innumerable are the points in which educated men attain an unnecessary degree of exactness over
the half-educated. The peculiarities of provincial utterance rarely disappear; how much more rarely the peculiarities, and especially the deficiencies, of an uncultivated childhood. The wail and grapple against such evils, but he will never entirely overcome, except by avoiding them.

Holcroft's life has been published, partly from diaries of his own. It is a performance of the form which private friends of a large class are in determining. Lengthy quotations and needless talk fill three volumes, where one would have read ably suffered.

HOLDERNESS. [Yorkshire.]

Edward HOLLEY-SED, RAPHAEL, the annalist, who was born probably during the first half of the 16th century, but when is uncertain. Anthony & Wood says that he was educated at one of the universities, and was a minister of God, but it appears most probable that he was studied to Thomas Hurlet of Bromroke in Warwickshire. It is possible however that the sentence in which he refers to 'this master' may be interpreted on the supposition of his having been passed under his rule; and before his death, which took place in 1586, as his will was made fifteen months before, and proved two years after that time.

Holinhed is an important authority in English history, and contains much of authority which refers to him shows he has possessed considerable learning. The first edition of his history is a very scarce black-letter in two folios, adorned by numerous wood-cuts. The second and improved edition one of the latter and last of Holinhed, has and has suffered also from the censorship of the times, which compelled the cancelling of several sheets. It consists of the following items:—Descrip- tion of England," by Harrison; of 'Ireland,' by Siunihurn and Durlack, from the Lectura of Hooker; of 'Scotland' by W. Harrison. 'History of England,' by R. Holinhed; of 'Ireland till the Conquest,' by Giraldus Cambrensis, by J. Hooker (an uncle of the divine); 'till 1509,' by Holinhed; and of 'Scotland' till 1521, by Holinhed, and continued by others.

(Wood's Atl. Oxon.; Biographia Britannica.)

HOLKAR, MULHAR RAO, the first of the name known to Europeans, was a Mahan solid who having been instrumental in extending the conquests of his nation, under the first Peshwa, towards the north of India, received a grant of land in Malwa about 1756. Ultimately one half of that large province was given to him by his father. At the age of 24, according to Mr. Mill, but, according to Captain Duff, a stranger in blood. Tuck- agee, dying in 1787, left four sons, whose patrimony was usurped for a time by Scindia, the most powerful of the Mahars, and Rao Holkar, the third son, an able, brave, unsupercilious soldier of fortune, defeated Scindia, and re-established himself in Malwa. The Marquis Wellesley, then Governor-General, refused however to recognize his title, and in 1804 commenced a war against him, which was terminated at the end of 1805 by a peace more favourable than Holkar had reason to expect, which left him to the greater part of his dominions. The violence of his temper ultimately grew into madness; and the last three years of his life were passed in close confinement: he died in 1811. When he placed under restraint his son, a minor four years old, Mulhar Rao Holkar, succeeded to the nominal authority; all real power being of course in the hands of one or two ministers. A wretched anarchy succeeded. After the final overthrow of the Maharaja power in 1818, Mulhar was suffered to retain a small portion of his dominion under the protection of the British. [MAHATRAS] (Mill. Hist. of British India; Duff. Hist. of Maharatras.)

HOLLAND. This name properly designates one of the provinces of the ancient republic of the Seven United Provinces, which, being the largest, richest, and in all respects the most important, has often given name to the whole country; and occasionally, but still more improperly, even to the whole of the dominion of the British, and, when after a separation of two centuries, they were again united in 1815 by the name of the kingdom of the Netherlands. Though the two divisions of the kingdom are now in fact as distinct as they were then by the late revolution [Dutch Rev.] and there is not the slightest probability of their reunion, it is not unlikely that the northern portion will still be called the kingdom of the Netherlands, and we therefore have given the general description of the kingdom under that head.

The northern part of Holland is situated between the 53° 20' N. lat., and 5° 45' and 5° 20' E. long., and is bounded on the north and west by the German Ocean, on the east by the Zuyderzee and the provinces of Utrecht and Gelder- lach in Germany, and on the south by the province of Zeeland. The whole country is one flat, in many parts below the level of the sea, against which it is protected by stupendous dikes, which are raised along the coast and on the banks of the rivers. To the north of Holand lies situated between the 51° 45' and 52° 35' E. lat., and 4° 45' and 4° 20' E. long., and is bounded on the east by the German Ocean, and on the west by the province of Utrecht.

In South Holland, the Dunes, which are a triple row of sand-hills, form a barrier, which the ocean itself has thrown up. The country is traversed by canals in all directions. The soil, like that of Greece, is marshy, and scarce arable, which support a remarkably fine breed of cattle, to the number of nearly a million, and large flocks of sheep; very little corn is grown, except in some parts of South Holland, and other cultivated matter is of excellent quality. Hemp is produced chiefly in South Holland, but though of a good kind, too little care is bestowed on it. Potatoes are pretty extensively cultivated, though hitherto not much exported, and the sowing of oats, barley, rye, beans, and turnips is also extensive. The canary, and onion seed, are raised for exportation. The garden produce is abundant and excellent. Flowers are cultivated chiefly in the tract from Alkmaar to the Hague, but more especially on the coast. In 1828 the sale of the cattle, of which the exportation of these two articles is one of the chief sources of the wealth of the farmers. Wood, both for building and fuel, is very scarce: the greater part of the land gained during the 17th century is covered with bracken, and where there may have been forests thousands years ago, they have been long since extinguished. For fuel the inhabitants use turf, which is dug to the annual value of a million and a half sterilized. Of minerals, property so called, there are none. Whatever is valuable is extremely fine, and are seldom found. The Dutch linen is celebrated for its fineness and durability. Next in importance and excellence is paper: though Dutch paper is now banished from almost every market, each country manufacturer has his particular kind, and no paper on the Continent equal to the best Dutch kinds. The woolen manufactures are flourishing; and the finest cloths, those of Leyden for instance, fetch very high prices. The distilleries of gin, especially at Schiedam, are very extensive. The solid foundation of the wealth and greatness of Holland has been its commerce. On this subject we might state, as applicable to this province, all that relates to the commerce of the whole country; which, to avoid repetition, is deferred to the article NETHERLANDS. Here it need only be observed that the effects of the French revolution, the annexation of the country to France, and the loss of its colonies, brought its commerce to a state of decay from which it is now beginning to recover. The province of Holland is divided into two governments, North and South Holland.

I. NORTH HOLLAND contains 930 square miles, with a population, on the 1st of January 4, 1838, of 22,583 inhabitants. It is divided into the four districts of Amsterdam, Haarlem, Hoorn, and Alkmaar. The Helder is a village and seat of the collection of the citizens called the Mars Diep, which separates it from the island called the Texel, celebrated for its large and secure harbour, and its commodious roadstead on the east coast. Great naval battles between the English and Dutch were fought on the Texel, in 1664, 1673, and 1799. The Helder has
about 2,400 inhabitants, who are chiefly pilots. The harbour, called the Nieuwe Diep (in which ships of 600 tons burden can lie close to the quays in perfect safety, even in the greatest storm), is defended by two strong forts, which have bomb-proof casemates for 10,000 men. The Nieuwe Diep communicates with Amsterdam by means of the North or Helder Canal, one of the greatest works of our time; it is about 60 miles in length, 24 feet deep, and 120 feet wide, rapids of the kingdom of Mark. The Men are men of spirit, and has sluices through which ships of the line of 74 guns can pass. It cost nearly eight millions sterling. The great duke of the Helder, nearly two leagues in length, is 40 feet broad at the summit, on which there is a very good road, and descends in gradually increasing slope from 150 feet to only four degrees. At certain distances enormous buttresses, broad and high, are proportioned to the rest of the dike, and constructed with still greater solidity, project several hundred yards into the sea. This artificial coast is entirely composed of enormous blocks of granite from Norway. Edam (3500 inh.) is celebrated for its two cheese fairs, at which about seven millions of pounds are annually weighed. In the neighbourhood is the famous Beemster-Polder, about 8000 acres, formerly covered with water, but now gained for cultivation by dikes and canals, and occupied by an industrious and wealthy population of nearly 3000 souls, who have numerous branches of trade and manufactures. Amsterdam (16,000 inh.), though it has declined from its former importance, has still an extensive share in the herring fishery. The other remarkable towns are described at their respective places.

It was at this time that Hollar, in company with a population, on the 1st of January, 1838, of 503,354 souls. It is divided into six districts, the Hague, Leyden, Rotterdam, Dordrecht, Gorcum, and Briel, the chief towns of which are of the same names, and, with others belonging to South Holland, are described in their places. There are described on the mouth of the Maas (1500 inh.), has a fine harbour, and likewise a reserve harbour for ships of war and merchantmen, where they are protected against storms.

HOLLAND, PHILEMON, was born at Chelsmford in 1551, and educated there at Trinity College, Cambridge, of which he became a Fellow. Afterwards he was elected master of the Granta grammar school, where he undertook those laborious versions of the classics which have given him a respectable name in literature. He is, to the best of our knowledge, the first English translator of Livy, Suetonius, and Plutarch's 'Moralis,' and the only English translator of Pliny's 'Natural History,' and Ammianus Marcellinus. He also translated Xenophon's 'Cyropedia,' and Camden's 'Britannia.' In addition to all this he found time to write a volume of 'Observations respecting the Antiquity, and reached the age of 85, after a most laborious life, with unclouded faculties, having gone on translating till he was 80 years old.

HOLLAR, PRANCESLAUS, was born at Prague, in Bohemia, in 1607. He was first intended for the profession of the law; but partly from disinclination to that pursuit, and partly from the ruin of his family after the taking of Prague in 1619, his views in life became changed, and he took to drawing and engraving. He had some instructions from Matthew Marisi, an engraver who had worked under Vandyke and Rubens, and who is thought to have taught Hollar that peculiar manner which marks the working on his plates. He was but eighteen when the first specimens of his art appeared. These were a print of the 'Ecce Homo,' and another of the Virgin, both small plates, with a Virgin and a Christ after Albert Durer, with Greek verses at the bottom, and were described in their place in the Nieuwe Diep from Prague in 1617. During his stay in different towns of Germany he copied the pictures of several great artists, and took perspective views and draughts of cities, towns, and countries. The most important of these are those of Rome and the Papal States, and the greatness of which his native beauty were exceeded by no artist of his time. His views along the Rhine, the Danube, and the Neckar gained him his greatest reputation. In 1636, Howard, Earl of Arundel, who was on an embassy to Ferdinand II., and immediately took him into his retinue. Hollar attended him from Cologne to the emperor's court, and in this progress made several draughts and views in the towns through which they travelled. It was then that he took the view of the Siegesdenkmal, under which is written 'Hollar delineavit in legatione Anglevulnae ad Imperatorum.' He afterwards made a drawing of Prague which gave satisfaction to his patron. After finishing his negotiations in Germany, Lord Arundel brought Hollar to England, where he was not confined to his lordship's service, but allowed to take employment from others. His prospect of Greenwich, which he finished, is a two parts dated in 1637, was one of his first works in England. In 1639 he stiched several portraits of the royal family for the work which was published descriptive of the entry into this country, the monograms and medallions of the queen, to visit her daughter Henrietta Maria. About 1648 he seems to have been introduced to the royal family, to give the prince of Wales a taste for the art of design. In this year appeared his beautiful set of figures entitled 'Ornatissimi Musulmi' and 'Angeli.' For the sages and the men of letters of the east and west, he engraved in 1649 a collection of a hundred women, from the nobility to the countrywoman, as they are in these times.' In 1651 he published his prints of King Charles and his queen. At the breaking out of the civil war Lord Arundel left the kingdom to attend the queen, and Hollar was left to shift for himself. From some unknown cause he soon became obnoxious to the ruling powers, probably from his general acquaintance with the friends of his patron, who were mostly royalists, with some of whom he was made prisoner at the surrender of Basing House, in Hampshire, in 1645. Hollar however having some time after obtained his liberty, went over to the Continent to avoid the visitation of the Inquisition in Antwerp, where he remained for several years, copying from that portion of his patron's collection which had been carried there, and in working for print-sellers and publishers, particularly in Dordrecht, South Amsterdam, Vincenza, Holbein, and other great masters, made their appearance. In 1652 he returned to England, and worked incessantly till the time of his death. The plates by him of the 'first and second edition' of the old maps of 'Antwerp,' 'Dale's 'Monasticon,' in Dugdale's 'History of St. Paul,' and in his 'Survey of Warwickshire,' sufficiently prove his industry. It would be endless to enumerate all the subjects he engraved. A map of Donegal, in Ireland, is one of the rarest; in 1659 he was sent to Africa, in quality of his majesty's despatcher, to take the various prospects there of the garrison, town, fortifications, and surrounding country; these he subsequently engraved. Several of the plates of his 'Antiquities of Nottinghamshure,' some of which remain unfinished. When Hollar was in his seventieth year he had the misfortune to have an execution at his house in Gardiner's Lane, Westminster: he desired only to have the body put away from the window, as he might not be removed to any other prison than his grave. Whether this was granted to him or not is uncertain, but he died March 29th, 1677, and, as appears from the parish-register of St. Mary-le-bow, his body was buried in the churchyard, near the place of his death. No monument was erected to his memory. Grose, from information he received from Oldys, has recorded that Hollar used to work for the booksellers at scrape near an hour, always having an hour-glass placed before him; and that he was so scrupulously exact, that even whilst talking, though with the persons for whom he was working, and upon their own business, he constantly laid down the glass to prevent the sand from running. His works, according to Vertue's catalogue of them, amount to nearly 2400 prints. In drawing the human figure Hollar was defective; and he failed in a few plates which he attempted to execute with the aid of the camera obscura, as he had never, with some account of his life, 4to. Lond. 1759; Strutt's Dict. of Engravers; Chalmers's Biogr. Dict., vol. xviii., pp. 72-78.)
Linnæus, in his last edition of the Systema Naturæ (the 12th), gives the following definition of his genus Holothuria, which he places under his Vermes Molulus, between Tethys and Teretella:—"Body free, naked, glossy; vent (anus) terminal. Tentacles numerous at the other extremity (tentacula plura in alerae extremitate). Mouth situated among the tentacles." He records 9 species. Gmelin, in his extremely valuable work on the species 23.

The following is Lamarck's definition of Holothuria. "Body free, cylindrical, thick, soft, very contractile; with a coriaceous skin, which is most frequently papillose. Mouth terminal, as is the anterior extremity of the animal. Three pairs of lateral branchial lobes, remote, or pinnated. 5. Calculaceous teeth to the mouth. Tentacles at the posterior extremity." He gives 10 species of Holothuria; but he separates other Holothuria of authors into two genera, Holothuria and Pneumoderma. These three genera are preceded by Actinias and followed immediately by Saccocula. The place therefore assigned by Lamarck to Holothuria is among the radiated animals, in the third section of which, the Pterolides, he has arranged the tribe.

Curvier gives the Holothuria a position among the pedicillated Echinodermata, making them follow the Echinides. Priapulus is placed by him in the next order, the footless Echinodermata. He gives a good outline of the anatomy, referring to the excellent work of Tiedemann.

M. de Blainville's Echinodermata form the first class of his Actinidea, and the first order of that class consists of the Holothurides, which are followed ("Acologie," 1834) by the Echinides, the second order. M. de Blainville thus defines the Holothuridea:—

"Body more or less elongated, sometimes subvermiciform, soft or flexible on all sides, provided with tentacle-like appendages, very excavated, very extended, completely contractile, and pierced by a great orifice at each extremity. Mouth anterior, at the bottom of a sort of funnel or prebuccal cavity, sustained in its circumference by a circle of fine-calcareous pieces, and provided with a circle of calcareous appendages, more or less ramified. Tentacle terminating in a sort of escutcheon opening externally by a large terminal orifice. Generative Organs terminating externally by a single opening, at a little distance from the anterior extremity, and nearly marginal."

M. de Blainville observes that Bianchii appears to have been the first to come to the conclusion that this form ought to be subordinated to the Echiidae, and in fact names only one species Echinus cirrosus; an opinion which was adopted by Blumenbach and most of the modern zoologists, when they made the Holothuria a division of their Echinodermata, the Echinoidea and Asteridea; some however, following the lead of Pallas, consider that they should be placed near the Actinidea.

Organization.

The author last quoted remarks that the organization of these animals is not yet completely known, notwithstanding the labours of Boasch, Müller, Vahl, Forskali, Monro, Tiedemann, and Delle Chiaje. In addition to these names we would call the attention of the reader to the drawing and description of Holothuria tremula, Linn. left to John Hunter. The drawing is beautifully engraved, and, with the description, will be found in the 1st vol. of the Descriptive and Illustrated Catalogue of the Physiological Series of Comparative Anatomy, contained in the Museum of the Royal College of Surgeons in London, p. liii. The following parts are distinctly made out, viz.: 1. The mouth, in which a bristle is introduced. 2. Appendicea coxa, which surrounds the mouth, or faucæ, into which the enter, and which M. Hunter supposes to be salivary glands and ducts. 3. A large one, lower down, just at the beginning of the intestinal canal. 4. The whole tract of the intestinal canal is considered as a single one. 5. The half part of the intestine, or rectum, or what seems to answer the same purpose as the dilated part of the gut at the anus in a bird. 6. The anus. The use of the parts to which we next have to advert, though the part of this subject is not only difficult to be described, chiefly because they have been more the subject of conjecture with Mr. Hunter. 7. Two branching bodies almost like a tree, which consist of a duct with its branches, and which open into the dilated part of the rectum. These M. Hunter suspects to be the kidneys, from their opening similar to the kidneys in birds, turtles, &c. There are small oblong bodies near the opening of the principal trunk into the rectum. 8. A vast number of hollow round tubes, all opening into one duct, which opens at the head. These will be best seen in another plate which will be published in the fascicule of the catalogue relating to generation. 9. Vesicles which seem to have neither beginning nor end, somewhat like the Vena portorum: they appear," adds M. Hunter, "to be collecting at one end while they are ramifying at the other. This is the absorbing vessel which is the feeding vessel, and which the ramifying, I do not know; however it is possible one end is the absorbing system, the other the arterial. Whenever there is a heart one commonly can make out the motion of the blood from and to that viscus; but where we are concerned we simply observe the large lateral branchial vessels which ramify and ramify, rather than the particular disposition of any single system, the vessels are not delineated in the position which is requisite to convey an idea of the whole course of the circulation; and he further observes, that according to Tiedemann's description, the intestine receives the blood from h to k into the intestinal artery, and carry it by the trunks l, m, to the respiratory organ (regarded by M. Hunter as analogous to the kidney), whence it is returned by the branchial vein, part of which is seen at m, to the intestine, where it again passes into the intestinal artery: k, M. Owen adds, is a large anastomosis joining two portions of the intestinal artery, which ramify in the peduncle, and from which branches the abdomen recommends the vessel to be injected. To the description of the plate succeeds a general account of the animal by M. Hunter, to which we must refer the reader, our limits not permitting us to enter into it at large. Interesting though it be.

The preparation No. 984 ("Physiological Series," Gallery) in the Museum of the Royal College of Surgeons, is the specimen of Holothuria tremula laid open, and the alimentary canal is seen very clearly. The respiratory organs can be seen, and the gills are large, ramified processes, commencing by a common orifice from the closed cavity, and extending into the intestinal canal. The vessels are seen into the opposite part, and it is in more immediate connexion with the alimentary canal, and is abundantly supplied by ramifications of the intestinal vessel, the contents of which are thus brought into necessary communication with the sea-water, introduced into the tubular branches from the cloaca. The other gill is more closely attached to the parietae of the body, and probably serves to receive the vessel of that part. (Cat. vol. ii.) To this Professor Owen adds, that in the description of the Holothuria, they have quoted themselves. He adds that these organs a more limited share in the great excretory functions than they undoubtly perform, regarding them, from their connexion with the cloaca, as analogous to the kidneys in the higher animals. These organs are however, observes the Professor, developed until we arrive at a much higher point in the scale of organization than the Holothuria and its congeners attain to; the formation of the preparation is therefore placed in the respiratory series. (Ibid.)

Geographical Distribution of the Holothurides.—M. de Blainville states that it would seem that these animals exist in all seas; but that perhaps they occur more plentifully in comparatively cold climates than in those that are very warm. This may be doubted (see p. 270 et seq.). Many species are found in the European seas, and they are especially abundant in the Mediterranean. Some are also found in the Indian and Pacific oceans, and many species are common in the Mediæterranean, where many species are so common, should turn their attention to this subject.

Genera.

M. de Blainville acknowledges the difficulty which attends
the distinction of the species, from the following, among
other causes:—
1. The general form is extremely variable. When the
animal is in a state of tranquillity in the enjoyment of all
its faculties at the bottom of the water, it is, in the greatest
number of cases at least, very much elongated, often cylin-
drical, and almost vermiciform: on the contrary, when in a
state of repose, it becomes much more convex in the middle
than at the extremities. Where it is irritated, whether in or out of the water, the contractile
action becomes stronger, and the animal can no longer be
recognized, except especially when it has been plunged
in spirit that the form differs totally from that which the
living animal exhibits.
2. The size, the form, and distribution of the more or
less mammillated tubercles which are numerously spread
over the skin, appear to M. de Blainville, to offer too great
a number of variations to permit of their being employed in
distinguishing specific character.
3. The tentaculiform suckers, which have their exit
through the pores or holes in the skin, and by means of
which these animals attach themselves to submersion bodies,
are, in a certain number of species, spread nearly equally
over the whole supercificies of the body; but in others they
are accumulated on the lower surface, without order, in a
determinate order, or are disposed in double series upon
five longitudinal lines, as in Holothuria pentacta.
4. The more or less terminal position of the two orifices
may, M. de Blainville thinks, be taken into consideration
advantageously.
5. Some zoologists, and among others M. Leseur, says
M. de Blainville, attach a great importance to the number
of the tentacular appendages of the mouth, and to their
form and mode of division; but M. de Blainville fears,
erroneously, for he has been positively assured that the
most common species of the Mediterranean, H. tubulosa,
which is found in hundreds at Toulon, varies much, both as
to the number and terminal divisions of these organs.
6. It seems to M. de Blainville that a better character
may be drawn from the form of the circle of the solid pieces
of the mouth, which is constant, as he believes, in each
species; it is however difficult to employ this test.
7. To judge from a considerable number of Holothuria
 której seen by M. de Blainville, colour in these animals
is very variable, in intensity at least, passing from a nearly
deep black to a pale yellow and bordering upon white.
8. With regard to dimensions, besides the difficulty of
measuring the animals when captured, it appears that they
vary considerably in size, doubtful from age.
M. de Blainville, finally, after a careful analysis of the
different species described by authors, joined to his own ob-
servations upon seven or eight species in a living state,
distributes these animals into the following five sections,
which he considers to be sufficiently natural, and some of
which may be established as genera:—
- Flattened, with suckers below .......... Cucumaria.
- Subprismatic, with inferior suckers ...... Holothuria.
- Fusiform, with scattered suckers ....... Thyone.
- Vermiform, with pinnated tentacles ...... Fistularia.
- Subpentagonal, with ambulaciform
  suckers ............................... Cucumaria.

A. Species whose rather short body, more convex and
harder above than below, is provided with tentaculiform
suckers, only on that side, and with fairly developed
buccal appendages; the two apertures more or less
superior. (Cucurria. Péron; Pedus, Oken.)
Example, Holothuria Phantaspus. Scarborough Ascidia
of Pennant ("Brit. Zool").
B. Species whose corpuscular and rather elongated body is
subprismatic; the belly sufficiently distinct from the
back, and alone provided with tentaculiform suckers,
scattered throughout its whole extent; the buccal ap-
pendages in general but little ramified; the mouth sub-
inferior. (Holothuria, Lam.)
Example, Holothuria tubulosa.
C. Species whose body, in general elongated, but a little
corpuscular, entirely covered with retractile papillae, and
whose buccal appendages are very large. (Thyone, Oken; Mulleria, Fleming.)
Example, Holothuria papillosa.
D. Very soft species, but little or not at all corpuscular, very
long and vermiciform, cylindrical or subpentagonal, pro-
vided with cirriform papillae, which are very small,
scattered, and with the buccal appendages usually regu-
larly pinnated.
Example, Holothuria villosa.
E. Species sufficiently corpuscular, smooth, in general short
or moderately elongated, regularly pentagonal, with ten-
aculiform suckers in ten rows, two at each ambulacral
and. (Cucumaria; Sea-Cucumbers.)
Example, Holothuria Cucumis.
zoological and anatomical drawings made by M. Mertens or his draughtsman, taken from the living and well-developed animals, as well as the descriptions left in manuscript by the former, may be considered that the system of M. Brandt, strengthened by that of M. Jäger, rests upon differences of great value, but is in M. de Blainville's opinion sometimes a little too anatomical, which may be injurious to its adoption. To these, more or less, which the system of M. Jäger and Brandt rests the following:—

1. The absence or the presence of tentaculiform suckers, which M. Brandt, as well as M. Jäger, calls feet, in common with many zoologists.
2. The resemblance or dissimilarity of those organs.
3. The existence or absence of the posterior and internal aqueous, branchial apparatus, which they name lungs, with good reason, because the ambient fluid penetrates therein.
4. The disposition of the tentaculiform suckers at the surface of the body, all round it or on certain parts only, in regular series, of variable number, or irregularly scattered.
5. The freedom or the adhesion of the respiratory aqueous tree, divided by M. Jäger into the intestinal lung and the locomotive lung.

6. The least important character is drawn from the form of the tentacles which surround the buccal aperture, which leads M. Jäger to his subgenera and tribes, and M. Brandt to his genera and subgenera. M. Jäger forms, says he, an endless number of facts, only three of which he considers as subgenera, Cucumaria, Tiedmanaria (Fistularia), and Holothuria, which he separates into six tribes, Mulleria, Bobatachia, Cucumaria, Polul, Holothuria, and Trepang, in which he considers the tentacles of the system of M. Brandt, as M. Jäger himself considered it.

M. Brandt's divisions resolve themselves into seven groups:—

A. Pentactiidae, answering to M. de Blainville's division B (Cucumaria), and subdivided according to the free or fixed state of the aqueous tree.

2. Sporadopode, confounded by M. de Blainville with the Holothuriidae properly so called, from which he says they do not differ very much, excepting that the tentaculiform suckers with which the body is covered are similar both above and below. This division contains only two genera, established upon the distinction of having the tentacles sheathed or not.

3. Hipopodidae, comprising M. de Blainville's division A, separated into two genera, Cucumaria and Polul, containing each two species.

4. Acanthopoda, which were regarded by M. de Blainville as belonging to the genus Fistularia of Lamarck, to the number of four or more, the half of which are doubtful, and containing only, for M. Brandt, the genus Ophiactis.

5. Schizopoda, which are diversiform species more or less elongated, in which the tentaculiform suckers are disposed in three or five longitudinal rows: these form but two species containing one species only, for which we had first opinion upon the subject of the species of M. Brandt forms seven genera.

All these are Holothurioidea pedata, but the 7. consists of the Non pedata, forming a great part of M. de Blainville's division D, that is to say, the genus Fistularia of Lamarck, separated into three principal genera: the only one provided with suckers distinguished by the form of their body, and the third has been named Symplectos by Escholtz.

Though M. de Blainville does not think that this disposition of the Holothuridae is very natural, nor in a serial order, he takes advantage of it to complete his method according to his principles of zootomy, and in his ' Nouvelles Additions et Corrections' (1850) to his Actinologia published in 1852, he has set out upon the interesting observations relating to the affinities and analogies of the various groups. We must refer the reader for details to the work itself, and must limit ourselves to the mere notice of his arrangements of the groups which he subdivides, retaining many of the generic names of Jäger and Brandt.

A. The Vermiform Holothuria (Fistularia), which have the body elongated, soft, vermiform, and the tentacular suckers very small or even null. Three divisions.

1. Without suckers, tentacle pinnated. (Symplectos, Escholtz.)

2. Without suckers, tentacle pinnatifid. (Cladodactylus, Brandt.)

3. Very small suckers disposed in five bands. (Oncidolas, Brandt.)

B. The Acriform Holothuria (Polul), whose body is on the contrary not elongated, but more or less fusiform, elongated with tentaculiform suckers forming five ambulacra, one on each angle. (Brandt.)

1. Tentacles pinnated very small or null. (Liogramma, Brandt.)

2. Suckers very visible.

a. Tentacles pinnated, ramose. (Cladodactylus, Brandt.)

b. Tentacles pinnatifid. (Dactylopus, Brandt.)

C. The Fistulariform Holothuria, whose body is but little elongated, more or less fusiform, elongated with tentaculiform suckers forming five ambulacra, one on each angle. (Brandt.)

1. Suckers in three rows. (Stichopus, Brandt.)

2. Suckers in five rows. (Diplopideria, Brandt.)

D. The Cucumiform Holothuria, whose body is but little elongated, more or less fusiform, elongated with tentaculiform suckers forming five ambulacra, one on each angle. (Brandt.)

1. Suckers in three rows. (Cystichopus, Brandt.)

2. Suckers in five rows. (Diplopideria, Brandt.)

E. The Cucumiform Holothuria, whose body is but little elongated, more or less fusiform, elongated with tentaculiform suckers forming five ambulacra, one on each angle. (Brandt.)

1. Suckers in three rows. (Cystichopus, Brandt.)

2. Suckers in five rows. (Diplopideria, Brandt.)

F. The Spatangiform Holothuria. Body more or less suddenly attenuated backwards, of an ill-defined pentagonal form, without either ambulacra or suckers? Ten- tacles very small, cylindrical, and cylindrical, as in the Actinidae. (Medusa, Cuvier.)

1. M. Holothuroidea. (Cuvier.)

2. M. Musculus. (Risso.)

Utility to Man.—When M. de Blainville says that he has never heard of any one excepting of these animals were of much utility to mankind, but that M. Delle Chiaje does indeed inform us that the poor inhabitants of the Malayan coast eat them. He appears to have forgotten the great Oriental traffic carried on with some of the species of food under the name of trepang or Trepang, Biche-de-mer or Boche-de-mer. Captain Filliders fell in with a fleet of Malay prows at the English Company's Islands, north coast of New Holland, near the Gulf of Carpenter (1805), and was informed that sixty prows belonging to the jahs of Boni, and carrying one thousand men, had left Macassa with the north-west monsoon, two months before, on an expedition to some place on the east coast of Java. 'The object of their expedition," writes Captain Filliders (Voyage to Terra Australis), 'was a certain marine animal called trepang. Of this they gave me two dried specimens; and it proved to be the beche-de-mer, or sea-cucumber, which we had first opinion upon the subject of the sea-coast, and had afterwards sailed on shore plentifully with the scene, especially in Caledon Bay. They got the trepang by diving, in from 3 to 5 fathoms water; and where it is abundant, a man will bring up eight or ten at a time. The mode of preserving it is this:—The animal is split down one side, boiled, and pressed with a weight of stones; then stretched open with slips of bamboo, dried in the sun, and afterwards in smoke, when it is fit for market, and away in bags, but requires frequent exposure to the sun. A thousand trepangs make a picol, of about 125 Dutch pounds; and one hundred picols are a cargo for a prow. It is carried to Timor, and sold to the Chinese, who buy them there: and when all the prows are assembled, the fleet returns to Macassa. By Timeor seems to be meant Timor-laut; for when I inquired concerning the English, Dutch, and Portuguese there, Tubossous (Capt. Filliners) said: 'We heard of Coopang, a Dutch settlement, but said it was on another island. There are two kinds of trepang: the black, called butato, is sold to the Chinese for forty dollars the picol; the white or grey, called butano, is worth more than twenty. The butano seems to be what we found upon the coral reefs near the Northumberland Islands, and, were a colony established in Broad Sound or Shoal-water Bay, it might perhaps derive considerable advantage from the
trepan. In the Gulf of Carpentaria we did not observe any other than the koro or grey slug.

Capetian Philip Parker King, who quotes a part of the above passage ('Survey of the Intertropical Coasts of Australia'), found a foot or so of the leaf of the palm, which the raja had frequently visited in the command of a fleet that annually frequents its shores. The coast is called by them 'Marega,' and has been known to them for many centuries. They find trepang on the coast near Cape York. But Captain Phillip King thinks that this number is perhaps very much exaggerated, and leaves Macassar for this fishery; it sails in January, during the western monsoon, and coasts from island to island, until it reaches the nearest land, and then it steers south-east and south-south-east, which courses carry them to the coast of New Holland, the body of the fleet then steers eastward, leaving here and there a division of fifteen or sixteen prows, under the command of a new captain, until it reaches Macassar, where the Chinese traders meet them and purchase their cargoes. At this time (1818) the value of the trepang was from forty to fifty dollars a picol; so that it is probable the half of the value of their cargoes will be worth 5000 dollars. Besides trepang, they trade in sharks' fins and birds' nests; the latter being worth about 3000 dollars a picol. To this Captain King adds a note stating that in 1822 the value of the trepang was 2500 dollars a picol, the price having fallen to twenty-five dollars the picol.

In Crawford's 'Indian Archipelago' it is stated that the slug or trepang, is sometimes as much as two feet in length, and from seven to eight inches in circumference; a span in length and two or three inches in girth is the ordinary size. But the quality and value do not depend upon its size, but upon properties not discernible by the touch. When dried by the sun on the deck of a ship, the shallow water the animal is taken out by hand, and in deeper water it is sometimes spearred. When taken it is gutted, dried in the sun, and smoked over a wood-fire. The fishery is carried on in the Indian Ocean, in the Moluccas, in the South Sea Islands, and on the coast of New Guinea, and the southern shores of Australia, to Ceylon inclusive. Indeed within the last few years it has been successfully prosecuted on the shores of the Mauritius. The whole produce goes to China. In the market of Macassar, the great staple of this fishery, not less than thirty varieties are distinguished, varying in price from five Spanish dollars a picol (13½ lrs.) to fourteen times that price, each variety being distinguished by well known names. The quantity of trepang sent annually to China from Macassar is about 7000 piculs, or 3333 cwt.; the price usually ranging from eight dollars a picol to 110 and 115, according to quality. The export of trepang from Manilla to Canton. (See McUroch's 'Dictionary of Commerce,' article 'Trepang."

HOLROYD, LORD SHEFFIELD. [Gibson.]

HOLSTEIN, a ducally belonging to Denmark. Holstein Koenigsmark is bounded between 53° 26' and 54° 24' 40' lat., and 11° 42' and 11° 42' 10' E. long. It is bounded on the north by Schleswig, on the east by the Baltic, on the west by the German Ocean, and on the south by the Elbe and Lauenburg, on the south of the Elbe (which separates it from Hanover) and the territory of Hamburg. Its form is very compact, and its superficial extent about 3520 square miles; the number of inhabitants was, in 1826, 855,743; in 1856, 407,787, and in 186, 439,636. It is divided into seven districts, or seven adminstrative districts, each being divided into 18 subdivisons, or portions. The eastern part of the province is an elevated hilly country, with many beautiful little lakes, numerous woods, pleasant villages, and pretty towns; and it abounds in picturesque scenery. The central part is a sandy barren tract, full of heaths and moors: the western part is low and level, and protected by dikes against the encroachments of the sea. The rivers are the Eibe, the Weisse Elbe, the Odore, the Aller, the Anhofer, the Travè, &c. The largest of the lakes is that of Plone. The country is on the whole fertile, especially in the marshlands on the German Ocean and the Eibe; and the eastern part is rich and fertile, with various woods and marshlands, chiefly by the use of man. The mineral products are, in the vicinity of Oldesloe, salt, lime and plaster of Paris, and near the Baltic, amber; but there are no extensive forests. The Schleswig-Holstein, the Schleswig, and the Scandinavian Peninsula, which lie in parts of Holstein (Engholm, Tableau des Terrains, &c.), constitute the most curious problem in the geological character of Holstein.

The agricultural products are corn, more than sufficient for the horse consumption; oats, potatoes, hay, hemp, and beets. The breed of horses and of horned cattle is excellent. There are likewise sheep, swine, and abundance of poultry and game. There are no manufactures that need any particular notice. Inhabitants about are 880,000, of whom 380,000 are farmers, 210,000, &c.

HOLSTEIN is highly favourable to commerce; the exports consist of corn, timber, horses, cattle, butter, and tar; the imports of colonial produce, wines, and manufactures. The herring fishery, and the Greenland fishery with its flax, fur, and fish, give the country a considerable profit. Trade is greatly facilitated by Holstein or Kiel canal, made in the years 1777—1784, at the expense of above two millions and a half of dollars, to form a communication between the Baltic and the North Sea. The canal is 23 miles in length, 100 feet broad at the surface, 56 feet broad at the bottom, and 10 feet deep. It has 6 sluices through which ships 1000 feet long, 26 feet wide, and drawing 4 feet of water can pass. The cost of the canal amounted to 2,000,000 dollars. The Holstein is a rich, industrious, and enterprising people. The capital of the Duchy of Holstein is Kiel, on the Baltic, near the termination of the canal [Kiel]; and Altona, the largest town in the Danish dominions, next to Copenhagen. [ALTONA.] Glückstadt on the Rhine is a megalopolis with 14,000 inhabitants. The capital of the Duchy of Schleswig is Lauenburg, with 21,000 inhabitants. The capital of the Duchy of Holstein are, Kiel on the Baltic, near the termination of the canal [Kiel]; and Altona, the largest town in the Danish dominions, next to Copenhagen [ALTONA.]

It has a Lutheran, a Calvinist, a Roman Catholic church, a gymnasium, and other public institutions, and is divided into twice seven hundred parishes. The clergy and other public functionaries are under the jurisdiction of the bishop of Lübeck, the abbot of St. Mary, and the city of Hamburg. The government comprises two states, the county of Holstein and the county of Schleswig, each consisting of two duchies, the duchies of Schleswig and Holstein.

The capital of the Duchy of Schleswig is Neumarkt, with 5000 inhabitants. The early history of the Duchy of Holstein is obscure. Charlemagne subdued the Saxons, who then inhabited it; removed 10,000 families of them to Flanders, Brabant, and Holland, and declared the Emperor, on its northern frontier, to be the boundary between Germany and Denmark. The Elector of Saxony made Holstein in 1440 a county, and in 1442 connected it with the bishopric of Lübeck, and in 1448, 1456, 1471, 1486, 1492, and 1493, the Elector of Holstein made Holstein a county, and at last united it with the bishopric of Schleswig, and the bishopric of Schleswig was then and became a king's bishopric. In 1778, it was united to the kingdom of Denmark and Holstein, and in 1848, the kingdom of Holstein was created, and in 1866 it became a part of the German empire. The present king is a prince of the blood royal, and is styled the Duke of Holstein and the Duke of Lauenburg.
government. The king of Denmark had a seat in the diet as duke of Holstein; but on the dissolution of the empire and the formation of the Rhenish Confederation in 1813, he declared all his German possessions to be parts of the kingdom of Denmark: however, on the formation of the German Confederation in 1815 he became a member of it, and Holstein was re-annexed to Germany. (E. Kuss, Herzogtum Schleswig und Holstein; J. F. A. Döder, Topographie des Herzogtums Holstein, etc.)

HOLSTENIUS, the Latinized name of L. HOLSTE, born at Hamburg in 1595, became one of the first scholars of his time. After travelling through Italy, England, and other countries, he returned to Paris and took part in these discussions with the brothers Dupuy, Peiresc, and other learned men. At Paris he embraced the Roman Catholic religion, in consequence, he said, of his deeply studying the works of the Fathers, and of his seeking for the principle of unity in the Church. Peiresc introduced Holstenius to the pope's nuncio, Cardinal Barberini, the nephew of Urban VIII., whom he accompanied to Rome in 1597. From that time he lived in Rome, and was a secretary to the Papal legation. He was sent on several missions to Germany, among others, to Innsbruck, to receive the abjuration of Queen Christina who resided in Innsbruck, and of other Conversations to Catholicism. Holstenius died at Rome in February, 1661, leaving his patron, Cardinal Barberini, his universal legates. He had collected a vast quantity of scholars of science and the arts, and had written works of his own in an unfinished state. With much application and a great desire of knowledge, he never persevered, and was apt to suddenly desert one branch of study for another. Among his works are the following: 'De Fossilibus copertis de Vasa Pythagor.,' Rome, 1630, with a Latin version and notes, and a dissertation on the life and writings of Pythagoras, which has been considered as a model of learned biography. 2. 'Demophil. Demophili, Descripsi Secundam Philippum Philosophum Germanicum, Celebrissimum, Etc.' Rome, 1638, 'Note in Sallustium Philippum de Diis et Mundo.' 4. 'Observationes in Apolloni Rhodi Argonautica.' 5. 'Arrianus de Venatione,' with a Latin version. 6. 'Adnotatio in Sacris Liturgiis Sacri Libri in Cum Prius Ac Quam Antiquam Codicem, et Thesaurum Geographicum Orteli.' 7. 'Nota et Castigationes Posthumae in Stephani Byzantini de Urbibus,' edited by Ryckius. 8. 'Liber Dionysii Episcopi Romani, hoc est de Episcopis Germanicis.' He also wrote a collection of the rules of the earlier monastic orders, which was published after his death, and he edited in his lifetime the 'Antiquities of Prænesta,' by Scolasius, which was published under the name of Ker, and also published his life was written by N. Wilkins, Hamburg, 1723.

HOLT, SIR JOHN, lord-justiciar of the King's Bench, was the eldest son of Sir Thomas Holt, Knt., a barrister, and a great-great-grandson of Robert of Oxford. Sir John Holt was born at Thame in Oxfordshire, on the 30th of December, 1642, and after spending some years at the free-school of Abingdon was in his youth sent to St. John's College, Cambridge, and then to Cambridge College, Oxford. His college life appears to have been unusually wild and licentious; but like his predecessor in the King's Bench (Sir Matthew Hale), he discarded his irregular habits, and became remarkable for diligence and application. In 1662, before he was ten years old, he had been entered upon the books of the Society of Gray's Inn, and on the 27th February, 1663, he was called to the bar, and rose rapidly into notice as a first-rate lawyer and successful advocate. He was employed in most of the cases in which the troubled times in which he lived produced, and was generally counsel on behalf of the accused. His opposition to the measures of the court brought him up the vengeances of James II., who procured his removal from the recorder's of London. Shortly after the accession of William III. (April 1689) Sir John Holt was made lord-justicer of the King's Bench, in which situation he continued during the whole of his life, although, in 1697, the chanceller was offered to him on the removal of Lord Somers in 1700. Sir John Holt in the discharge of the duties of his office expunged great resolution in opposing the encroachments of the House of Commons on the powers of the house of parliament. His demeanour towards prisoners presented a noble contrast to the insensibility, brutality, and vulgar brutality which had disgraced the criminal proceedings of former reigns, and he set an example of spirit and temper which has continued to distinguish and adorn the judicial bench of England.

It was the fortune of Sir John Holt to be placed more than once in a position to bring into a strikingly plain sight the personal intrepidity of his character, one instance of which, from the interest attached to it from the recent claims of privilege by the House of Commons, may be here mentioned. It arose in the famous case of Aylsbeare v. Basset, a decree of which was obtained by a returning officer who had refused to record their votes. The House of Commons resolved that the plaintiffs were guilty of a breach of privilege, and committed them to Newgate, but Sir John Holt, who was sitting in the chief-justice's court, expressed his opinion that they were entitled to their discharge. Upon this the House of Commons issued warrants for the apprehension of the counsel who had argued the case, and for the bringing of the deponents into the bar of the house. Sir John Holt summoned him to appear at the bar of the house. The chief-justice bade him begone, upon which the house sent a second message by their speaker, attended by as many members as was necessary, who delivered his message, Sir John Holt is reported to have said, 'Go back to your chair, Mr. Speaker, within this five minutes, or you may depend upon it I will send you to Newgate; but if you persist I will put you in my dignified seat, and the chief-justice of my court shall send you to Newgate, and from the spirited observations made by Sir John Holt whenever the due course of law or justice was attempted to be impeded, it is probable that his anger at the interference of the House of Commons would be shown by very strong language.

Sir John Holt died in March, 1709–10, leaving behind him a reputation for learning, honour, and integrity, which has never been surpassed even among the many eminent individuals who have attained to his dignified position. There is no complete biographical account of Sir John Holt. The volume which bears the title 'The Life of Sir John, Lord Chief Justice of the King's Bench,' London, (1764), is merely a collection of letters of Sir John Holt, with occasional references to his life. The above account has been taken chiefly from a memoir published in the 'Law Magazine.' The Tattler (No. 14) contains an outline of his character.

HOLYHEAD, or CAER SEIR, a seaport and market-town situated upon a small island of the same name at the western extremity of the island of Anglesey, 367 miles north-west by west from London. The Romans are supposed to have had a station or part of a station here. There have been found in the vicinity at different times; there are also distinct traces of Druidical remains. The two principal streets are broad and well built, and several of the more spacious houses are of stone. A new bridge, formed by a pier 900 feet in length, constructed chiefly of hewn limestone, and at the pier-head there is, during ordinary tides, a depth of 14 feet at low-water. The other end of the bridge is formed of a suspension bridge of cast-iron, and the road is thus continued across the island of Anglesey to the Menai Bridge. The church is a very ancient structure, embattled, with the inside of it a part of the transverse day had delivered his message, Sir John Holt is reported to have said, 'Go back to your chair, Mr. Speaker, within this five

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HOLYHEAD, or CAER SEIR, a seaport and market-town situated upon a small island of the same name at the western extremity of the island of Anglesey, 367 miles north-west by west from London. The Romans are supposed to have had a station or part of a station here. There have been found in the vicinity at different times; there are also distinct traces of Druidical remains. The two principal streets are broad and well built, and several of the more spacious houses are of stone. A new bridge, formed by a pier 900 feet in length, constructed chiefly of hewn limestone, and at the pier-head there is, during ordinary tides, a depth of 14 feet at low-water. The other end of the bridge is formed of a suspension bridge of cast-iron, and the road is thus continued across the island of Anglesey to the Menai Bridge. The church is a very ancient structure, embattled, with the inside of it a part of the transverse day had delivered his message, Sir John Holt is reported to have said, 'Go back to your chair, Mr. Speaker, within this five
of the inhabitants of Holywell. The machinery belonging to the establishments above mentioned is occasionally worked by steam power, but it is more frequently driven by the force of a stream which issues from the remarkable Holywell of St. Wenefreda, and which is justly considered by the inhabitants as the origin of their present prosperity. According to Pennant this spring throws up twenty-one tons of water in a minute, and has never been known to freeze, but it is a vulgar error to suppose that it is nearly as impervious to fluctuations during drought. The spring issues from the rock into a beautiful polygonal well, over which a chapel was erected by the Stanley family about the time of Henry VII. The waters were formerly held in high repute for the cure of diseases, and were moreover resorted to by large numbers of pilgrims. Even as late as the time of Pennant the Lancashire pilgrims were to be seen in deep devotion up to their chins for hours, sending up prayers, and making a prescribed number of evolutions, and this excess of piety was carried so far as in several instances to cost the devotees their life. Near this town are the remains of the abbey of Basingwerk; and near the spring are the remains of the old British fortification of Dinas Basing, 'the fort in the bottom.'

The manufactured copper and brass and brass are all shipped on the Dee, just below the factory, to the warehouses of the company at Liverpool, whence large quantities are reshipped to London, America, and India. Holywell is a contributory parliamentary borough to Flint. The living is a vicarage in the diocese of St. Asaph, with an average net income of £350. The rents are in occupation in 1837, 38 for a term of years, and in 1837, 38, as to a small part, £200. (History of the Parish of Holywell in Flintshire, 2nd Ed., p. 106, &c.)

HOLM MIDDEN. [BRUNSWICK.]

HOMAGE, an incident of tenure which is now abolished by 12 Car. II., c. 34. [FEUDAL SYSTEM.] The word, according to Dr. Edward Coke, is derived from homon, because when the tenant did his service to the Lord, he said 'I become your man,' &c.

Homage, according to the old English law writers, was of three kinds: by ligeance, by reason of tenure, and ancestry; the distinction between which is not necessary to state here: the whole subject, which is now merely matter of curiosity, is explained in 'Coke upon Litt.,' p. 64, and following pages.

The copyholders, or tenants who attend to do their duty in a court baron, are called the homage.

HOMALIA CELEB. A small natural order of shrubby exogenous plants with peltate leaves, a row of glands in front of the segments of the calyx, many perigynous stamens, and a 2-3-styled ovary, with many parietal placenta as styles. The species chiefly inhabit tropical countries; they have small starchy flowers, and are of no known utility. Brown considers them nearly related to Passifloraceae.

(Acts, 1837) certain differences which induce him to separate the true lobsters, Homarus, from the Crawfishes, Astacus, and to combine the genera Astacus, Homarus, and Nephrops in one small group, which he designates as the family of the Astacia. These facts are as follows: the Astacias appear to have a much larger length of the first abdominal segment, which the Astacias also resemble in the hardness of the terminal segments; but their sternum is not enlarged into a piastron, and the nervous ganglia corresponding with the two middle rings are distant, and united by rather long double cords.

The body of the Astacias is elongated and a little compressed; the abdomen is very large, but at the same time less developed in proportion to the thorax than it is in the Shrimps. The carpus terminates anteriorly by a moderate rostrum, which overhangs the base of the ocular peduncles. The antennæ are inserted nearly on the same transverse line; those of the first pair are of moderate length, their joint is straight, and their terminal filaments two in number. The external or second pair are much longer, and their peduncle is furnished above with a moveable plate, which is analogous to the spine form appendage in the Astacias, as well as in the Astacias proper, which is found in the Salticus. In the Astacias this appendage is hastiform, and never entirely covers the last peduncular joint situated below, and it is even rudimentary. The first pair of jaws is provided with a small didactylous claw; the four last pairs are of moderate length, and nearly of the same general form, excepting that the second and third pairs are provided with a small didactylous claw, and that the four last are monadactylous. The abdomen is nearly of the same size throughout, and presents on each side a lamellar prolongation, which descends so as to increase more or less completely the base of the false feet. The last segment is very wide, and forms, with the two plates of each of the appendages of the sixth ring, the caudal fin, all the pieces of which are nearly of the same length. The external plate of this fin has a transverse joint towards its posterior third part. The false natatory feet are elongated; in the species the first pair are straight, and armed, nearly as in the Brachyura, while the others are terminated by two large foliaceous plates with ciliated borders, a condition which belongs to the whole of these feet in the female. The branchium amount to twenty on each side. They are discussed in three rows, so as to form vertical bundles separated by obliquely appendages, fixed to the base of the feet. These last-mentioned appendages are very large, and are only wanting in the posterior feet.

This family corresponds to the genus Astacus of Fabricius; and M. Milne Edwards, adopting the division established by Dr. Leach in founding his genus Nephrops, further separates the Crawfishes properly so called from the true Lobsters thus—

<table>
<thead>
<tr>
<th>Homarus</th>
<th>Astacus</th>
<th>Nephrops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rostrum depressed, and armed with one tooth at most on each side. Last thoracic ring moveable.</td>
<td>Eyes spinous. Last ring of the thorax solid to the preceding.</td>
<td>Eyes reniform. Last ring of the thorax preserving a little mobility.</td>
</tr>
<tr>
<td>Astacias.</td>
<td>Rostrum straight, and armed with many teeth on each side.</td>
<td>Lobsters; Homarus.</td>
</tr>
</tbody>
</table>

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But the separation thus further carried out by M. Milne Edwards does not depend on external distinctions only; for there are great differences in the conformation of the internal organs of generation and digestion, as compared with that of those essential parts of the animal economy in the other Astacians. Thus M. Milne Edwards remarks, that in the Crawfishes the duodenal portion of the intestine presents on its internal surface a great number of small villi, and is not clearly separated from the rectum, which is smooth internally; while in Homarus the duodenum is smooth within, the rectum is plaited internally, and there exists between these two parts of the digestive tube a kind of circular valve; the posterior cecal appendage of the intestine, which is seen at the extremity of the duodenum of the true Lobsters, is wanting in the Crawfishes. The liver is composed in the Crawfishes of small serous tubules, which are comparatively much more elongated, and its anterior lobes are less developed; the testicle is very small, and is composed of three lobes, whereas springing the very long and tortuous deferent vessels, whilst in the true Lobsters these secreting organs are very much elongated, extending from the head into the abdomen, presenting no mamillose lobes, but a simple commissure, and only giving rise to very short deferent canals.

The Astacians, which are all fluvialists, consist of the species A. fluviatilis (the natural history of which will be found in the article Astacus, vol. ii.), Bartonisi affinis, Australasiensis, chlorusa, and tumida.

The Homarsi, which are all marine, consist of the species H. vulgaris, the Common Lobster (the natural history of which will also be found under Astacus), Americanus, with its immense claws, and Capensis, according to M. Edwards, who considers the Astacus scaber of Fabricius as identical with Capensis. The species A. euryclesus, A. fulgens, A. fulvus, are unknown to M. Edwards, and considered doubtful by Latreille.

Nephrops. (Leach.)

Body more elongated than that of the Crawfishes; rostrum slender and rather long, armed with lateral teeth like that of Homarus. Eyes large and prominent. Lamellar appendage of the external antennae wide, and long enough to extend beyond the peduncle situated below. Feet, first pair long and prismatic; succeeding pairs with a compressed manus. Nothing remarkable either in the abdomen or in the buccal appendages. Branchiate disposed as in Homarus.

Example. Nephrops Norvegicus, Norwegian Lobster of authors. Length six or seven inches.

Fossil Astacians.

M. Milne Edwards refers the impression of the small Meeerus crustacean from the beds in the neighbourhood of Peppenbeim to the genus Astacus provisionally. He quotes the figures of Knorr (pl. v., fig. 8-5), and Desmarets (Crustacés Fossiles, pl. ii., fig. 6), and dedicates the species to the first of these naturalists, under the name of Astacous Knorr. He considers that the fossil figured by M. Desmarets (pl. ii., fig. 3), under the name of Palmaris Reg., has more relation to Nephrops than to any other species of crustacean, but that it probably ought to constitute a particular genus. Astacous Leachii of Mantell (Geology of Sussex) belongs, in the opinion of M. Milne Edwards, to the family of Astacians; but he remarks that it differs considerably from the species which compose the three genera constituting that family. Of the genus Colonia, established by Mr. Broderip, and described and figured by him from the lias in 'Geol. Trans.,' 2nd series, vol. v., p. 171, pl. 12, M. Milne Edwards says that he considers it to be intermediate between the Astacians and Saltacous.

HOMBURG, HESSUS. [HESSE-HOMBURG.]

HOME, HENRY (Lord Kames), was born at Kames, in the county of Argyle, 1705. He was originally bound to a writer of the signet, but by diligent study he qualified himself for the higher practice of an advocate. His first work, entitled 'Remarkable Decisions in the Court of Session,' which appeared in 1728, excited considerable attention.

Then followed the history of Mr. Home's life, published by the publication of his 'Essays on several Subjects in Law.' In 1741 he published, in 2 vols. fol., 'Decisions of the Court of Sessions,' which were arranged under heads in the form of a dictionary; and in 1745 appeared his 'Essays on several Subjects concerning British Antiquities.' In his 'Essays on the Principles of Morality and Natural Religion,' while he worked out extensively the principles of a rational moral sense in general, and especially in regard to property, he opposed all exclusive theories of human nature which derive all the actions of men from some single principle, and endeavoured to establish several general principles. Some of the propositions advanced by him concerning natural religion gave offence to a few, who thought that they could advance the interests of Christianity by depreciating the reason, on which however all revealed religion ultimately rests. In 1752 Mr. Home was appointed a judge of the court of session, and took his seat on the bench by the title of Lord Kames. At the same time he was nominated a trustee for the encouragement of manufactures, fisheries, and arts, and also commissioner for the management of the forfeited estates. But the activity of his mind was far from being exhausted by his numerous official duties, and he found leisure to compose two important works, in which he attempted to apply to the science of jurisprudence the principles of philosophy. The titles of these works are 'Historical Law Tracts' and 'The Principles of Equity.' In 1761 he published an 'Introduction to the Art of Thinking,' for the use of youth, which, as an elementary work, is still highly esteemed. The year following there appeared 'Elements of Criticism,' 3 vols. 8vo., which exhibit a rare union of philosophical acuteness with a fine taste and warm feeling for the beautiful. In 1763 he was appointed one of the lords commissioners of justice; but his literary labours were still uninterrupted by the growing weight of duty and of years, and in 1774 he published 'Sketches of the History of Man,' 7 vols. 4to., an ingenious and amusing work: but the light and facile ideas of the doubtful authority of which upon which it rests materially detract from the value of the many important views of society which it lays open. In 1776 appeared 'The Gentleman Farmer, or an Attempt to improve Agriculture by subjecting it to the test of Rational Principles.' This treatise is even now referred to by writers on agriculture, and was not without its influence in effecting the present improved state of Scotch farming. His last work was devoted to the benefit of the young. His 'Loose Hints on Education' were published in the 85th year of his age, and in the following year he died, on the 27th December, 1792.

Lord Kames's reputation as an author rests at present...
in praise of different gods. Opinions the most various have been held regarding his birthplace, his age, his station, and the circumstances of his life; so that it seems almost hopeless to come to any satisfactory conclusion on subjects which history has given us such scanty materials to determine. The author, or authors of the Iliad must have been accurately acquainted with the geography of Greece and the northern part of the Archipelago. Leake notices several instances where epithets are applied with an almost conveyed exactness which could only have been derived by them from a simple feeling of gratification which accompanies every perception of a congruity in objects to man's triple nature, whether they present themselves under the form of the good, of the beautiful, or of the true. It is in this sense of the word that the comparison is placed and described as nearly allied, to the moral sense. But he more frequently uses it in the larger and more general sense, in which it comprehends not merely this simple feeling, but the cultivation also of an intellectual perception of the causes and ground of this congruity itself in the objects of taste. This is particularly noticeable in his remarks upon beauty. This term he confines originally to objects of sight; it is only figuratively extended to objects of other senses. Visible beauty is of two kinds: *intrinsico*, which is perceived immediately; and *relative*, which is only medially perceived by an act of reflection and the discovery of some deeper or more abstruse relation. From this, oftentimes the judgment may overbear the taste, and an object totally devoid of intrinsic beauty may appear beautiful upon a perception of its utility; for instance, a want of form and symmetry in a tree will prevent its appearing beautiful, if it produces some useful fruit or flower.

His theory of the sublime is more correct. The strong emotion produced by the impression of a great or grand object which we cannot apprehend without an effort is the sentiment of the扩充, an Attic minstrel, that is, an offspring of the grandeur of its sublimity. However he considers it difficult to reconcile the sense of the sublime with the sense of beauty, since many sublime objects are not merely deformed, but are altogether amiable and delightful to the eye. Yet he rightly observes that psychologists they agree in excelling an agreeable emotion diversely modified by its respective objects or causes.

The chapters on *Virgil* and *Language, Language, etc.,* contain many excellent marks and happy illustrations. In those on Epic and Dramatic Poetry, Lord Kames insists that the unities of time and place do not rest upon a general principle, that it can be applied to the objects of other senses. He considers that beauty is the perfection of the part of the whole, and that the beauty of a whole is the perfection of the parts. *Life of Lord Kames,* by Lord Woodhouselee.

*Homer,* or *Hume, John,* was born in Scotland about the year 1725, and is supposed to have been a relation of David Hume's. He was a friend of Dr. Johnson, and subsequently nominated to the pariah of Athelstanford, where he produced his tragedy of *Douglas,* which was acted at Edinburgh with the most unbounded applause. Perhaps there never was a composition more perfectly harmless and free from offence; but the circumstance of its being a drama was enough to draw down the anger of the rigid elders of the church, who were shocked to find such a work proceed from the pen of a minister. Not only did they expel him from the ministry, but even denounced those of his friends who might visit him, or go to see the performance of his piece. Home retired to England, where he received an honorary degree from the University of Oxford. He was a member of the Oxford University of Charity. Four other tragedies, *Agis,* *Aulot,* *The Fatal Discovery,* and *Alonso,* followed *Douglas,* but they did not equal it, and have been long since forgotten.

Hume died in 1776.

The play of *Douglas* has always kept its place on the stage, and from its pure style, elegant language, and interesting plot, will ever continue a favourite. Never was fanaticism more unlucky than in having such an inoffensive work as *Douglas* selected as its victim. It is probable that reading the drama would never dream of the possibility of its exciting anything like persecution, while his work goes down to posterity as a classical and moral production. *Homer,* or *Hume,* had never been seen residing in every rational person with indignation and contempt, unless indeed a liberal allowance be made for the bigotry of the age.

*Homer* (in Greek, Ὑμήρος), the supposed author of the earliest Greek epic poems, and of some hymns.

Some accounts say that he forsook his expulsion, and avoided it by retiring.
life, goes on to apply his conclusions to the Greek nation in particular, and furthermore to the heroic age of the Greeks, he will doubtless find little difficulty in agreeing with a remark which has already been made regarding heroic poetry, namely, that as a simple form of art it does not imply the development of a plot, but rather the extraction of a certain portion from the poetical annals of a nation, before the conclusion of which may seem to suggest, but not necessarily ending with a regular disengagement of a plot regularly worked up and studiously combined from the beginning of the poem. To apply this to the Odyssey, it is clear that it would be out of place, to aim at proving, as some have done, that the Iliad is a poem constructed on regular principles of art. It is a poem of natural growth; the earliest and yet the noblest type of the epic genre of the most important Latin and the native nation of which we have any record, and, as Thirlwall has remarked, perhaps the first work to which was applied the newly invented art of writing. This last supposition, if adopted, would lead us to infer that the Iliad, in its present state, is the work of Homer, the poet, and in the ten- dency which the Odyssey displays to exalt the individual above the class, a tendency which proves that an advance had been made to that kind of poetry which treats of individual feeling without the most important national feeling. But there is one other characteristic of the Odyssey which we have, and which we should not lightly disregard; we mean its romantic look, using romantic as opposed to classical. There is something quite northern in the adventures of Ulysses; they might have happened to a knight of Arthur's court, or perhaps still better, to Beowulf. The Sirens would be singing maidsens, who de- coy travellers by their strains; the nymph Calypso would find an antitype in some enchantress. Ulysses slays the suitors, much in the way of Cloutesley, does not burn old ballad; and the horror of great darkness which the prophet sees surrounding the suitors is so like Sir W. Scott's description of the banquet at the end of 'The Lay of the Last Minstrel', that we cannot help it, if we might suppose it had suggested the scene, were not we almost certain that he had borrowed, consciously or uncon-sciously, from some northern story, if at all. To this we might add that in the same Odyssey the hero of a certain episode gives Ulysses (Od., v. 346), the story of the Lotos-eaters, the tying up the winds in a bag (Od., v. 19), a practice still in use among the Laplanders, and the ship of the Phaeacians, "That need no spite of wind or tide."

These grounds and others have impressed many modern scholars with the opinion that the Odyssey and Iliad are not the produce of the same mind. How far either poem can claim to have been written by a single author is another question, and one which it is far easier to solve. We have mentioned some of the arguments that have been urged, and to these we might add an historical analogy from the same kind of poem in our own country. The great romances, some of them at least, were more than a century in their produc- tion, and one, the 'Romance of Alexander,' had, if we mistake not, at least a dozen contributors. Whether there be the same traces of many hands in the two poems, we must leave to others; if not, the instance proves no more than it would to refer to the 'Mirror for Magistrates,' which contains more separate accounts than it had authors. Again, Mr. Henry the younger has shown that the professed Ulysses, as many others have done, to point out all the interpolations. Our limits do not permit us to say more on this subject than to notice that there is little doubt that much has been interpolated in the account of Ulysses' visit to the shades, and that Aristophanes and Aristarchus the grammarians considered the latter part of the 23rd and all the 24th book spurious. It will be more to our purpose to con- sider the question whether the Homer and the Odyssey are or are not to be referred to the same author, and this we shall do rather more with the view of pointing out some important features in the discussion, than as hoping to arrive at a very definite result. A sect arose very early among the grammarians, called 'The Semits' (ευσεμιταί), who denied to Homer the authorship of the Odyssey. The grounds of this opinion were mostly critical, such as the different use of different words in the two poems; or historical, such as the very different in point of relation to Helen, Nereus' sons, Aprodite's husband, &c., but we possess but little of the fruits of their researches, although enough, according to Grauert ('Rhaisisthes Min- nesse', l. c.), who, as he has been made of note, is in point of early childhood of criticism. In our day, or at least in that of our fathers, the question has been revived, with a power of suggesting doubts, as much greater that as of satisfying them, such as the identity of ideas, according to the real meaning from the use of different words in the two poems, both in ancient and in modern times, it must be observed that in the Iliad itself, compared with itself, there is, if any thing, a more remark- able variety in the use of words than in the two poems. We do not remember to have seen the observed, but we think that any one who reads the Iliad, noting down any words which strike him, will find that no sooner has he got acquainted with a set of words than they disappear, and that this rising and setting of words continues all through the poem. If then the use of different words argue dif- ferent authors, there will be some difficulty in escaping the conclusion that there are two Iliads in the Odyssey. Whether the two Homeric poems, were the production of separate authors. The different use of words however is a strong argument, but a stronger than all is to be found in the different state of civilization and difference to the Iliad and the Odyssey, the two Homerics, were the production of separate authors. This last supposition, if adopted, would lead us to infer that the Odyssey, in its present state, is the work of Homer, the poet, and in the ten- dency which the Odyssey displays to exalt the individual above the class, a tendency which proves that an advance had been made to that kind of poetry which treats of individual feeling without the most important national feeling. But there is one other characteristic of the Odyssey which we have, and which we should not lightly disregard; we mean its romantic look, using romantic as opposed to classical. There is something quite northern in the adventures of Ulysses; they might have happened to a knight of Arthur's court, or perhaps still better, to Beowulf. The Sirens would be singing maidsens, who de- coy travellers by their strains; the nymph Calypso would find an antitype in some enchantress. Ulysses slays the suitors, much in the way of Cloutesley, does not burn old ballad; and the horror of great darkness which the prophet sees surrounding the suitors is so like Sir W. Scott's description of the banquet at the end of 'The Lay of the Last Minstrel', that we cannot help it, if we might suppose it had suggested the scene, were not we almost certain that he had borrowed, consciously or uncon-sciously, from some northern story, if at all. To this we might add that in the same Odyssey the hero of a certain episode gives Ulysses (Od., v. 346), the story of the Lotos-eaters, the tying up the winds in a bag (Od., v. 19), a practice still in use among the Laplanders, and the ship of the Phaeacians, "That need no spite of wind or tide."

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a logical proof, especially one which only goes on probabilities. Each man who engages in the controversy will have it decided for him as much by his own natural character and bent as by argument; and he who may leave it with this one remark, that the most which can be proved, even by the rules of taste, is that the great design and chief filling-up is by one author: individual lines or even whole homilies are composed by many authors. Be this as it may, one part of the question the reader will find some very valuable remarks in Hermann's preface already quoted, which relate also to the opening lines of the Theogony, and more especially to the Homer and Homeric poems which we come now to notice, the Homeric Hymns.

The Hymn to Apollo, as Hermann thinks, owes its present form to the fact of the last transcriber having had before him, according to Hermann, a lectionary of at least a second edition, all which introductions, in transcribing, he mixed up together; and furthermore to his having mixed up two separate hymns, one to the Delian and one to the Pythian Apollo, of which the latter was itself composed of two, to the Pythian and one to the Taphianus Apollo. The Hymn to Hermes is very corrupt, consisting of a larger and a smaller hymn, and interpolations. The Hymn to Aphrodite and that to Demeter are also much altered; the latter, according to Hermann, has lost marks of at least two editions. These are the principal of the Homeric hymns: the fragmentary one to Dionysus seems also to have been one of the larger and more important ones. There are two fragments for Orpheus, the Prayer-Book of Orpheus, as well as seventeen epigrams, or rather epigraphs. These, with the 'Battle of the Frogs and Mice,' make up the sum of the Homeric poems, genuine and spurious.

The earliest of the Homeric hymns is by Findar. Herodotus and Thucydides quote and refer to him; and when we get to Plato he is constantly either hinted at or transcribed. There is a good deal of information on this topic and others in Heyne's text, which is already, though, but a poor copy of Thirlwall's authority for the remark that 'an argument which confines itself to the writings of Wolf and Heyne can now add but little to our means of forming a judgment on the question, and must keep some of its most important conclusions in suspense.' Thirlwall has, however, a great deal more information to be found, by those who will take the trouble to look for it, scattered up and down in the pages of German periodicals. Buttmann's Lexicaloga and Thiersch's Grammar supply critical matter in abundance. Heyne's 'Symbolik und Mythologie,' Hermann and Creuzer's 'Letters on Homer and Hesiod,' Voss, Nitzsch, and K. O. Mueller, may be also studied with advantage, as well as Mr. Thirlwall's 'History of Homer,' in which this latter writer has much fine literature of Greece, in the 'Library of Useful Knowledge.'

The principal modern editions of Homer are, those by Clarke and Payne Knight, in this country (the latter having the former's text, but making improvements in their proper places), and abroad, Hayne, Hermann, and Nitzsch (which is as yet incomplete), for the Iliad, Hymns, and Odyssey respectively. Of translations we have Hobbes, Chapman, Pope, and Cowper; but of these Pope's the best known, is rather an imitation, not at all in the style of the original, than a translation. Perhaps, on the whole, Chapman's is the best. The German translation by Voss is perfectly wonderful as regards accuracy. It is in hexameters, and preserves every sense and nearly every word.

HOMICIDE, in the English law, signifies the killing of one man by another. Homicide is of three kinds: justifiable, excusable, and felonious. Justifiable homicide is when the death of the offender is necessary to prevent a great and immediate public injury; and, as the public interest is more inviolable necessity, where no shadow of blame can be attached to the party killing, as soldiers in action, persons defending their own lives, &c. Excusable homicide is of two kinds, by misadventure, and voluntary manslaughter. Of the first is where a man doing a lawful act, and using proper precautions, unfortunately kills another; the second, where a person in defending himself from an assault of a less serious nature than death, may lawfully kill an aggressor. Manslaughter, kills the offender; and this it often difficult to distinguish from manslaughter, in the legal sense of the word. Felonious homicide is the offence of murder; for the legal definition of which see murder. But Photius distinguishes the homily from the sermon, as being a familiar conversation, in which the preacher and people interrogated each other. All the homilies of the Greek and Latin fathers were composed by bishops, for before the fifth century none but bishops were allowed to preach. We have good specimens of this sort of composition extant among the works of Chrysostom, Gregory, and other fathers. The 'Clementine Homilies' are composed by St. Clement of Rome, by an Ebionite in the second century. (Lardner's Credibility, pt. ii., c. 29.)

In modern use the term 'homicide' is applied to a discourse read out of a homily or sermon.

In the eighth century a collection of homilies was compiled from the writings of the fathers by Paul the Deacon and Alcuin, at the command of Charlemagne. This collection is called the 'Collection of the Church of Alcuin.'

At the period of the Reformation in England two books of homilies were published by authority, in order to ensure uniformity of doctrine and to supply the defects of some of the clergy. The first book was published in 1547, and consists of twelve discourses, most of which are ascribed to Cranmer; the second, containing twenty-one discourses, supposed to be written by Bishop Jewell, was published in 1542. They were appointed to be read in churches every Sunday unless there were some service appointed to be read in accordance with the 35th Article of the Church of England as 'containing a godly and wholesome doctrine.' A handsome edition of the homilies has lately been published by the Christian Society of London.

HOMOCERAL. Fishes with symmetrical forms of tail are thus named by M. Agassiz, in contradistinction to HETEROCERAL.

HOMEOPATHY (Greek word, ἑμοεπαθής, literally 'similar or like state of feeling'), a mode of treating diseases, founded on peculiar doctrines, which were first proposed in 1796 by a German physician named Hahnemann. Essentially it is based on the homoeopathic principle, in which a medicine which is capable of exciting in healthy persons symptoms closely similar to those of the disease which it is desired to cure.

Samuel Hahnemann, born at Meissen in Upper Saxony, in the year 1755, was educated for the medical profession at Leipzig, and soon obtained considerable reputation in his own country for his knowledge of chemistry and of the properties of medicines. He was however no physician; he knew nothing of the laws of diseases, before for the action of the animal system. While experimenting, in 1796, on the mode of action of Cinchona bark in his own person, he observed that it produced symptoms like those of intermittent fever, the disease against which this medicine is said to be an almost specific remedy. It was this circumstance which led him to adopt the opinions afterwards so zealously promulgated by him in his writings and in his public lectures at Leipzig.

It is not true that physicians, to endeavour to remove the diseased state of one part of the body by inducing a new action in another, in this endeavour imitating nature herself. This is styled by Hahnemann the 'allopathic method.' He professes however to neglect the efforts of nature, characterizing them as generally ineffectual, and frequently destructive. Again, physicians have been accustomed under some circumstances to palliate symptoms by means known to produce opposite states; thus, to relieve pain, they would give strengthening and exciting medicines; to remove fullness of blood, they would bleed; setting thus on the principle of 'contra naturam curatur.' But Hahnemann denies the death-like effects of this 'antipathic method,' and, maintaining that it is never successful against diseases of long standing, except when in the prescriptions employed some homoeopathic medicine has been unwittingly included. All remedies have a property, unique to each, of producing in a healthy person all the symptoms of that certain disease; sulphur, which is a specific against scabies, gives rise, when taken internally, to an eruption of pustules on the skin; and vaccine, they suppose, prevents the occurrence of smallpox only because it produces in the body all the symptoms of that disease; their principle then is 'similia similibus curantur;' and in estimating the resemblance between a disease and the state produced by the medicine, they regard only the external symptoms, and do not consider on what essential internal
condition of the body these depend. But even the resem-
blance between the apparent symptoms of the disease and
those produced by the substance said to be its homoeopathic
remedy is, in most cases, very slight. This ground-work of
the doctrine is extremely weak.

Hahnemann’s explanation of the efficacy of the homoeo-
pathic method is ingenious. Two different diseases, he
says, cannot destroy each other, for they affect different
parts of the system; they will either continue their progress
simultaneously, or the weaker will merely be arrested during
the continuance of the stronger; while, on the contrary, if
the morbid state secondarily excited resemble in its symp-
toms that of the original disease, it will affect the same parts
of the body, and the two, meeting there, will destroy each other.

A great peculiarity of the homoeopathic treatment is the
minuteness of the doses in which the medicines are ad-
mixed. A very small dose which other physicians prescribe
several grains is given by the homoeopathist in the quantity
of a deciSCillion of a grain, or even less. An ordinary form
in which the dose is administered is that of a comfit of
sugar of the size of a poppy seed impregnated with a very
weak solution of the medicine; but if the patient is very
sensitive, it will be sufficient to let him smell once to a
phial containing a comfit of suarc, thus impregnated, of
the size of a mustard-seed. Such doses appear at first
sight ridiculously small, but Hahnemann reminds us that
since homoeopathic medicines produce the same symptoms
as the original disease, they must act on the same parts,
and hence have far greater power than substances acting on
other systems. Moreover he has discovered that the medicines
acquire at each division or dilution a new degree of
power by the rubbing or shaking which they undergo,
so that latterly, he says, 'I have been forced by expe-
rience to use a number of shaking or divisions, as much as
four or five, in one dose.' It is worthy of remark that
Hahnemann was a disciple of Mesmer, a be-
liever in animal magnetism, and speaks of the wonderful
effects which he has seen produced by a substance
preparing a similar train of effects in the minds of
Mesmerists, that is to say, by one movement of
the hands of the magnetizer along the surface of the
body, from the crown of the head to the soles of the
feet.

There is a fact that has hitherto not been performed
by the Hahnemannian method, but it appears most reason-
able to regard these merely as new proofs of how much
may be done by the strict regulation of diet, by the powers
of nature, and by the wonderful influence of the imagina-
tion upon the body. When patients are firmly convinced
that they shall be cured, the cessation of nervous pains,
particularly those of a hysterical nature, may with more
justice be ascribed to the influence of the mind than to the
powers of medicinal doses of medicine

HOMOGENEOUS and HETEROGENEOUS, terms applied in mathematical language to expressions which have or have not the same number of factors of a given sort. Thus, with respect to x and y, $ax + by$ is ho-
homme, but $ax + by$ is homoeo-

HOMOLIA, HOMOLA TRIBE. The Homoli, ac-
I, existing to the system of M. Milne Edwards, are the second
tribe of the Asteroids family of the Actinocord dus-
cean, and their place is between the Dromi and
the Rhamnids.

Character of the Tribe.—Carapace spiny, and armed
with a rostrum. Internal pair of antennæ without a stem
and incapable of being bent back upon the front. Jaw-footh
pediform. Feet of the second, third, and fourth pairs, very
long; fifth pair very short, and of no service in progression.

Spot, brown. Clypeus narrower anteriorly than posteriorly.

Tells of the three following feet styloform. Posterior feet more
or less completely pedunculate.

M. Milne Edwards thus divides the tribe into three
genera:—

Subcheliform and exposed; cara-
HOMOLIA.

Homola (Leach.)

Carapace longer than wide, nearly quadrilateral; the
stomachal region occupying the whole breadth of it ante-
riorly; and the branchial regions, though not prolonged
above the base of the foot, very large. Ventral view of
carapace vertical. Front narrow, and advancing so as
to form a small rostrum; on each side of its base a large conic
tooth directed forwards. Orbita extremely incomplete, even
within, where the articulation of the peduncles is naked; they are scarcely limited without, and are continued
with a large oblique and very superficial pit, against which
the eyes are applied. Ocular peduncles cylindrical and
divided into two portions, one internal, slender, and elon-
gated; the other stout, short, and terminated by the eye.
Internal antennæ not lodged in pits; their basa lie joint
nearly globular and advancing below the insertion of the
ocular peduncles, the two succeeding joints very long, the
third, as in the Brachypura, supporting two very small
multiarticulate filaments. External antennæ inserted
nearly on the same line as the internal; at their base a
large auditory tubercle, which is sometimes extremely pro-
jecting; their first joint cylindrical, rather stout, and
moderately long; the second slender and very long; the
third very short: the terminal filament very long. Buccal
frame quadrilateral. External jaw-foot nearly pediform,
their three last joints being large and nearly as long as the
two preceding, which are hardly flattened. Sternal plastron
much resembling that of the Dromi, and not containing
the gular parts. Feet very long; 1st pair terminated by
a nearly cylindrical hind, 5th pair raised upon the back
and subcheliform. Abdomen very wide in the male as
well as in the female, and composed of 7 distinct joints; in
the female the first ring carries a pair of very short append-
ages; those of the four succeeding segments are formed
in the same form as in the Brachypura; the penultimate ring
has no vestige of any appendage. The vulva, instead of occu-
pying a place in the sternal plastron, as in the Brachypura,
are buried in the basa joint of the third pair of feet.
The disposition of the branches is equally remarkable;
there are fourteen on each side; the first is laid across
(ten travers) under the base of the succeeding ones, and
fixed to the base of the second jaw-foot. The others are
all directed obliquely up, and are fixed to the circumference
of the vault of the sides. One is inserted at the ring
which carries the jaw-foot of the second pair, two above
the base of the external jaw-foot, three on each of the two
succeeding rings, and two to the penultimate ring.

Locality, Seas of Europe.

Example, Homola species.—Body covered with yellow
hairs; length about 18 lines.

Locality, the Mediterranean Sea.
it is not their place, and that they evidently belong to the Anomura. They bear, he says, the greatest analogy to the Apterura, and especially to Homola; but they establish the passage between those crustaceans and Brinca.

Carapace: jointed or rather heart-shaped; its upper surface distinctly limited by a thick and spiny border. Rostreum horizontal and very long; it covers the insertion of the eyes and the anterior border of the carapace is very short. The form of two great triangular joints is seen on the place ordinarily occupied by the external angle of those cavities. Ocular peduncles very short. Interna antennae inserted far from the mesial line, below and within the eyes; their first joint nearly cylindrical; the two succeeding, of moderate length, and the terminal filaments of the same conformation as in the Brachyura. Externa antennae inserted more backwards and outwards than the preceding; their basilar joint entirely mortised between a prolongation of the lateral border of the buccal frame and the anterior border of the carapace; the second carries a conic tooth externally, the last joint of the peduncle is long and slender, and finally the malaciticulate stem is rather long. The buccal frame is not distinct except laterally, where its borders are straight. The external jaw-feet are pediform, and their second joint, which is stout and short, carries internally a strongly toothed prolongation. The thorax presents a disposition different from that of the crustaceans which precede this genus in the system, but which is general in the succeeding family (Pterygura); its last ring is not soldered to the preceding, but free, and even movable. The sternal plastron is linear and heart-shaped, but becomes very wide afterwards, and presents complete transverse sutures between the three last segments; in the interior of the thorax there is no posterior suture turecna nor mesial apodeme nor sternal canal. The feet of the first pair are moderate and cylindrical; the three succeeding pairs are very long and equally cylindrical; finally, those of the fifth pair are extremely small and bent back in the interior of the branchial cavities; they are cylindrical and terminated by a small claw with flattened and extremely short fingers. The abdomen is large, triangular, and bent back against the plastron; its basilar part is completely solidified below, but in the terminal half it is only furnished with cornes, tubes and isolated plates, which appear to represent the six last rings. In the female, oviocular filaments seem to exist only on one side of the abdomen.

As in the other Anomurus crustaceans the urobor are not situated on the terminal processes, but occur on the basilar joint of the third pair of feet. The branchiae are disposed as in the rest of the tribe.

Example. Lithodes Arctica.—Length of carapace about five inches; colour reddish-yellow.

Locality. North seas.

Lomia. (Milne Edwards.)

M. Milne Edwards remarks that the small crustacean on which he has founded this new genus has been confounded with the present time with the Porcellana, to which it is, in fact, bears a resemblance in its general form, but from which it differs in many important particulars, such as the conformation of the tail, the antennae, &c. He gives the following generic character:

Carapace depressed, narrowed anteriorly and truncated posteriorly, it does not reach beyond the middle of the base of the third pair of feet; and the surface of the body is occupied by the base of the abdomen. The frontal is truncated and armed with a small mesial tooth; there are no orbital pits, and the ocular peduncles have the form of two great triangles. The first joint on each other on their internal edge and carry the eyes at their external angle. The internal antennae are moderate; their three joints are cylindrical, and terminate by two small filaments. The external antennae are inserted on the outside of the eyes and nearly on the same line; they are large and terminated by a stout multiformate stem furnished with long hairs at its lower border. The external jaw-feet are pediform; their third joint has no noticeable dilatation, and the three succeeding joints are very slender. The first pair of feet are very large, very wide, and extremely depressed; the carpus is as large as the arm and nearly quadrilateral; the clav is stout, short, and nearly horizontal. The three succeeding pairs are short, stout, and terminated by a nearly conical joint; the fifth pair are slender and bent back above the others in the branchial cavity. The abdomen is very wide but narrow below, stouter below the sternum, as in the Porcellana, and presents no vestiges of appendages belonging to the penultimate ring.

M. Milne Edwards says that he knows nothing of the manner in which the processes of the thorax, known as the terebratula or terebrator, are retracted and exposed, whether by a certain muscle, or by means of a fold, or whether the thorax is articulated like a fan, as in the Palaemonidae, or like a scythe, as in the Libralatae ?

Locality, supposed to be the seas of the Bering Sea.

HOMOLOGOUS, a term applied in Euclid to those magnitudes which, being of the same kind, occupy different places in a proportion, one being an extreme, and the other a mean. Thus, if

A :: B :: C : D;

then A and B being of the same kind, and also C and D, but the first pair of a different kind from the second, A and B are homologous, and so are C and D. But if all four be of the second kind, A and B are homologous terms, and also A and C; B and C are homologous, and also B and D.

HOMOLOUS, the name of a group of trilobites, as they are generally called (Palaephyra Daimon); in which the three segments of the thorax are equal, and the rest of the dorsal almost lost; for which reason Mr. Miller called it Monohelote. Homolous Knightii occurs in the Upper Silurian rocks of England, and a similar species at the Cape of Good Hope. (Kingsley, Sec.)

HOMOPTERA, one of the sections into which the class Insects is divided. According to Leach, Stephens, and some other authors, the section Homoptera is regarded as a suborder; but in the arrangement of the two great sections into which the order Hemiptera is divided, the insects of this group are thus characterized by Latreille:—restrum arising from the lowest part of the head near the chest; the eytra, almost always tectiform, are of the same consistence throughout, semi-membranous, and sometimes resembling the wings; the three segments of the thorax are blended, and the first is often shorter than the following.

In the typical Homoptera the head is large, broader than long; the eyes are large, and there are ocelli, or simple eyes, between them; the antennae are minute, composed of few joints, and terminated by a seta; the restrum is a slender, joined process, which, like that of the Hemiptera, lies close to the chest; the legs are of moderate size; the hinder tibiae are usually spined; the body is convex above and flattened beneath; the wings are semi-membranous, the anterior pair often one of those organs, the thorax is almost always of a uniform texture throughout. The larvae are active, and resemble the perfect insect, excepting that they possess no wings; the pupae are also active, but possess rudimentary wings.

These insects feed upon vegetable juices. The females are furnished with an ovipositor, composed of three denticulated blade-like processes, which are lodged in a groove in the abdomen. The ovipositor of the ovipositor they pierce holes in vegetables, in which they deposit their eggs. Many Homopterus insects possess the power of leaping by means of their posterior pair of legs.
The section or order Homoptera may be divided into the following families, most of which are analogous to Linnæan genera, or nearly so.

Family 1. Cicadidae (Leach) comprises those species in which the antennae are six-jointed, where there are three ocelli on the upper surface of the head, and where the tarsi are three-jointed.

In these insects the wings are usually transparent, and have dark nervures; the males are furnished with an apparatus, situated at the base of the abdomen on each side, by means of which they create a monotonous musical sound. They are usually of large size (some measuring as much as seven inches in width when the wings are expanded), and for the most part inhabit hot countries. But one species is found in England, the Cicada haematoce, an insect about two inches in width, with transparent wings having black nervures, and their basal portion red; the anterior margin of the fore wing is also red; the body is black, but with the margin of each segment red; the legs are red, variegated with black. This, which is the largest Homopterous insect found in England, is not commonly met with in the New Forest, in Hampshire.

Family 2. Fulgoridae (Stephens). Antennae three-jointed, inserted beneath the eyes; ocelli two in number; tarsi three-jointed. The males of this family have most generally the fore part of the head produced, and varying in form according to the species. They do not possess the power of creating a sound, nor do those of the following families.

The genus Fulgora, cicada vulgaris, is mentioned in the 'Regnum Animal.' The Fulgora laternaria (Linna.) will serve as an illustration of the second. This curious insect is an inhabitant of Brazil. It is about five inches wide, and two half inches long, of a yellowish colour, mottled with black, and having a large ocellated spot on each of the under wings.

Family 3. Cercopidae (Leach). The antennae three-jointed; tarsus three-jointed; ocelli two in number; antennae situated between the eyes. [CICADELLA.]

Family 4. Pyllidae (Stephens). Antennae with ten or eleven joints, of which the last is terminated by two setae; legs formed for leaping; tarsi two-jointed; both sexes winged.

Family 5. Thrripidae (Stephens). Antennae eight-jointed; rostrum minute; tarsi terminated by a vesicular joint, and without claws.

Family 6. Aphid (Leach). Tarsi two-jointed; antennae with seven joints; rostrum, in both sexes, with three distinct joints; females generally apterous. [ARIST.] 

HONDEKOEter, the name of a celebrated family of Dutch painters, of whom the founder, Egidius or Gilles Hondekoëter, born at Utrecht in 1635, was the son of a merchant of Westerlo, a wealthy town in Brazil, who was obliged by the persecutions of the Inquisition to withdraw from his own country. He painted landscapes in the manner of Savery and Vinckboons, in which he introduced with great success kinds, highly finished. His son, Sylabrecht, born 1613 at Utrecht, was a skillful painter of domestic poultry, but was far surpassed by his son Michael, born at Utrecht in 1636. Till the age of seventeen Michael was carefully instructed by his father, on whose death in 1653 he studied for a time under John Baptist Weenix, his uncle. His representations of cocks, hens, ducks, peacocks, &c., excel in truth, life, elegance of design, and delicacy of execution, the works of all other painters of such subjects. His genuine pictures are held in high estimation, and fetch great prices. He died in 1695, aged 54.

HONDURAS. [CENTRAL AMERICA.]

HONEY is a fluid or semi-fluid substance, the materials of which are collected by different kinds of bees, in Europe chiefly by the honey bee, or Apis mellifica. In some parts of the world it is gathered from the nectariferous glands in the cup or chalice of flowers. It cannot be said to be a purely vegetable production, for after being collected by the producer of the honey, it is transported to the bee-hive, and conversion of the osmophasus termed the crop, sucking-stomach, or honey-bag, where it is elaborated, and again dosaged, to be deposited in the cell of the honey-comb. It undergoes less change when the bees are very young, remaining nearly white, and is then denominated anemica. At all other ages it retains qualities derived from the kind of plant whence it has been procured, as is manifest not only by the peculiar colour of the honey, but by the effects which follow the use of honey derived from certain plants. In each of the sub-tribe Rhodacae, such as the Atraxa, rhododonton, kalmia, &c., which yield a honey frequently poisonous, white that from the genus Euryza (termed heather-honey), and more generally the honey, is wholesome. The plants of Hymettus, see Chandler's 'Travels,' chap. xxvi., and Hobhouse's 'Letters from Albania,' letter sexvi.

The honey of the common bee is at first generally white, inclining to yellow, but by age it becomes of a deeper colour and greater consistence, and of a more acid taste. The honey of Surinam and Cayenne, collected by the aps smalthe, is reddish. The spic uniceolor produces a greenish honey collected from the Mimosa heterophylla and Weinmannia gabara, of the most exquisite flavour. Honey is of different degrees of consistence: that of Malawi, of Hymettus, and of the Bermudas is liquid; that of England is more or less disposed to become nearly solid.

Honey is sweet, faintly aromatic, granular, soluble in water, and capable of undergoing the vinous fermentation, and so yielding an intoxicating drink. By mixing it with water, tholin, or mead, honey consists of an uncrystallizable portion, and a portion which crystallizes in very white grains. The former is soluble in alcohol, the latter not, and is regarded under the name of Muscata, or maple honey. By the action of nitric acid, can be converted into oxalic acid, like the sugar of the sugar-cane. When old it probably contains some free acid. Honey is sometimes adulterated with flour, with which and other impurities it may be freed by diffusing it through cold water. Honey is certainly nutritive, but it cannot be employed to any great extent, since, if taken in considerable quantity it excites the action of the bowels, and is gently laxative. Its effects in this way will be greater in proportion to its age and acidity, and less or scarcely appreciable if largely diluted with water. In this last state it is rather demulcent, emollient, and refreshing, and hence forms a good drink for fever and other inflammatory complaints, but it should not be taken if there be much gastric or intestinal irritation. It is used likewise in catarrhs, and when drank warm is considered to be expectorant. Along with vinegar it forms a good gargle in some cases of sore throat. In some cases of scrofulous or other venereal application in aphthas of the mouth and throat. Owing to idiosyncrasy in some individuals honey causes great uneasiness, or even severe suffering, but it is most likely that such cases originate in the kind of plant from which the honey is collected, or in the measures used to destroy the bees. Smoking them with sulphur must be hurtful, from forming sulphuric acid gas, which may be absorbed by the honey. Humanity as well as economy demands that other means should be employed to procure the honey without sacrificing the life of the industrious insects which collect it. (See the plans of Nutt and Taylor in Taylor's Bee-keeper.)

HONEY-SUCKLE. [CAPRIFOLIUM.]

HONFLUR, a town in France, in the department of Calvados, in 49° 25' N. lat. and 0° 13' E. long.; 39 miles in a
straight line north-west or west-north-west of Paris, or 117 miles by the road through Pontoise and Rouen. It is
on the left bank of the Seine, very near the mouth of that
river. This town is built on the slope of a hill, the crest of
which is covered with wood, and crowned with a chapel
which the sailors hold in great veneration. The streets are
irregularly laid out and dirty, and the port will not contain
more than a few ships. The houses are miserable.
There are two churches: the principal one is built of wood.
The population in 1831 was 8403 for the town, or 8888 for
the whole commune. The inhabitants are engaged in the
coal, whiting, herring, and fishing industry. They are
Danes in costume in a manner similar to that of the
Baltic states, with Le Havre by steam-boats. Fishery,
coppers, oil of vitriol, and iron wares are manu-
factured, and ships are built. Considerable trade is carried
on with Europe and America.

HONITON, a parliamentary borough, market-town, and
parish in the hundred of Axminster and county of Devon,
148 miles west-south-west from London. The town lies on
the great western road from London to Exeter, and is plea-
santly situated on a rising ground to the south of the river
Otter, which commands a fine view of the surrounding
country. It consists principally of one broad handsome
street, running from east to west, and another of less
length, at right angles to it. Through the former flows a
small transparent stream, from which the inhabitants are
supplied by means of a dipping-place opposite almost every
doors. [Vol. ii., p. 142.] The buildings are mostly modern,
and covered with slate, and the streets are well paved and
lighted. The church, distant about half a mile from the town, was originally a small chapel for mendicant friars.
The screen which separates the nave from the chancel is of curious workmanship. The first church was erected about the year 1482 by Courtenay, bishop of Exeter. The living is a rectorcy in the diocese of Exeter, and in the patronage of the earl of Devon, with an average net income of £8, 10s. 6d. per annum. Honiton, though
above the borough by prescription, was only twice represented in parliament prior to the reign of Charles I. Since that time it has
returned two members.

The population of the town is vested in a portreeve and
bailiff, who are chosen annually at the court of the lord
of the manor. The principal manufacture is lace, of which
considerable quantities are annually sent to the metropolis.
The population of the borough and parish in 1831 was
3509. The education of the poorer classes is partly provided
for by a free-school for boys and a school of industry
for girls, the latter of which is supported by the subscriptions
of females.

[Facsimile Papers, &c.]

HONORIUS, son of Theodosius the Great, and younger
brother of Arcadius, was born at Constantinople, A.D. 384.
After the death of his father in 395 Honorius had for his
successor the Empress Pulcheria's younger brother, under
Stilicho, a distinguished general of the Imperial armies.
Honorius fixed his residence at Milan. For several years
after Stilicho was the real sovereign of the West; and he
also endeavoured to extend his sway over the territories of
Arcadius in the East, under pretence of defending them
against the Goths. He gave his daughter Maria in mar-
rriage to Honorius, and recovered the province of Africa,
which had revolted. About the year 400 the Goths and the
Huns, under Alaric and Radagaisus, invaded Italy, but
were repelled by Stilicho. In the year 402 Alaric came
again into Italy, and spread alarm as far as Rome, when
Stilicho was killed at Tolentia, on the banks of the Tiber,
completely defeated him, and obliged him to retreat to the
Noric Alps. After this victory Honorius repaired to Rome with
Stilicho, where they were both received with great applause.
On that occasion Honorius was invested by a decree the
fights of gladiators, and he also forbade, under penalty of
death, all sacrifices and offerings to the Pagan gods, and
ordered their statues to be destroyed. In the year 404
Honorius left Italy, and, for some time, transferred his
court, making it the seat of the empire, like another Rome,
in consequence of which the province in which Ravenna
was situated assumed the name of Romania, Romaniola, and
afterwards Ravenna. In the following year Radagaisus again invaded Italy with a large
force of barbarians, but he was completely defeated and put
to death by Stilicho, in the mountains near Fessula, in
P. C., No. 759.

In the next year the Vandals, the Alani, the Alemani, and other barbarians, crossed the Rhine, and invaded Gaul. A soldier named Constantine revolted in
Britain, usurped the Imperial power, and, having passed
over into Gaul, established his dominion over part of that
country, and was acknowledged by Honorius as his col-
league, with the title of Augustus. Stilicho now began to
be suspected of having an understanding with the barba-
rians, and especially with Alaric, to whom he advised the
emperor to pay a tribute of 4000 pounds weight of gold.
Honorius gave an order for his death, which was executed
at Ravenna in August of the year 408. Historians are
divided concerning the fact of Stilicho's treason: Zosimus
and the poet Claudianus consider it as a calumny. His death
however was fatal to the empire, of which he was the only
remaining support. Alaric again invaded Italy, but was
defeated at Rome, and at last took the city, and proclaimed the great At-
talus emperor. Honorius meantime remained inactive and
shut up within Ravenna. [ALARI.] The continual
indecisiveness and bad faith of Honorius, or rather of his
favourites, brought Alaric again before Rome, which was
this time plundered, A.D. 410. After Alaric's death his son
Aataulphus married Placidia, sister of Honorius, and took
possession of Spain. The rest of the reign of Honorius was
a succession of calamities. The Empire of the West was
now falling to pieces on every side; and in the midst of the
universal ruin Honorius died of the dropsy at Ravenna, in
August, 423, leaving no issue.

HONORIUS I., a native of Campania, succeeded Boni-
face V. as bishop of Rome, A.D. 626, with the sanction of
the Imperial Court which had ejected the pallium to the archbishops of York and Canterbury, but he
found great opposition among the Welsh clergy, who re-
sisted the metropolitan authority assumed by these newly-appointed prelates, and the supremacy claimed by the
bishops of Rome. Some members of the modern British church differed also from Rome in their manner of
conducting Easter. [Pinkerton's Enquiry into the Early
Bishop of Hereford, 1823.] Honorius has been compared
with Sergius, patriarch of Constantinople, who favoured
the doctrine of the Monothelites concerning the singleness
of the will in Jesus Christ. [Eutychians.] Two letters of Honorius to Sergius, which are preserved, contain pas-
sages apparently in favour of Monothelism, at the same
time recommending not to dwell too much upon those
subtle distinctions, for fear of creating scandal and schism.
In the sixth council of Constantinople the doctrine of Ho-
norius on this subject was condemned as heretical. Bartoli,
in his 'Apologia pro Honorio,' Baronius and others, have
undertaken to refute the charge of Monothelism brought
against Honorius. Palma in his 'Bibliotheca Graeca'
gives an accurate account of those writers who have treated
of the history of Monothelism. Honorius died A.D. 638,
and was succeeded by Severinus.

HONORIUS II., or Gomberto, bishop of Ostia, was
elected by the cardinals, A.D. 1124, after the death of
Calixtus II., while most of the bishops assembled at Rome
elected Tebaldus, cardinal of Santa Anastasia. Honorius
was supported by the powerful family of the Frangipani; and
the people being divided in opinion of the usurper, to avoid
further strife, waived his claim, and Honorius himself is
said to have expressed doubts concerning the validity of his
own election until it was confirmed by the clergy and the
people of Rome, which was consequently done. He refused
the investiture of the dukeries of Apulia and Calabria to
Roger, count of Sicily; and Roger having besieged the
pope within Benevento, Honorius excommunicated him;
but, after a short residence at Anagni, in 1127, Honorius
granted the investiture. He also confirmed the election of
Lotharius as king of Italy, and excommunicated his
rival Conrad. Honorius died at Ostia in 1130. His

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death was followed by a schism between two rival candidates, Anaelus and Innocent II.

HONORIUS III, Cardinal Cencio Savelli, succeeded Innocent III in 1216. He employed himself zealously, but with no great success, in restoring peace among the Italian cities, which, having become independent of the German empire since the peace of Constance, seemed to have no other notion of enjoying their independence but by waging war against one another. Another object of the pontificate of this pope was to present the Council of Verona, and especially Frederick II, to undertake a great crusade against the Musulmans in the East. Frederick promised everything, in order to be crowned, which ceremony was performed at Verona on the 13th of November, 1229; but afterwards Frederick, instead of proceeding to Palestine, tarried in Apulia and Sicily, in order to reduce those countries to complete submission. Honorius was meantime frequently at variance with the nobles of Rome, who drove him repeatedly from that city. After ten years of a very troubled pontificate Honorius died in March, 1227, and was succeeded by Gregory IX.

HONORIUS IV, Cardinal Giacomo Savelli, succeeded Martin IV, in 1285. He showed great zeal for the cause of Charles of Anjou against the Aragonese, who had occupied Sicily: and he even preached a crusade against the latter, qualifying it as a "holy war." The Aragonese however stood firm, and defeated the French on several occasions. Honorius died in April, 1287, and is said to have contrived, during his short pontificate, to enrich his family considerably. He was succeeded by Nicholas IV.

His person was very famous in our popular poetry, is supposed to have lived in the reign of Richard I. His epistle, said to have been inscribed on his tombstone near the nunnery of Kirklees in Yorkshire, and first printed it appears in "Dulce," 1414. The genuineness of which however has been doubted, makes him to have died "24 Dal. Dekembres" (perhaps meaning the 24th of December), 1247. Other copies have "14 Dal. November," and it could be properly November. He was the most distinguished in his time of those numerous outlaws who under the tyrannical government of the early Norman kings lived in bands in all the great forests, and combined a sort of chaotic government in the cause of the old national independence with the practice of deer-shooting and robbery. The chief residence of Robin Hood and his followers, as is well known, was the forest of Shirewood, or Sherwood, in Nottinghamshire; but he is said to have also frequented Barnet the in Yorkshire, and, according to some accounts, Plumpton Park in Cumberland. "The said Robert," says Stow, "entertained an hundred tall men and good archers with such spoils and thefts as he got, upon which as more were there five or six strong three times to give him the onse. He suffered no woman to be oppressed, violated, or otherwise molested: poor men's goods he spared, abundantly relieving them with that by which he took from the houses of rich men. (the Scottish historian) blameth him for his rapine and theft, but of all thieves he affirmeth him to be the prince, and the most gentle thief." He seems to have been as famous in Scotland as in England, as is evinced by the honourable mention made of him both by Major and by his predecessor Forcon. "The personal courage of this celebrated outlaw," Bishop Percy observes, "his skill in archery, his humanity, and especially his levelling principle of taking from the rich to comfort the poor, have in him made him the favourite of the common people." His exploits appear to have been a common subject of popular song, at least from the time of Edward III., though most of the numerous ballads in which he is celebrated are probably of more recent origin, and, at least in the shape in which we now possess them, are certainly comparatively modern. Of these pieces the most complete collection is that published by Mr. Ritson in his "Tunes of Old England," vol. iv. The whole of the ancient poams, songs, and ballads now extant, relating to that celebrated English outlaw, 1812, Lon., 1795. Prefixed to this collection are "historical anecdotes" of the same nature, which, in restoring peace amongst all the notices respecting the outlaw that the compiler's reading had discovered in manuscripts or printed books. It cannot be said however that much, or indeed anything, has been added to the real facts of his history by this interesting collection, though it may be considered more authentic than the manner in which the writer jumbles together all sorts of relations about his hero, and builds his chief conclusions on the most unauthoritative testimonies. A source of information upon which he greatly relies is a MS. in the Sloane Collection in the British Museum, which as regards all that relates to the origin and history of the outlaw, and especially that which relates to the Council of Verona in 1229; and as already mentioned, some of the old Latin chronicles speak of him as of noble lineage; but the account here gravely given of his name and genealogy is founded upon nothing better than a pedigree drawn out by Stukely and published in the "Psalms of Britania," No. 2 (1746), which appears to be a mere joke of that antiquity. It is as wholly unsupported by any sort of evidence as any pedgree in the Greek or Roman mythology. The ballads about Robin Hood usually describe him as a yeoman. One of these ballads tells us that he was born in the town of Locksley, or Laxley, in Nottinghamshire, and such is also the opinion of the MS. which is quoted above, and it goes on to about the year 1160. Ritson therefore sets down as an ascertained fact; but he at the same time admits that no place so named is now known either in Nottinghamshire or Yorkshire. Of Robin Hood's followers the most celebrated was John (who is said to have been Nailer); his chaplain, called Friar Tuck, whom some will have to have been a real monk; and his paramour named Marian. This famous outlaw and archer appears to have been subsequent to the reign of Robin Hood; and the first who is met with in the ballads is Adam Bell, a man of the cloth, and William of Cloudesley, who haunted Eagleswood Forest, near Carlisle, and whose exploits, of the same description with his, have been also a subject of many ballads. Of the origin of the word "Lives," a great deal has been said, and Percy's "Religions of Ancient English Poetry," 4th edit., vol. i., pp. 81 and 154; and Hawkins's "History of Music," vol. ii., p. 410.)

HOOD, WILLIAM, viscount, was born Dec. 12, 1724, at Butley in Somersetshire, of which parish his father was the incumbent. He was brought up to the navy and after passing with credit through the inferior ranks of the service, was appointed in 1737 to command the Antelope, 50 guns, in which he took a French 60-gun ship. In 1739, in the Vestal, 32 guns, he was again successful in capturing the Bellona, a French frigate of equal force. He served in the Mediterranean, under Sir Charles Saunders, and command of the Prince Alexander, when he was made a rear-admiral; and in 1763, commanded the West Indies, where he almost prevailed over an admiral of the same name, and Nelson, Persuade Religions of Ancient English Poetry, 4th edit., vol. i., pp. 81 and 154; and Hawkins's "History of Music," vol. ii., p. 410.)

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critics. For the following transactions see Rodney. The
brunt of the action of the 9th of April fell on the
van division, which Hood commanded; his own ship, the Bar-
fleur, had at one time seven, and generally three, antago-
nists. On the great day of the 12th his conduct was
equally distinguished. For these services he was created
an Irish peer by the title of Baron Hood of Catherington.
After this battle Rodney returned finally to England, lower-
down, and he remained in his return, in which he
retained till the peace of 1783. In the memorable West-
minster election of 1784 Lord Hood opposed Fox, and was
returned at the head of the poll. He lost his seat on being
made an under-secretary, and have polished a number of
elogs in 1793. In 1793 he was appointed to command the Medi-
terranean fleet. An arduous responsibility, both civil and
military, devolved on him, in consequence of the surrender
of Toulon to the British fleet by the French Royalty.
After a long siege the town was pronounced uncapable
[Bonaparte], and evacuated December 18. On this oc-
casion a severe injury was done to the French navy by
burning the arsenal, dock-yard, and fifteen ships of
war; in addition to which eight were carried away.
Early in 1794 Lord Hood applied himself to the expulsion of
the French from Corsica, which was accomplished chiefly
by the astonishing exertions of the British sailors on
shore. This was disingenuously attributed to the
Hospers (Nelson), for which Lord Hood received the thanks
of both houses of parliament. His health being much im-
paired, he returned to England at the close of the year, and
was again in the country and its interests. He was ap-
pointed governor of Greenwich Hospital, and raised to
the English peerage by the title of Viscount Hood of
Whitley. He afterwards received the Grand Cross of the
Most Honourable Military Order of the Bath, 16 March,
1816. His professional character has been thus given:
'To great bravery he united great seamanship: he possessed
at the same time a certain promptitude of decision, coupled
with extraordinary coolness, skill, and judgment. These
qualities, commingled with a complete knowledge of the
art of naval warfare, which he uniformly possessed; while all under his
authority yielded a ready obedience to a commander, who, when
necessary, always appeared foremost in danger, but never risked
with want of care; I really think that this was the most
imposing of his good qualities. [Obituary, Naval Chronicle.]

HOOD, ALEXANDER, VICOUNT BRIDPORT, younger brother of the above, was also brought up to
the navy, and also found many opportunities of signalising his
skill, activity, and bravery, in the lower ranks of his
profession. He was made rear-admiral in 1780, and in 1782
sailed as second in command of the fleet sent under Lord
Bailly to relieve the descent of the exiled Monarch. [Hood's
era.] He held the same rank in the Channel fleet, under the
same commander, in 1784; and bore a distinguished part in the
great victory of the 1st of June. In 1795 he engaged a French fleet off
L'Orient, and took three ships of the line; and in the
following year, his rank being raised to that of admiral, he
was again ordered to the command of the Channel fleet, which he
held till April, 1800. He was successively raised to the Irish
and English peerage by the titles of Baron and Viscount
Bridport, the last creation June 16, 1801. Lord Bridport
died at Bath, May 3, 1814. The title is now extinct.

HOOD, SIR SAMUEL, VICE-ADMIRAL, who also
was elected M.P. for Westminster in 1806, is not to be
confounded with Lord Hood's namesake and cousin. He
was in Rodney's battle of the 12th of April, served in the
Mediterranean under Lord Hood in the Juno frigate, and
distinguished himself at Toulon and in the reduction of
Corfu, and was appointed to the command of the
Dutch settlement of Groningen. [Hood's era.] For these
services he received the order of the Bath. He lost his
arm off Rochefort, in 1806, in an action in which he captured
three French frigates; but was again engaged in the ex-
pedition against Copenhagen in 1807. He was afterwards
appointed to the ships men excepted in the action of
Zborowski; but in the latter he died in 1814, much honoured, regretted, and beloved. He
was an admirable officer, cool and prudent, as well as fearless,
possessed of great professional skill, ready resources, and a
moral worth. [Obituary, Naval Chronicle.]

HOOD, CAPT. ALEXANDER, brother of the above,
another brave and meritorious officer, was killed in com-
mand of the Mars, in action with the French 74 L'Hercule,
which was captured April 21, 1798.

HOOFIT, PETER CORNELIUS, one of the most em-
iminent poets and prose writers of Holland, was born on
the 16th of March, 1581, at Amsterdam, where his father was
an eminent burgomaster. After studying at the high-school
at Leyden he travelled to Italy, the study of whose literature
and poetry chiefly occupied him during his stay there. On
his return to the Low Countries, he published his tragedy of 'Granida,' which, for elegance and
harmony of diction, is still considered one of the choicest
specimens of the Dutch language. Thus he may be said to
have polished a language all his own, and have
refined it, from the harshness and stiffness in which he found
it, into such melodiousness and flexibility, that he left
others more to imitate than to improve upon. He composed
several other poems, all of which are distinguished in some
degree as the founder of the Dutch stage. These, as
like those of his great contemporary Vondel, are all on the
Greek model, and interspersed with choruses. But it is
in his lesser productions, his Minnedigte, or satyryc com-
positions, that Hooffit displays most originality. Many of
these are replete with Anacreontic playfulness, naïveté, and
elegance. Few who have been eminent as poets have ob-
tained anything like equal celebrity as prose writers: but
Hooffit, both for the grandeur and, as he might be called,
in the still more difficult task of establishing a correct and
harmonious style of prose, of which his 'History of the Nether-
lands' is justly esteemed a model, remarkable both for its
accuracy and concreteness. When his wife died in 1624, his second survived him. In her
society and that of his numerous friends the last twenty years of
his life were passed in lettered ease and enjoyment. His
chateau at Hoorn was the rendezvous of all the most dis-
tinguished for talents. He died May 31, 1647.

HOOGHE, PETER DE, was born about 1643, but the
place of his birth is uncertain, as well as the master under
whom he studied. There are some accounts which represent
that Hooghie's style of painting is the most marvellous
force and clearness, and to avail him-
self, with the finest tact, of all the advantages of his art by
soft gradations and striking contrasts.' His pictures, of
which there are some capital specimens in England, sell at
high prices.

HOOGVEEN, HENRY, was born at Leyden in
January, A.D. 1712. His parents, who were in humble cir-
cumstances, were unable to give him the education of
which he was capable. He engaged in business, and was
employed in the Bank, where, like many other persons who have distinguished
themselves in after-life, he did not at first make much prog-
ress in his studies. But as he advanced to maturity, his
merit became apparent, and he was appointed at the age
of twenty co-director of the school of Groningen, and in
the following year (1733) was placed at the head of the
gygium at Woerden. He filled successively the office
of rector at the gymnasiums of Kullenburg, Breda, Dort,
and Delft, at the last of which places he died in 1781.
The principal work of Hoogveen is a treatise on the Greek
Particles (2 vols. 4to, Leyd., 1769), of which an
abridgment was made by Schütz (Leip., 1806). He also
published an edition of the Greek classics, with numerous
Notes; but neither this work nor his treatise on the
Greek Particles gives us a high opinion of his scholarship.
A useful work of Hoogveen, entitled 'Dictionarium
Philologicum,' was published in 1773, at the time of his
death at Cambridge, in 1806. This dictionary is mainly
a list of the words in the Greek language, arranged in
alphabetic order, according to their final letters. All
words with the same termination of case or parts of speech
are placed together; and thus a comparison of two words
may be instituted between them, which often
leads to valuable etymological results.

HOOGLY. [CALCUTTA: HINDUSTAN.]

HOODE, NATHANIEL, died in 1764. He was
ignorant of the Latin or any other language. He was a
Roman Catholic, enjoyed the friendship of Pope, and was
intimate with most of his eminent literary contemporaries.

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He is said to have lost his fortune in the South Sea scheme.

The work by which Hooke is principally known is entitled "The Roman History, from the Building of Rome to the Ruin of the Commonwealth," which was originally published in 4 vols. 4to, in 1677, and has since been frequently reprinted. This work is little else than a translation of the classical writers on Roman history; and in those parts which relate to the contests between the Patriarchs and the Protestant churches, the author has given the latter with as much partiality as Middleton, in his "Life of Cicero," had supported the side of the former. Hooke also published a work on the Roman senate in answer to Dr. Middleton and Dr. Godwin's "Treatises on the assembly," 1758; and translated from the French the "Life of Fénelon," 1723, and Ramsay's "Travels of Cyrus," 1739.

Hooke, Robert, was born July 18, 1632, at Freshwater, in the Isle of Wight, of which parish his father was then minister. After leaving Westminster School, where he had been placed under the care of Dr. Busby, he entered Christ Church, Oxford, in the year 1650; and shortly afterwards, having been introduced to the Philosophical Society of Oxford, we learn that he was engaged to assist Dr. Wallis in his chemical experiments, and that he subsequently served Mr. Robert Boyle in a similar capacity. In 1658 he became curator of the Society's books to the Botanical Society; and when that body was incorporated by charter the following year, Mr. Hooke was one of those Fellows who were first nominated by the council. (Thomson's Hist. of the Royal Society, appendix ii.) In 1664 he succeeded Dr. Dector as professor of geometry in Gresham College; and two years after, having produced a plan for rebuilding the city of London, which had been recently destroyed by fire, he received the appointment of city surveyor, and from that office he subsequently acquired considerable wealth. (Ward's Lives of the Gresham Professors, London, 1740, fol.) In 1668, Hevelius having sent a copy of his "Cometographia" to Mr. Hooke, the latter was so much pleased with the invention of his sidereal telescope, which led to a dispute wherein several of the members of the Royal Society afterwards became involved. (Hevelius.) In 1677 he succeeded Oldenburg as secretary to the Society. In 1691 he was created Doctor of Physic, by a warrant from Archbishop Tillotson. He died at Gresham College in 1702, in his sixty-eight year, exhausted by long continuance and meritorious exertions in the cause of science. His funeral was attended by all the members of the Royal Society, and his remains were interred in the church of St. Helen, Bishopsgate Street. In his person Hooke was short of stature, thin, and crooked. He had a keen eye and a quick ear, and often went to a cockfight in the morning, and frequently pursued his studies during the whole night. His inventive faculty was surprisingly great, but he was chiefly characterized by his mechanical turn and his great sagacity in discovering the general laws of phenomena, in proof of which it will be sufficient to give the following extract from a paper communicated by Dr. Hooke in 1674 (Phil. Trans., No. 101, p. 12), entitled "An Attempt to prove the Motion of the Earth from Observation," wherein he says "he will explain a system of the world differing from any yet known, but answering in all things to the common rules of mechanical motions, which system depends upon three suppositions. 1. That all celes- tial bodies whatever have an attraction or operating power towards their own centres, whereby they attract not only their own parts and keep them from flying from them (as we may observe the earth to do), but also all other celes- tial bodies within the sphere of their attraction. 2. That all bodies whatsoever that are put into a direct and simple motion will so continue to move in a straight line till they are by some more effectual power deflected and brought into a curve in the direction of the new line. 3. That these attractive powers are so much the more powerful the nearer lying the body whereto according on to their own centres. "This," observes Mr. Barlow (Ency. Metrop., art. Astrology), "was a very precise enumeration of the principles laid down by Newton, and which was left by Hooke too numerous to mention here; but the reader will find a complete list of those published during his lifetime, and also of his posthumous works, in Ward's Lives of the Gresham Professors."

HooKer, otherwise Vowell, John, an English historian, born at Exeter about 1592. His father, Robert Hooker, was mayor of that city in 1592. John Hooker was bred at Oxford, but whether in Exeter or Corpus Christi College, Wood was uncertain. He afterwards travelled in Germany, and studied law at Cologne. Soon after his return to England in 1544, he was made chamberlain of his native city, and being the first person who held that office. He was subsequently sent into Ireland upon the affairs of Sir Peter Carew, and was elected burgess for Athlone in the parlia- ment of 1571. He was mighty of the government of Ireland, and upon the death of Lord Deputy, was appointed lord deputy himself. He died in 1580.

Hooker, Richard, was born at Heavytree, near Exeter, about a.d. 1553, according to Walton, or about 1554, according to Wood. By the kindness of his uncle, John Hooker, chamberlain of Exeter, he obtained a better education at school than his parents could have afforded; and he was afterwards introduced by the same relative to the notice of Bishop Jewel, who procured him, in 1577, a clerkship in Corpus Christi College, Oxford. In November of the same year he received a bursary of the college, and in December, was made fellow and master of arts in 1577. In 1579 he was appointed lecturer on Hebrew in the university, and in October of the same year he was expelled his college, with Dr. John Reynolds, and three other fellows, but restored the same month. In about two years he took orders, and was appointed to preach at Paul's Cross. On this occasion he lodged with Mr. John Churchman, whose daughter Joan he married in the following year. This lady, as Dr. Walton says, "brought him neither beauty nor portion." His fellow- ship being vacated by his marriage, he was presented to the living of Drayton-Beuchamp in Bucks, by John Cherry, Bishop of Wadeston, in Nov., in 1582. He was frequently visited by Edward Sandys, who took pity on his poverty, and obtained from his father, the archbishop of York, a promise of pre- ferment for him. Through the archbishop's influence he was appointed Master of the Temple in 1586. Here he became more engrossed in religious disputations, and some points of doctrine with Walter Travers, afternoon lec- turer at the Temple, who had been ordained by the Pres- bytery at Antwerp, and held most of the opinions of the divines of Geneva. Travers being silenced by archbishop Whigfield, appealed to the privity-council, but without suc- cess. His petition to the council was published, and an-swered by Hooker. Travers had many adherents in the Temple, and the grave he built in the churchyard of Walton, which induced Hooker to commence his work on the Laws of Ecclesiastical Polity. Finding that he had not leisure at the Temple to complete that work, he applied to archbishop Whigfield, who presented him to Longfram, in 1589. He was accordingly presented to the living of Boscombe in Wilt- shire, in 1591. On the 17th of July in the same year he was made a prebendary of Salisbury. At Boscombe he finished four books of the Ecclesiastical Polity, which were published in 1594. On the 7th of July, 1595, he was presented by the queen to the living of Bishopbourne in Kent, which he held till his death on the 2nd of November, 1600. He was interred in the church at Bishopbourne, where a monument was erected to his memory by Sir William Cowper. Hooker's manner was grave even in childhood; the mildness of his temper was proved by his mo- deration in controversy; and his piety and learning procured him the approbation of all. The sum of his whole work is his defence of the constitution and discipline of the
Church of England, in eight books, under the title of 'The Laws of Ecclesiastical Polity.' This work obtained during the author's lifetime the praise of a pope (Clement VIII), and a king (James I), and has ever since been looked upon as one of the chief bulwarks of the Church against innovation and of ecclesiastical establishments in general. The publication of the first four books has been mentioned above; the fifth was published in 1597. He completed the last three books, but they were not published till after his death. Dr. Ralph Walton gives of the mutilation of the last three books is highly improbable, and no doubt can be entertained of their authenticity, though they are certainly imperfect. In 'The Laws of Ecclesiastical Polity,' Hooker left some tracts and sermons.

The latest editions of his works are those printed at the Clarendon Press, Oxford (1839), and the edition of Mr. Hampson, London, 1839. The latter contains the 'Christian Letter to Mr. R. Hooker,' occasioned by the publication of the 'Laws of Ecclesiastical Polity,' and Dr. Covel's 'Defence of the Five Books of Ecclesiastical Polity,' in answer to the 'Christian Letter.'

Isaac Walton's 'Life of Hooker, with Strype's Interpolations.'

HOOLE, J. [Tasso]. Hooper, J. Hooper, one of the most venerated martyrs of the Reformation, was born in Somersetshire about 1545, and educated at Oxford, where, by study of the Scriptures and the works of the foreign reformers, he was converted to Protestantism. On this account he found it expedient to go away from his native land, and to seek seclusion in Switzerland about 1540. For some years he led a wandering life, part of which was spent in Switzerland, the stronghold of the Reformation, where he met with a most friendly reception from the inhabitants. One day, as he was walking up the hill of the city of Edward VI, in 1547, he returned to England, and settled in London, where he was very diligent, and greatly followed and admired as a preacher. In 1550 he was appointed bishop of Oxford, and his assumption of the office was long delayed by his scrupulousness as to the use of the episcopal dress. By way of overcoming his reluctance he was confined to his own house, and finally committed, during some months, his patients, as by his own example, the most devout patients, were denied the use of the holy communion, and to obey them his influence in the church through various considerations, and exhorted him to compliance. Finally the matter was compromised. In 1552 he received the bishopric of Worcester in commendam.

While he was bishop, Wood says, he preached often, visited his dioceses, kept good hospitality for the poorer sort, and was beloved of many. But when Queen Mary began to reign, in July, 1553, he was purgative to London, and his name was included in the list of the Fleet, where, remaining some months, he was at length examined several times, and required to recant his opinions; but standing constant and resolute to them, was condemned to death. After suffering exceedingly and long, the 9th of February, at Gloucester, bearing his tortures, which were dreadful, with exceeding courage. His works are numerous, chiefly controversial. (Wood, Ath. Oxon.; Foxe's Martyrs; Burnet, Hist. Ref., Soc.)

HOOPING-COUGH. This disease, to which, on account of the violence of the cough that attends it, the Latin term 'Pertussis' has been applied, and which from the recurrence of this cough in paroxysms has also obtained the popular designation 'chink or kink-cough,' appears to have been unknown to the antients. No mention is made of it in the medical writings of the Greeks, Romans, or Arabs; but during several centuries it has prevailed in the various countries of Europe, and, from the frequency of its occurrence and the serious consequences of which it is sometimes productive, has much occupied the attention of physicians.

It commences with the symptoms of simple catarrh, and is indicated by cough and the expectation of a clear limpid fluid, by redness of the conjunctivae, a watery discharge from the eyes and nostrils, hoarseness, and occasionals of a rigor of a degree of fever, which in general however is very slight; the patient is languid and out of spirits, but is free from pain, or complains only of soreness in the anterior part of the breast. But in the course of a few days they are confounded with a common cold, but there is already some peculiarity in the cough, which occurs more in fits, and is more sonorous than in the latter malady. At the end of a period varying from one to two weeks the affection assumes a somewhat different character; the fits of coughing become longer and more frequent; each fit is commonly accompanied by a sensation of tickling in the larynx and trachea, during which the inspirations are irregular and incomplete, especially in children, whose countenances are at this time expressive of fear and anxiety. At the moment the fit comes on they cling with firmness to the persons or objects around them, mark of the suddenness, they suddenly start up and place themselves in a sitting posture. The effects of coughing are now repeated in such quick succession as to suspend almost completely the act of breathing; during the pain in the chest and inability to breathe, inspirations are of short duration, and incompletely taken. At times when the cough is momentarily interrupted by a prolonged inspiration attended by a peculiar 'whooping' noise, which has such a name for the affection, and which constitutes its characteristic symptom. In cases of obstruction to the circulation occasioned by these long continued efforts of coughing, the face and neck become swollen, and of a deep red or violet colour; the veins on these parts are distended almost to the point of erumpent and bathed in tears; occasionally the patient becomes completely exhausted; the fit of coughing is interrupted for one or more minutes; it then recurs with the same violence, and the patient seems to have the symposium of suffocation, when the paroxysm is terminated by one or two long and 'whooping' inspirations, and by the rejection of a limpid viscous fluid, which hangs in threads from the mouth, and which partially fills the chest, and inclines his body forwards. This fluid comes from the bronchi and pharynx, and sometimes also from the stomach; it is often mixed with portions of food which are rejected at the same time, and occasionally with particles of blood.

These paroxysms or fits of coughing continue for many minutes, and when they are very severe the patient's hands, feet, mouth, ears, and lips, and also the conjunctivae, become bluish; the eyes of the patient are sunken, and the arms and legs are often stiff, and erected; they recur at various and often very short intervals, generally however more frequently and with greater severity by night than by day, and they are excited by the slightest cause, as by the patient's name for the affection, or mental emotion. When the affection exists in a state of simplicity it is attended, even in this stage, with very little or no fever; the appetite continues as good as or better than in health, and the little patient, whose play was interrupted by the approach of the fit, immediately returns to it when the paroxysm is over; and during the intervals of these paroxysms often shows no other indications of disease than are furnished by the puffiness of the face and the redness of the conjunctivae, which, the patient in the interval of the circulation during the violent and long continued efforts of coughing has occasioned.

In the intervals of the fits the chest sounds well on percussion, and the patient breathe easily; but when the affection is heard pure, or mixed only with a little mucous froth on the posterior part of the chest, as in common croup, during the paroxysm breathing is almost completely suspended, and no respiratory murmur is audible except in the very short intervals which exist between the expulsive efforts of coughing; the prolonged and noisy inspiration which constitutes the pathognomonic character of whooping-cough seems to be limited to the larynx and trachea, and gives rise to no respiratory murmur audible on auscultation of the chest.

It is chiefly during this stage when whooping-cough becomes comparatively more dangerous, the disease being in the head or chest, on which its danger mainly depends. In the common cold at the breast the most common complication is cerebral congestion, giving rise to convulsions; in persons more advanced in life the visera of the chest become more frequently implicated, and the affection is to be regarded as a progressive pleurisy, which day by day spreads, and plagues that death, when it occurs, is generally attributable.

After the affection has presented the characteristic symptoms which we have described for a period which varies from two to three weeks to many months, the paroxysms become shorter and less frequent, and the cough ceases to be characteristic, but still continues to terminate in vomiting and in the discharge of sputum, not only to be regarded as a disease of the lungs, but as a disease of the trachea. The paroxysms become more and more rare, in some cases recur at regular intervals, and finally cease, but for some time
account of its solubility and the certainty of its operation, is the medicine best adapted to this purpose.

At the commencement of the disease, and as long as any febrile symptoms continue, the diet should be of the mildest description; afterwards a more tonic and nourishing regimen may be allowed, not only with safety but with advantage.

Cerebral congestions and inflammations of the lungs and pleurae, when they occur during the course of hooping-cough, must be treated in the same manner as when existing under ordinary circumstances.

HOOPOE. [PROMEROPIDAE.] HOORN, in the province of North Holland, the capital of the county of the same name, is situated on the Zuiderzee. It appears to have been formerly a strong fortress, and is still surrounded with ramparts on the land side, but they are not calculated for defence. There are numerous gardens close to the town, which has a remarka-

ble agreeable situation, the street is much broader, clean, and regular, and the houses very neat. There are some manufactures of woolen cloths and paper-hangings, and the inhabitants carry on a brisk trade, especially in cattle, butter, and cheese, for which last article Hoorn is a staple place. The exportation of the produce of the fisheries, especially herrings, is considerable; and shipbuilding is carried on pretty extensively. The number of the inhabitants is about 2,800. Hoorn is the native of the navigator Schouten, who doubled Cape Horn in 1616.

HÔPITAL, or HÔPITAL, MICHEL DE L' ; born in 1549, near Aiguerappe in Auvergne, was the son of Jean de l'Hôpital, physician to the Comté de Bourbon, of whom he hold a small estate. While l'Hôpital was studying law at Toulouse, his father was involved in the prosecution of the Comté, whom he accompanied to Italy; he was condemned to perpetual banishment, and his property was confiscated. His son, although only eighteen years of age, was arrested, banished, and kept for a short time in con-

finement. On being released, he went to Milan to join his father, who sent him to Pavia to finish his studies. l'Hôpital remained in that celebrated university six years, during which time the Comté de Bourbon died beneath the walls of Rome, and Jean de l'Hôpital found him-

self without a protector in a foreign land. He however took his son to Rome to see the coronation of Charles V., and it was in that city that the Cardinal de Grammont, the French ambassador, became interested in favour of the young man, and induced him to return to France, where he began to practise at the bar of the parliament of Paris. His merit, added to his having married the daughter of the lieu-

tenant-criminal Lévêque, procured for him a seat on the bench of the counsellors of the parliament, where, by his assiduity, his learning, and his probity, he won the favour of the cham-

cellor Olivier, and of Duchêtel, bishop of Tulle and li-

brarian to Francis I. L'Hôpital was named ambassador to the Council of Trent, which had been just removed by the pope to Bologna; but the discontents among the members of that assembly rendered his mission useless, and he was recalled by Henry II. in Flanders, for the daughter of Francis I., a princess fond of learning, invited L'Hôpital to her court, and recommended him to her bro-

ther the king, who appointed him superintendent of the finances. L'Hôpital endeavoured to check prodigality,

mismanagement, and corruption by which course he made himself many enemies. There was another subject upon which he differed from the court party, and that was the persecution to which the Protestants were subject. L'Hô-

pital, with the concurrence of his friends in the council, the Du Faurier, Paul de Foix, Christophe de Thou, and others, petitioned Henry II. to suspend the proscriptions and exe-
cutions until the newly-assembled council should decide on the religious controversy; but the king considered their remonstrances as rebellious, and he ordered Montgomery, the captain of his guards, to arrest Paul de Foix, Louis du Pau, Anne du Bourg, and other members of the parlia-
ment. Du Bourg, who had spoken the most boldly, was soon after hanged, and his body burnt. During the minority of Francis II, a special court, appropriately called the 'burning chamber,' was instituted to punish heretics. The Guises were so afraid that they shut themselves up. One of the Guise-
viers himself signed the ordinance by which the Duke of De
Guise was appointed lieutenant-general of the kingdom. The old chancellor died soon after, and Catherine de Medicis, alarmed at the power and intrigue of the Guise party, desired that integrity was to be insured, to replace him in 1566.
His office was not an enviable one in those times. He stren-
uously opposed the Cardinal de Lorraine, who wanted to esta-
blish the Inquisition in France, and he proposed instead of it to give to the bishops cognizance of matters of heresy within the dioceses. This resolution was proclaimed in the edict called 'De Romorantin,' which the chancellor laid before the parliament to be registered, observing at the same time that opinion might be subverted by accusa-
tions and reasoning, and not by violence and persecution.

L'Hôpital's next thought was that of assembling the states-general, which had not met for eighty years, but the Guises were afraid of the numerous powers which would be fac-
tial to their power. L'Hôpital accordingly petitioned him-
self with assembling the nobility and high clergy at Font-
ainebleau. Francis II, with his wife Mary Stuart, presided in person after the death of the young dauphin. The extent of the state of the kingdom, and the religious and civil discontents which prevailed. Coligny next presented to the king two petitions from the Protestants of Normandy, and Montfau-
con, bishop of Valence, and the archbishop of Vienne, strongly cautioned the king against the persecution adopted against the Protestants; they spoke of the indulgence of the primitive church on similar occasions; they complained of the per-
petual obstacles presented by the court of Rome to the con-
version of the French people, and they pleaded the cause of Christendom; and at last they proposed, as the only remedy to exising evils, the convocation of the states-general, and also of a national synod. The Guises consented to the first, but not to the second. In both cases the synod was not heard of.

Each of the three orders composing the states now chose its own orator, and it soon became apparent that no har-
mony could prevail in the assembly. The orator of the third estate, or commons, without being favourable to the Par-
lement, did not entirely neglect the conduct of the Catholic clergy. The orator of the nobility, reflecting on the wealth and luxury of the church, de-
manded freedom of worship for the Protestants. The orator of the lower clergy accused the Guises of high crimes and acts of oppression, and exhorted the king to look to their welfare. L'Hôpital, which abolished arbitrary taxes, regulated the feudal authority of the nobles, and corrected many abuses in the judicial system. Soon after, July, 1561, L'Hôpital obtained from the regent Catherine an edict, in the name of the king, that the houses of all princes suspected of heresy. By another edict Catholics were forbidden, under pain of death, from forcing an entrance into the houses of Protestants under pretence of dispersing their meetings. The parliament of Paris opposed these measures; but the chancel-
lor prevailed, and the edicts were enforced.

L'Hô-
pital was present at the conference of Poissy, where Bera and other Protestant theologians argued on matters of doctrine against the Cardinal de Lorraine and other Catho-
lic divines, but which ended, as such meetings generally end, in mutual recriminations. In January, 1563, L'Hôpi-
tal obtained from another assembly, consisting of deputa-
tions from all the parliaments of the kingdom, an edict of toleration granting liberty of worship to the Protestants, except within the walled towns, and under the condition that they should live in their own houses. After the death of the duke of Guise, 1563, L'Hôpital prevailed upon Catherine to grant the edict 'of peace,' by which, among other conditions, all prisoners on both sides were released, and the Protestants were allowed the exercise of their religion within the towns which they had occupied during the war. He also prevailed upon Catherine to declare the majority of her son Charles IX. whom he afterwards induced to make a tour through the various provinces of the kingdom. The chance of this opportunity of reading some sharp lectures to the various parliaments, especially that of Bordeaux, which had encouraged perse-
cution and civil war. In 1566 L'Hôpital again assembled the states-general, and the Catholics parliamemt, for a purpose similar to that of 1561. They took a strong hand in the affair of Moulins, where an ordinance was issued for the reform of justice, which is one of the best judicial regulations adopted in France previous to the reign of Louis XIV. After this, L'Hôpital, who had endeavored, during every cessation from actual fighting, to restore peace between the two parties. He thus became notorious to the Guises, who desired nothing less than the extermination of the Protestants. At last a bull came from Rome authorizing the king to levy 100,000 écus yearly on the revenues of the clergy, for the purpose and on the condition of rooting heresy out of his kingdom. The chancellor opposed the bull; he besought the king and his council not to impair the peace of France before the blood; he seemed to have prevailed, but soon afterwards the seals were taken from him, and he retired to his country-
bouse at Vignay, in 1568, deplored the calamities of his country, which had become his church. After some years of retirement the news of the St. Barthélemy massacre came to give the finishing blow to his exhausted frame. He was himself in danger of his life, but was spared through the influence of the duchess of Savoy, the former duke of

HÔPITAL, GUILLAUME-FRANÇOIS-ANTOINE
L', Marquis de Sainte Mesme and Count d'Entremont, commonly known as the Marquis de Sainte Mesme, was born in

Paris, in the year 1561, and died in 1744. He entered the army at an early age, and served during several years in the capacity of captain of cavalry; but the weakness of his sight and his desire to prosecute the study of the mathe-
maticians with less interruption than was compatible with active service, induced him to quit a profession in which he might otherwise have followed the footsteps of his ancestors. Among other academies which are related to the establishment of this last magnificent monument of French science, it is said that, at the age of fifteen, happening to be in company with a number of savans at the house of the duke de Roanne, when great admiration was expressed of a solution which Pascal had just given, he replied with the eclat of the cyclist, L'Hôpital expressed his belief that the ques-
tion was not beyond his own powers, and two days afterwards he supported his pretensions by answering it on different princi-

The name of the marquis de L'Hôpital is ini-
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mately connected with the early history of the differential and integral calculus. In 1691 no knowledge whatever of the calculus existed in France, and it appears to have been known only to Leibnitz, and to the brothers John and James Bernoulli. About this time John Bernoulli arrived at Paris, and spent some time at the residence of L'Hôpital for the purpose of giving him instruction in mathematics. He returned to Lausanne, or more distinctly determined [Cyclod], which Bernoulli had proposed as a challenge to the geométrics of the day, and to which, at the end of ten months, only four solutions had been given, by Newton in London, James Bernoulli in Switzerland, and L'Hôpital in France. Still however the calculus was regarded as a sort of mystery by most of those mathematicians by whom it was not actually opposed; and with the exception of the papers by Leibnitz dispersed in the Acts of Leipzig, there existed no work from which any information could be obtained. To remedy this defect he wrote and published his 'Analyse des Infiniment Petits,' which appeared in 1696, Paris, 4to. 'The appearance of this work,' says M. Boucharlat, marked the epoch of a great revolution in science. Mathematicians hastened to initiate themselves into the wonders of the infinitesimal calculus, and doubts concerning its truth were advanced only in the direction of the absurdities and prejudices that are the vour of ancient methods.' L'Hôpital has been accused by Montucla (Histoire des Math., vol. ii., p. 397) of not having sufficiently acknowledged his obligations to John Bernoulli, from whom he is said to have derived the principal methods that are given in the work just mentioned; but M. Boucharlat is of a different opinion. (See also Bernoulli, John.) The work itself has gone through several editions, of which the latest, we believe, is that edited by Lefèvre, in 1749, which was only 43 years in the making. In 1749, 43 years in the making. L'Hôpital left an 'Analytical Treatise on Conic Sections,' which was published in 4to. the following year, and was for a long time considered the best treatise on the subject.

HOPS. (Botany.) [Humulus.]—HOPS (Humulus lupulus of Linnaeus) are extensively cultivated for the flowers or seed-vessels, which give flavour and perfume to beer, by being boiled with thewort in brewing. They impart a pleasant bitter and aromatic flavour, and prevent the too rapid progression of fermentation. Beer which is well hopped will keep long and become very fine. It has been found that one of those artificial or long which make the common brewers' beer so much inferior in quality to that which is home-brewed.

Hops were introduced into England from Flanders about the year 1524. The most extensive plantations are in Kent, Sussex, Hampshire; but they are also cultivated in Worcestershire, Wiltshire, Hampshire, Gloucestershire, Worcestershire, and several other counties.

The hop is a slender climbing plant, which requires a very rich mellow soil and careful cultivation. It is very tender, and the produce is precarious, sometimes giving a great profit to the grower, and at other times failing altogether. The greatest quantity of hops is raised in Kent, but the finest quality in the neighbourhood of Farnham in Surrey. The soil of a hop-garden must be rich to a considerable depth, or made so artificially. The subsoil must be dry and sound; a porous rocky subsoil, covered with two or three feet of rich mould or loam, is the best for hops. The exposure should be towards the south, on the slope of a hill, or in a well-sheltered valley. Old rich pastures make the best hop-gardens. They should be dug two or more spits deep. At the edge of the plantation, and on the boundary, they will gradually decay and afford nourishment to the slender roots of the plants which strike deep. A very large quantity of the richest rotten dung, at least 100 cubic yards per acre, should be well incorporated with the soil by repeated ploughing, and it is entirely decomposed and produces that dark tint which is the sure sign of an abundance of humus. The ground should be prepared by laying it up with the spade in high ridges before winter, to expose it as much as possible to the morning sun. A succession of green crops, such as rye cut green or fed off with sheep, early turnips fed off in autumn, or spring barley, are an excellent preparation, by cleaning the land. It is better to two or even three years in preparing the land and getting it perfectly clean, than to plant the hops in bad land and suffer them to rot in the ground.

The young plants are raised in beds, and may be raised from seed; but it is more usual to plant the young shoots which rise from the bottom of the stems of old plants. These shoots, when they are from 12 to 15 inches high, are cut off and planted in the nursery-bed. Care must be taken to have only one sort of hops in a plantation, that they may all ripen at the same time; but where there are very extensive plantations it may be advantageous to have an earlier and a later sort in different divisions, so that they may be picked in succession. The varieties most esteemed are the Grape Hop, the White Vine, and the Golden Hop. The ground having been prepared for planting, it is divided by very parallel or square drills, or a foot apart, and inserted into the ground along these lines at six feet distance from each other, so as to alternate in the rows, as is frequently done with cabbage-plants in gardens. At each stick a hole is dug two feet square and two feet deep, which is filled lightly with the earthy dug out, together with a compost prepared with dung, lime, and earth, well mixed by repeated turning. Fresh dung should never be applied to hops. Three plants are placed in the middle of this hole, six inches saucer, forming an equilateral triangle. A watering with liquid manure greatly assists their taking root, and they soon begin to show bines. A stick three or four feet long is then stuck in the middle of the plants, and the bines are tied to these with twine or the shreds of Russia mats, till they lay hold and twine round them. During their growth the ground is well hoed and forked up around the roots, and some of the fine mould thrown on them. The rows of hops should be alternated, so that new hops may be picked from these young plants in the autumn, but in general there is nothing the first year. Early in November the ground is carefully dug with the spade, and the earth being turned towards the plants, is left so all winter.

In the second year, early in spring, the hillslock around the plants are opened, and the roots examined. The last year's shoots are cut off within an inch of the main stem, and all that are not quite close to the crown are agreeable vegetable for the table, dressed like asparagus. The earth is pressed round the roots, and the cut parts covered so as to exclude the air. A pole about twelve feet long is then firmly stuck into the ground near the plants; to this the bines are led and tied as they shoot, till they have taken hold of it. If by any accident the bine leaves the pole, it should be carefully brought back to it, and tied; if three of these happen, the pole should be at least as long as the bine has acquired some height. The ground being well hoed and the earth raised round the plants, the produce this year will average 4 cwt. per acre, if the season is favourable.

Some of the bines are now dug, and the ground thinned before winter; others prefer doing it in spring, in order not to hasten the shooting, which weakens the plants. The same operations of pruning the shoots, manuring, and placing poles, which were performed the preceding year, are carefully repeated. Particular attention is paid to proportion the length of the poles to the probable strength of the bines; for if the pole is too long, it draws up the bine, and makes it bear less; if it is too short, the bines entangle when they get beyond the poles, and cause confusion in the picking. In September, the flowering containing the seed will be of a fine straw colour, turning to a brown; it is then perfect, and from this will be dried for hops, that are then called vert. No time is now lost, and many hands are procured as can be set a-picking; great numbers of men and women go out of the towns in the hopping season, and earn good wages in the hop plantations. During the picking they sleep in barns and out-houses, the bines being taken down, and the stems cut 3 feet from the ground; if they were cut shorter it would weaken the root, by causing it to bleed. The poles are laid sloping over a frame of strong planks, 6 feet long and 2 feet wide, with legs 3 feet high: this is called a bin. A piece of coarse cloth is fixed to this frame by hooks, so as to form a bag, which does not reach the ground. Three men or women, for four bines, are the necessary number of the force. The pickers pick the hops from two poles at a time. Where they are very careful of the quality of the hops, as at Farnham, they divide them into three sorts: the green, which are not
quite ripe; the light yellow-brown, which are in perfection; and the very dark, which are past their prime. Some go even further, and make several qualities according to colour and fragrance; for this purpose there are several baskets. The hops must not be put into a shed or barn without the door being left open, lest otherwise the hops might become musty, or take up too long drying, and lose their fragrance. The hops when picked are dried on a hair cloth in a kiln. When they appear sufficiently dry at the base, they are then put into a shed, or by special arrangement, some hop-driers that the turning of the hops is apt to injure them, and that it is best not to do so; but in order that the upper part may be dried equally with the lower, a wheel cover plate is laid on the bottom of the hop, on the hair cloth, to within a few inches of the surface; this reverberates the heat, and the whole is dried equally. The heat must be carefully regulated, in order that it may not alter the colour of the hop. When the leaves become brittle and rub off easily, they are sufficiently dried. They are then laid in heaps on the floor, where they undergo a very slight heating. As soon as this is observed, they are bagged. This is done through a round hole 25 or 30 inches in diameter, made in the floor of the loft where the hops are laid. Under this hole is a bag, the mouth of which is drawn through the hole, and kept open by a hoop to which it is made fast. The hoop is sometimes larger than the hole, and the hops are packed in the corner of the bag, and there tied firmly by a cord. A bushel or two of hops are put into the bag, and a man gets in to tread the hops tight. The bag does not reach the whole amount of hops in the loft, as the men more are continually added till the bag is full. It is now taken off the hoop, and filled up with the bands at as tight as possible. The corners are stuffed as soon as the mouth is nearly closed; the leaves and hops come brittle, and sewn closed and tight; it is stored in a dry place till the hops are wanted for sale.

The crop of the third year will average 8 cwt. per acre. In some very extraordinary seasons on good land, 15 cwt. have been picked per acre; in Flanders, where they manure with urine and the emptiness of privies, this is not an uncommon produce. Rape cakes, malt dust, and woollen rags are used with good success in hop-gardens; bones have been tried, but with an uncertain result.

The hop is a dioccean plant, i.e. some of the individuals are male plants, and others female, which are respectively flowers of a different construction and of different habits. The male or staminiferous flowers, which grow on stalks quite distinct from the female flowers, prepare the pollen, or fertilizing dust, and afterwards wither away, when the pollen grains are scattered on the anthers, and are afterward transmitted to the air, to be by it conveyed to the female flowers. The female flowers are in the form of strobili, or cones, consisting of scales, which have at their base the germ of the future hop, which have the habit of expanding, and the scales of the fruticose cones do, more particularly after the fertilization of the ovule, or future seed, by a quantity of the pollen falling upon it. Though the pollen, from its extreme lightness, can be wafted to a considerable distance, and some seeds in each cone may be so fertilized, yet it would be well to rear a number of the male plants among the others, or along the hedges of the hop-gardens, to ensure the fertilization of all the seeds. But as the farmers observe that the flowers of the male (tumed in Kent, seceding, blind, or wild hop; in Sussex, buck or cock hop) wither away, they generally extirpate them at the digging season, as unfruitful every where. That this is not the case and may be proved in various ways, but an appeal to the result of an opposite practice is the most convincing. A bushel of hops, collected from plants of the fourth year, raised from seed, weighed 36 pounds, there being male plants; a seed in the picking, and the plants were raised from cutting weighed 35 pounds; while a bushel, grown in a garden where the male plants were always eradicated, weighed only 22 pounds. Besides the greater quantity of hops thus obtained, the aroma is much greater (the lupulin, on which the second depends, is considered by Planché to be the unappropriated pollen dust which has alighted on the scales of the females), and the strength of the bitter much greater. After the period when the males have elaborated the pollen, and the strobili of the females begin to enlarge, the males may be cut down, and the stalks employed to make cordage for hop-hoops against the following harvest. In 1760 the Society of Arts awarded premiums for cloth made from the hop-bine. (Lance's Golden Farmer, London, 1831.)

The poles are an expensive article; those of chestnut are the most durable, and also the dearest. They should be cut and stored during winter; when this cannot be done, they are placed on end in the form of a cone, leaning against each other. If the tops of these cones had a cap of thatch, it would greatly protect them from the weather: a well-covered cone will be worth while to soak them in a solution of corrosive sublimate, according to Keen's patent, remains yet to be proved; but if it should preserve them, every extensive hop-grower should have a tank for the purpose.

Besides the use of hops in brewing, they produce a bitter infusion and a tincture which are valuable in medicine for complaints in the stomach. A pillow made of hops has been used with success to produce sleep, where opiates had failed. The excise duty upon hops is 18s. 6d. per cwt., and collected from the grower. From this circumstance has arisen the practice of quoting the probable duty of all the hops grown in England as an index of the probable result of the crop. The price of hops fluctuates greatly, and there are extensive and sometimes ruinous speculations in this article. Weyhill fair, near Andover, is the greatest mart for hops, and the remittance in 1837 of £30,000 amounted to 310,794 l. 4s., of which nearly one-half was contributed by the county of Kent; Sussex was the next in amount, and then Hereford, Worcester, and Hampshire. But the produce of the crop is shared among all the counties in proportion to their cultivation. A reduction, as indicated by the duties, will be best shown by the following statement of the number of acres of land in Great Britain under cultivation of hops in the year 1837, and the amount of duty chargeable on the produce in each of the Excise districts.

<table>
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<tr>
<th>Districts</th>
<th>Number of Acres</th>
<th>Amount of Duty</th>
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<tr>
<td>Barnstaple</td>
<td>63</td>
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</tr>
<tr>
<td>York</td>
<td>1</td>
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56, 323  310, 794  4  0

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HORAPOLLO, or HORUS APOLLO, the author of a treatise on Egyptian Hieroglyphics. Several writers of this name are mentioned by Suidas, Stephanus of Byzantium under Phenebathia, Photius (p. 366. ed. Bakker), and Eustathius (12); but it is doubtful to which of them the treatise on Egyptian Hieroglyphics should be ascribed. According to the inscription, which is found in most MSS., the work was originally written in the Egyptian language, but was translated into Greek by Philib. He was the name of one of the Egyptian deities, who was considered by the Greeks to be the same as Apollo. (Herod., ii. 144-156.) We learn from Lucian (Pro Imag., sec. 27) that the philosopher Aristotle was converted to the worship of their gods. But whatever opinion we may form respecting the author, it is evident that the work could not have been written before the Christian era, since it contains allusions to the philosophical tenets of the Gnostics. The value of this work in interpreting existing hieroglyphics has been differently estimated. Champollion, and Leemans, in his edition of the work, are disposed to attribute greater importance to it than former critics had been willing to allow.

This work was printed for the first time by Aldus (Venice, 1505), with the fables of Aesop. The best editions are by: Mercier, 1551; Heschenius, 1593; De Pauw, 1727; and Leemans, Anst., who has dispensed with his introduction to the edition and authorship of the work.

HORARY (Astronomy). The horary motion of the sun or a planet is the arc which it describes in one hour, or the angular distance traversed in a very short period of time.

HORATIUS FLACCUS, QUINTUS, was born at Venusia, or Venusium, December 8, a.c. 65, during the consulship of L. Aurelius Cotta and L. Manlius Torquatus (Carm. iii. 21, 1; Epod. xiii. 6). His father, who was a Sicilian, and an adherent of the party of the optimates, was a coactor* (1 Sat., vi. 6, 86), with which he purchased a farm in the neighbourhood of Venusia, on the banks of the Aufus. In this place Horace appears to have lived till his eleventh or twelfth year, when his father, dissatisfied with the country school of Flavius (1 Sat., vi. 72), removed with his son to Rome, where he was placed under the care of a celebrated schoolmaster, Orbilbus Pulpillus, whose life is described by Suetonius (De Iul. Gr. c. 9). After studying the ancient Latin poets (2 Ep., i. 70, 71), Horace learned the Greek language (2 Ep., ii. 41, 42). He also enjoyed during the course of his education the advice and assistance of his father, who appears to have been a sensible man, and who is frequently mentioned by his son with the greatest esteem and respect (1 Sat., iv. 105-121; vi. 78-89). It is probable that soon after this period assumed the virila, at the age of about seventeen, he went to Athens to pursue his studies (2 Ep., ii. 43-45), where he appears to have remained till the breaking out of the civil war during the second triumvirate. In this contest he joined the army of Brutus, was made a member of the bank of a mint, and was present at the battle of Philippi, n.c. 42 (Carm. ii. 7, 9). Though the life of Horace was spared, his paternal property at Venusia was confiscated (2 Ep., ii. 49-51), and he repaired to Rome with the hope of obtaining a living by his literary exertions. Some of his poems attracted the notice of Virgil and Varus, who introduced him to Maecenas, whose liberality quickly relieved the poet from all pecuniary difficulties. (1 Sat., vi. 24-62; Epod. ii. 31, 92; Carm., ii. 18, 11-14; Carm., iii. 16, 37-38.)

We are informed by Suetonius, in his life of Horace, that he purchased a place as clerk in the treasury. From his intimacy with Maecenas till the close of his life Horace appears to have enjoyed exemption from all cares: he was intimate with Virgil, Tibullus, and other distinguished literary men in Rome, and was a great favourite of his patron Maecenas and also of Augustus. He resided principally in Rome, or at his country-house in the Sabine valley, which had been given him by Maecenas. He also had in the latter part of his life another country residence at Tibur, or, as it is also called, Tusculum. The fact of his living in a house at the last place, though denied by some critics, is abundantly established by many passages in his works. (Carm., i. 7, 10-14; ii. 6, 5-8; iii. 4, 21-24; iv. 3, 10-12; 1 Ep., vii. 20. 2) Horace died on the 27th November, n.c. 8, when he had nearly completed the 50th year of his age. Many critics have maintained that each ode, each satire,

*s A coactor was a servant of the money-brokers, who attended at sales by auction, and collected the money from the purchasers.

s &c., was published separately by Horace; but Bentley, in the preface to his edition of the poet's works, argues from the works of Suetonius, the practice of other Latin poets, and the expressions of Horace himself (Carm., i. 1; ii. 20; iii. 30; Epod., xiv. 7; 1 Sat., x. 92; ii. 1; Ep. i. 1; 20), that his works were originally published in books in the order in which they now appear. He maintains that the first book would have been the first book of the first second book n.c. 35—37; the Epodes n.c. 32—31; the first book of Odes n.c. 30—28; the second book of Odes n.c. 26—25; the third book of Odes n.c. 24—23; the first book of Epistles n.c. 22—21; the second book of Epistles n.c. 19—18; the fourth book of Odes n.c. 17—15; the second book of Satires and the Epistle to Piso, called De Arte Poetica, were written last, but at what period is uncertain. The works of Horace have been printed in this order by Mr. Todd, under the title of "Horace Restitutus," and by Mr. Leake, and in the edition of Horace arranged in chronological order, Camb., 1832, 2nd edit., 1837, with a preliminary dissertation, in which he brings forward many reasons for adopting the order of Bentley.

The poetry of Horace is differently estimated according to the taste of each individual. In our opinion the Satires and Epistles, which are familiar moral discourses, and far more worthy of the name of poetry, according to the usual acceptance of the word, are by far the most valuable of his works. The Odes, which for the most part are little more than translations or imitations of the Greek poets, are of the same general character, and serve only to depict the stronger and more powerful feelings of human nature. The best are those in which the poet describes the pleasures of a country life, or touches on the beauties of nature, and has had the most intense and exquisitely refined of the most exquisite relish (Epod. 2); nor are his lyrical productions altogether without those touches which excite our warmer sympathies. But if we were to name those qualities in which Horace most excels, we should mention his strong good sense, his spirit of criticism, his ironical and satirical style, his sarcastic comparison of the arts of Greece with the arts of Rome, and his indication of the favourite, or rather, the preposterous character of our modern poets of taste. Many readers, we are aware, attribute still greater merit to the poetry of Horace than we are disposed to allow.

The following are the most esteemed editions of Horace: —Lambert, under the title of Horace Restitutus, or the Books of Horace, 1713; Sanadon, 1728; Mitscherlich, 1800; the edition of Baxter, edited by Gesner and Zeune, frequently printed; Döring, 1826-9; Braunhard, 1833. Horace has been translated into almost all the European languages, both in prose and verse. A few of the Odes and Satires have been well translated into English; but there is no good translation in English of the whole of his works. That of Francis (4 vols., 1795) is the best. For the translation of the Satires, Hordein, a peculiar vegetable product found by Proust in barley. It is a yellowish powder. When treated with nitric acid it yields oxalic and acetic acid, and traces of a bitter matter. Hordein is insoluble in water, and Proust manufactured a dye from it. The amount of this substance, malt contains only 12 per cent. It is not found in pearl barley, and is therefore supposed to be contained in the husk.

HORDEUM, the genus of plants to which the corn called Barley belongs. It is distinguished from Triticum, or the Wheat genus, by its spikelets having only one perfect floret in each, and by its glumes being somewhat unila
dinary, and bearded; Rye, or Secale, differs in having two perfect florets to each spikelet, and in the same additional circumstances as Triticum. As many as fifteen species of Hordeum are distinguished by Professor Kunth, the latest writer on the subject, and the same number of species occurs in many varieties. The species are found wild in various places in both the Old and New World: as many as eight inhabit America. In the application of their botanical and expressions, the names of these species are divided, one writer distinguishing four species, another six, and some a greater number. It does not appear possible to determin

One flowered spikelets of Barley grow in threes, on opposite sides of the ear. If all the spikelets of the ear have a single flower, the head is usually arranged in six lines or rows; these rows may be very distinctly arranged, as in H. hexastichon, or they may be disposed in an irregular manner, as in H. Biglirian.
But if the lateral spikelets of each parcel are imperfect all along the ear, the middle spikelet alone producing a grain of corn, the grains in that case will be in two rows only, as in *H. distichum* and *H. Zeaestron*. Of these two distinct forms, there are some in which the grain adheres to the paleae, or husk, as in the common Barley, and others in which the grain is free from the husk, as in naked Barley. It is generally supposed that Barleys of the second kind are mere varieties of those of the first kind; but there is no proof of the identity of either, and the probability is against it. These characters and a few others being attended to, cultivated Barleys may be arranged under the following heads:

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**Two-rowed Barleys.**

1. *H. distichum* (Linnaeus, *Sp. Pl.*, 125). Ear cylindrical; awns almost parallel with the ear; grains adhering to the husk. This is the common summer Barley of England, and that which cultivators seem to prefer; its ears are not so large as those of naked Barley, which are much superior to it in fertility. It is commonly stated to be a native of Tartary; Colonel Chesney found it wild in Mosopotamia, upon the banks of the Euphrates.

2. *H. Zeaestron* (Linnaeus, *Sp. Pl.*, 125). Ear conical; awns spreading in all directions as in Barley; grains adhering to the husk. From the spreading direction of the awns, the ears of this barley acquire a much broader figure at the top than at the bottom, on which account it has been called Battledore Barley; it also bears the name of Sprat Barley. It is little cultivated in England, because of the shortness of its straw; its native country is unknown.

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**Six-rowed Barleys.**

4. *H. hexastichum* (Linnaeus, *Sp. Pl.*, 125). Ear cylindrical; awns very long, rough, and rigid, and the awn in a manner spreading away from the ear; grains adhering to the husk. It does not appear in what way the *H. vulgare* of Linnaeus differs from this. Professor Lowe has justly remarked that there is no such unit of the species as described in every state. The common six-rowed Barley, by which Linnaeus defined his *H. vulgare,* and that all such appearances are merely imperfect states of *H. hexastichum.* The native country of this species is unknown; it is the bret, big, or winter Barley of farmers, and is particularly valuable for ripening quicker than the common two-rowed Barley; its grains are however lighter, and it is considered an inferior species to the last. To northern nations with short summers it is however invaluable.

5. *H. gymno-hexastichum* (Lowe’s *Elements of Agriculture*, p. 238). Ear cylindrical; awns very long, rough, and rigid; the awn in the manner of the supposed six-rowed Barley, grains adhering to the husk. The origin of this, the naked six-rowed Barley, is unknown. It is extremely productive, and in some parts of Europe it is reckoned the most valuable of all. The French call it, on account of its good qualities, *orge céleste.*

6. *H. Egicera* (Royle’s *Miss.*). Ears cylindrical; florets arranged in a confused manner, not in rows; awns soft, short, hooded, and bent downwards; grains loose in the husk. It is a curious species, found in the northern parts of India, and probably in Tartary, where the grains have been sent to England under the name of ‘Tartarian Wheat.’ Its appearance is more of that which than of Barley, and its naked grains assist the resemblance. It is however a genuine species of *Triticum.* It appears to be a productive plant, but little is as yet known of its quality in this climate.

Of most of the species there are many varieties, the most striking of which are called ‘Black Barleys,’ on account of the colour of their Coats. They are of such sufficient importance to require particular notice, except in works treating of agriculture in general detail. [BARLEY]

**HORIZON** (śceIn, bounding). The physical horizon is the apparent circle by which the spectator’s view is bounded when he is upon a level and uninterrupted plain, such as the surface of the sea. It differs from the astronomical horizon, or the circle of the earth to which the physical horizon dips, as it is called, or is not at the same level as the eye; and, secondly, because the astronomical horizon always supposes the spectator to be at the centre of the earth, and not at the surface. If AB represent a spectator standing upright, and C the centre of the earth, then if the circle VAX revolve round the axis BC, the physical boundary is the circle described by T, or TUV, and the astronomical horizon is the plane traced by CX (indefinably extended) drawn parallel to BD, or parallel to CB; and the angle DBT is called the *dip* of the physical horizon. In consequence however of the refraction of light, by which the rays are curved, as in the dotted line drawn from B, the physical horizon is thrown farther than in the explanation just given; for instance, to the dotted circle KLM. The effect of this is to make the distance AT greater by about its twelfth part. The rough rule for finding the apparent horizon at sea is, to take the 1/4 of the square root of the height of the spectator’s eye, in feet, gives the distance of the physical horizon in miles. Thus at a height of 100 feet, the horizon is 13 miles off.

The astronomical horizon divides the heavens into a visible and invisible part. Properly speaking it is the physical horizon which does this; but the distance of the fixed stars is so great, that the magnitude of the whole earth is but as a point, and the planes traced out by the revolutions of BD and CX may be confounded. It is not precisely the same thing with the planets, and least of all with the moon; but this belongs to PARALLAX. For the general use of the astronomical horizon, see SPHERE, DOCTRINE OF THE.

The plane of the horizon at any place is perpendicular to the direction of a plumb-line, or parallel to the surface of the earth at that point, and necessary to take into account in finding the altitude of any heavenly body, the physical horizon is, in tolerably fair weather, sufficiently well defined for the purpose, and, with proper allowance for its dip, is used accordingly. But in land observations with a sextant or other instrument requiring an horizon, the surface of a fluid (generally mercury) is used, which is called an artificial horizon, but might more properly be termed an artificial portion of a horizontal plane. A very slight knowledge of optics [REFLECTION] will show that the angle subtended at the eye by a star and its image in a fluid is double of the star’s altitude: this angle, then, being measured and halved, the altitude of the star is found.

HORMISDAS, a native of Frunit, succeeded Symmachus in the see of Rome, A.D. 514. Theodoric was then king of Italy, and under his wise administration the country enjoyed peace and prosperity. Theodoric made valuable presents to Hormisdus to adorn the basilica of the Vatican. Cassiodorus, a contemporary writer, speaks in his letters of the magnificence displayed at Rome at this time; and also of the fights of wild beasts given in the amphitheatre, especially on the occasion of the coronation of Flavius-Auricus Maximus, in which many of the fighters, or gladiators, as they were still called, lost their lives. Hormisdus repeatedly sent legates to Constantinople to the Emperor Anastasius II. and his successeur. In his reign he put an end to the schism between the Greek and the Roman churches, which had originated with the patriarch Acacius. [CSELIANUS I.]
A reconciliation was effected, at least for a time. Hornists died in the year 523, and was succeeded by John I. HORN, a musical wind-instrument, which in its primitive state, i.e. formed of the horn of an animal, or simply a shell, has been known from the most remote ages. Of the horns now in use, three are correctly denominated—the French Horn, the Bugle-Horn, and the Russian Horn. These are made of brass. The Basset-Horn (Corno Bassetto) and the English Horn (Corno Inglese), formed of wood, and partaking in no respect of what is generally considered the distinguishing character of the Horn, seem to be improperly named.

The French Horn, or now, par excellence, the Horn, is a tube of about ten feet, very narrow at top, widening considerably at the bottom, and bent in rings for the convenience of the performer, as well as to render it more portable. It is not provided with holes, as the flute, &c., the production of the various sounds depending upon the lips of the player, the more or less pressure of his breath, and the insertion of the hand in the bell, or wide end, of the instrument. As a simple tube, the Horn, governed by the laws of acoustics (Acoustics), yields only the generating note, or tonic, and its aliquot parts, or harmonics, and, of course, would be confined to one key, but for the contrivances just mentioned, by which the length of the instrument is adjusted to the key required. This consists in crook and shanks, or shifting pieces, added as wanted to the lower end of the tube, and thus the Horn may be employed in all keys.

Music for the Horn is always written in the key of C or the treble clef; and the key in which the instrument is to be tuned is indicated by the composer. Thus, if the piece be in b, the words "Corno in b" are prefixed to the horn part. Example, as written:

Horns in b.

The notes actually played are:

The natural scale of the Horn is that of the trumpet, but an octave lower. It is written as follows:

But the following are the sounds really produced:

By introducing the hand into the bell of the Horn, a tolerably good semitonic scale can be produced; and by a recent improvement, consisting of two valves added to the instrument, the performer can command a still more perfect scale of semitones.

The Bugle-Horn is a tube of three feet ten inches in length, doubled up in a small compass. The Keyed-Bugle, or a Bugle-Horn with keys, is that now in common use, the scale of which is as follows:

The Russian Horn is an unbeat brass tube, conical in shape, of various dimensions: the deepest toned is eight feet long, and nine inches in diameter at the wide end, and the highest is two inches and a half in length, by one at the wide end. The former gives A, an octave below the first voice in the base; the latter gives B, the third additional line above the treble; or—

Some of these horns, though not all, have keys, producing one or two semitones, but generally every note has its separate horn; and a band of Russian Horns counts almost as many individuals as diatonic notes in a scale of between four and five octaves.

Basset-Horn, or Corno Bassetto, see Basset-Horn.

The English Horn, or Corno Inglese, is a deeper-toned oboe, but of rather larger dimensions, somewhat bent, the lower end very open, and is to the latter what the basset horn is to the clarion; but the tone is still in favor of the violin. The tone of this instrument is extremely pathetic, and by the Italians is thought so much to resemble the human voice, that they sometimes call it the voice umana. The scale of the English Horn, which name it is most commonly known by musicians) is from A below the treble staff, to b above, or—

including all the semitones, except the lowest A.

HORN, CAPE. [CAPE HORN.]

HORNBEAM, the common name of the tree called Carpinus Betulus by botanists.

HORNBILL, HORNBILL FAMILY. The Buceridæ are a family of birds, the construction of whose bill arrests the attention at first sight, and ornithologists have been entirely agreed as to the situation which the form ought to occupy in the series.

It is not at all improbable, from the geographical distribution of the species, that some of the species were known to the ancients; but whether the Tragopan of Pliny and Solinus, or the Tragopemenes of Pomponius Mela, belonged to this genus is not clear. That the Rhinoceros bird of Heysehills and Varins was one of the species is not unlikely. Ailorandus, Dens, and Bontius give the form the same name, as do Ray and Willughby, the latter of whom gives two good figures of heads. Bontius also describes one of the species under the appellation of Corus Indicus, and another as Corus rostro cornu. Pether received the bill of one (which he figures) from Kamel, under the name of Calao. The description of the bird said by Jonston and others to have been killed as it was flying, when the Christians beat the Turks at the battle of Lepanto (Naupactum), agrees well with the characters of the genus.

Brison gives the Hornbills the name of Hydrocorax, following not improbably, Clesius, who speaks of one of them under the title of Corvus marini genus.

Linnaeus, in his last edition of the Systema Naturæ (15th), places the Hornbills, genus Buceros, under the Picæ, between the Toucans (Ramphastos) and Buphagæ. The former he defines to be genereus. Gmelin leaves Buceros in the same position.

Latham also places the Hornbills among the Picæ, Picæ, with walking feet.

Laçpède reduces the form far from the Toucans, placing it at the head of his Platypodes and in his 16th order (Bill
Dentilatae), with the Monotis, in his second division of his first subclass of birds, or those which have three anterior toes, and sometimes a hind toe, sometimes none.

M. Dunniensis's second family of his second order, Passe-caseus, or Passerine, or Passerine Birds, consists of the Hen, the Driades, the Oldworld-rumpled, including two of the Hornbills, Monotis, and Plant-cutters (Phytotoma).

Miller's Denitrates come between the Passerine Birds and the Monotis, belonging to his 2nd order, Ambulatores, or Walking Birds.

Cuvier places the Buceros at the end of the Syndactylous Passerine Birds; they are immediately preceded by the Toadies, or toad birds, to the last of which are come the Scansorial Birds (Les Grimpeurs), headed by the Jacamars (Galbula, Briss.), which are followed by the Woodpeckers. He speaks of the Buceros as large birds of Africa and the Indies, chiefly on account of their strong legs, which he calls their walking rams, and their feet, which are of the Bee-eaters and Kingfishers.

M. Vieillot arranges the Hornbills and Monotis in his third family of birds (Systeclinis).

M. Temminck introduces the Hornbills among the Omnivorous birds, the second order in his arrangement.

M. Vigors introduces the Buceros (Buceros) as a distinct group of his Contrastreetes. Fregilus, in the opinion of that ornithologist, by its curved and slender bill, leads immediately to the Birds of Paradise, which, in conjunction with the Epimachus, forms a family of Birds of Paradise, and here, Mr. Vigors thinks, we shall find the passage from the Corvus to the Buceros. He speaks indeed with considerable hesitation as to the situation of Epimachus, but he reserves all other matters for a more united species of the Buceros, among which, he remarks, the Buceros nautilus of Dr. Latham may be instanced.

We thus, says Mr. Vigors, "arrive at the singular family of Buceros, which seems to be referred to the part of the group, and its food and habits, as far at least as we can conclude from the very imperfect accounts which are transmitted of them. From the strength also of the formation of these birds, and the powers with which they are endowed, they seem to possess a title to a place in the vicinity of the group which is typical in the tribe. In one particular however we may detect a deviation from the more perfect structure of that type. The fore-toes of all are strongly united, and exhibit the typical character of the whole limb, as far as to the second articulation; an impediment which must considerably interfere with the free action of the member. This deficiency is, on the other hand, restrained by the very important and more delicate structure of the toes; an analogous defect, and an analogous mode of compensating for it, is observable in the Ostrich, a bird also, it is to be observed, closely allied to the typical group of its own family; and in both instances we may pronounce the deviation from the more regular or perfect conformation to be a defect rather than of the eye of the observer, an infringement upon what he would conceive to form the beau-ideal of the typical character, than a defect in reality. We may here delay a moment to observe upon the causes that assign so totally remote a station from the present to the Todida, Meropidae, and Halcyonidae, whose gossatorial feet, as they are technically called, are of the same structure that the Buceros. In the Toadies, in the deficiency, accompanied by a corresponding weakness of the whole member, is real, and of sufficient consequence to deprive the bird of the means of using its legs and feet to advantage. The former, or Passerine Birds, consists of the Driades, or Halcyonidae, which are of the wings, which are thus endowed with a more than usual share of strength, in order to afford the bird a more than usual assistance in the aerial mode of seeking its food which it is assigned by nature. In the Buceros, on the other hand, the gossatorial feet are accompanied by a superior robustness, which counterbalances their inferiority in form. And hence the family may consistently maintain its station in the vicinity of the more perfectly formed and typical groups of the Incessores which are now before us. The tendency, already observed, which opposite points of the circle in which a series of affinities is united have to approach each other, accounts for the resemblance here pointed out between these otherwise discordant groups, and serves to explain the reason why the analogouls relation between them has been mistaken for a relation of affinity by some systematic writers, it only remains for us to arrange all the gossatorial birds in one connected group. Besides the genus Buceros, Linn., the protuberance on the bill of which varies in almost every possible shape in which fancy can embody it, but in the Buceros family it is peculiar to this. Mr. Brison, which accords with the entire of that genus in its gossatorial feet, and with several species of it, as the genus now stands, in the curved but somewhat shorter and more attenuated bill, and in the less prominent protuberance on the lower mandible, the large and disproportionate bill of that family is carried on to the Ramphastidae, the first family of the Scansoriae, according to Mr. Vigors.

M. Latham arranges the Hornbills among the Syndactyline, the fifth family of his second order (Passe-caseus, or Passerine Birds), in company with the Bee-eaters, Monotis, and Kingfishers, &c.

In the remarks of M. de Blainville, as carried out by his pupil M. Lherminier, the Hornbills appear among the Normal Birds (first subclass), and as the fourteenth family, between the Kingfishers and the Toucans.

M. Leseur places the Buceros as the last family of his Incessores, or Grisemmates, arranging it in the third tribe (Syndactyline) of that first order. The other families of the tribe are the Bee-eaters, Meropidae, and Gossatorialii, and the Rock, Raptoidea.

Mr. Swainson arranges the Buceros under the Contrastreetes, together with the Corvus, Sturnidae, Fringillidae, and Meropidae, as the third and last species of the tribe of the Buceros, and in the inclusion of the bill in the Buceros, he observes that in some of the species that organ is without the basal protuberances, so that they bear the nearest affinity to the Toucans, belonging to the Scansorial tribe, which is joined to the Contrastral. He considers that among the Scansoriae the Buceros unites the two families in so perfect a manner as that by which the Toucans are blended with the Fringillistas through Priorites; and he remarks, that we should expect that a bird which might conduct us to the latter tribe of birds would be of large size, and that it would present us with some of the gay colours peculiar to the Toucans, both in its bill and plumage; but that its feet should no longer serve as a weapon for the destruction of insects, and before remarked, we see, in the little power possessed by the Toucans of climbing, that nature is about to quell the scansorial structure. There is good reason to believe, he thinks, that such a bird as this, the Buceros, is known to modern writers by a drawing executed in India, in the collection of Mr. Smith. Both Dr. Latham and Dr. Shaw, he adds, describe this bird under the name of the Crimson Hornbill, and he considers that the figure published by the latter carries internal evidence of its authenticity. Mr. Swainson sees in this bird the crimson colour, the long tail, and the dorsal collar, so prevalent in the genus Pteroglossus, joined to a miniature Toucan's bill, with a distinct band at the base, like the Ramphastos Toucan, yet with the feet of a Hornbill. That this bird, and probably other annectant species, will hereafter be discovered in the vast and still unexplored regions of the Amazon Archipelago, there is no doubt. He speaks of the Hornbills as a small family, of which perhaps the typical form is now only known; and he looks upon them as being as much isolated as the Toucans and the Parrots. He adds, that there are species of very enormous size, generally furnished with an appendage or excrecent on their top, the use of which, he says, is unknown; nor has he, adds, the internal structure of this member been fully ascertained. The feet, he remarks, are generally so short as to be barely detectable in many specimens. His opinion we had long entertained from theory, but it has recently been confirmed by a singular fact in their economy, communicated by an officer long resident in India. It seems
that all the species of Buceros he has met with in a live state are constantly in the habit of throwing their food up in the air and catching it before it is swallowed. This propensity Mr. Swainson considers to be an incipient development of the astriscorial economy. We have only to add, that Mr. Swainson does not admit into the family of the Buceriformes the Momota (Promites), which he places under a line drawn at the end of the family of Trogomyidae. (Classification of Birds, 1837.)

Organisation.

Some light will be thrown on the proper place of the bird in the animal series by the following account of the anatomy of a young Bucerous rhinoceros by Mr. Owen, now Hunterian professor to the Royal College of Surgeons. The subject died in the Gardens of the Zoological Society of London at the Regent's Park, and Mr. Owen's paper was read to the Society in 1833. The tongue was very short, of a triangular form, and very smooth. The air-cells were very large, and that in front of the neck contained the esophagus and the trachea. The esophagus, as in the Toucan, was very wide, and of nearly equal diameter as the gizzard. The gizzard was thicker in its coats and of a more elongated form than that of the Toucan: its cuticular lining was very tough, and disposed in longitudinal ridges. After the duodenal fold the remainder of the intestinal canal was disposed in two similar folds, and then extended along the middle line of the back to the cloaca. There were no ceca. The coats of the intestines were stronger than usual in birds, and the diameter of the canal was more considerable, diminishing however gradually from the commencement of the ileum, as far as the beginning of the rectum, and thence becoming wider to its termination. The whole length of the intestines was 5 feet; that of the bird, from the end of the bill to the vent, being 2 feet 2 inches, of which the bill measured 7 inches. The liver had the usual two lobes, of which the right was the largest. The gall-bladder was of considerable size. The pancreas, of an elongated slender form, had a small oval enlargement at its commencement at the lower end of the spleen, and a flattened oblong mass or head at the bottom of the duodenal fold: it accompanied the duodenum throughout its length, being folded on itself similarly to that of the intestines. Its secretion was conveyed into the intestine by three ducts; one from its head, which entered the duodenum at the bend of the fold; the others from the elongated lobes which terminated close together at the end of the ileum, and were little more than a line in width, and the ridges bounding it above and below were confined to the back part of the cavity. The bursa Fabricii (which Mr. Owen regards as analogous to the glandular pouch found in so many other classes) was of a triangular form, large, and surrounded, as usual, by a capsule of muscular fibres.

The muscles of the mandibles consisted of a digestivus, or of a muscle analogous to it, destined, as usual in birds, of a middle tendon, a temporal muscle of moderate size, and azygos externi and interni, proportionally more developed. There is also a strong ligament occupying the place of the masseter, and a second, destined to prevent dislocation backwards, which passes from the zygoma directly backwards to the condyle, or articulate depression of the lower jaw. Disproportionate, observes Mr. Owen, as this apparatus seems to the moving of so large a body as the bill of the Hornbill, it is yet fully adequate, the weight of that organ by no means corresponding with its size. The cavi- ties in the bones, the arrangement of the columns supporting their parietes, and the air-cells, produce at the same time lightness and strength.

With respect to the other parts of the skeleton, Mr. Owen particularly noticed the extension of the air-cells into the distal bones of the extremities. He remarked that Mr. Hunter observes how in the Pelican, the air passage not only into the ulna and radius, but 'into those bones which answer to the carpus and metacarpus of quadrupeds.' In the Hornbill Mr. Owen showed that the air passage also into these bones corresponded to the phalanges; and in the posterior extremity he demonstrated that it permeates the tibio, tarsus, and phalanges.

Mr. Owen concluded by some remarks on the affinities of the Hornbill as deducible from its anatomy. Its nearest approach is to the Toucan. The Toucan however, in the want of a gall-bladder, agrees with the Parrots; the presence of that organ in the Hornbill places the bird in more immediate relation with the Crows. The disposition of the intestines, in long and narrow loops, also agrees with the Raven. The tongue, so remarkably varied in form and use among the Woodpeckers, resembles in the Hornbill that of the carnivorous Birds. (Proceedings of the Zoological Society of London, 1833.)

Genus. Buceros.

Bill long, very large, compressed, more or less curved or falcated; base smooth, elevated, or rather surmounted by a casque or helmet-like protuberance; edges of the mandibles smooth or notched. Point smooth. Interior of bill, especially the upper mandible and casque, very cellular; mor- tise basal, on the surface of the beak, in a furrow, small, somewhat round, open, pierced in the corneous substance of the bill, covered at the base by a membrane. Feet short, strong, muscular; sole of the foot large. Wings moderate; the three first quills graduated; the fourth or fifth the longest.

Geographical Distribution of the Genus.—The Old World, Africa, India and its islands, New Guinea. Hhabitat, &c.—Bonitius in his description of his Corylus Indicus (Buceros Hydrocorax of Linnæus), a native of the Moluccas and Banda, says, 'More Corvus nostratrum gradaturn, indole a nostris corvis differt, quod non cadaver, sed pusillum nucibus axio node vocatur; isque insignia damnum infert. Caro eorum quoque deligata est, et asa saporos a pastu plano aromaticum habet (It walks like the crow of our countries, but differs much in disposition from our crows, inasmuch as it feeds not on carcasses, but most especially on nutmegs, and that greedily, doing a great deal of damage to them. Their flesh also is delicate, and when roasted has an aromatic flavour from their foot). Of the 'Corvus rostro cornuto' (Buceros Rhinoceros of Linnæus) he says that it lives on the carcases and intestines of animals, and that it awaits upon the hunters who kill wild cattle, boars and stags, to gorge itself with the entrails of those animals. With this, in his account of Bonitius his Indian Raven, says, 'It walks after the manner of our Raven, but differs from it in nature and disposition, in that it feeds not upon carrion or dead carcasses, but chiefly upon nutmegs, of which it is very greedy, making great destruction of that fruit, to the no small detriment of the owners. Its flesh is very delicate, and being roasted

* A section is figured in the article Stare, vol. iv., p. 257.
hath a plain aromatic relish, contracted from its food.' Of
the horned Indian Raven, or Topan, called the Rhinocerous
Bird,' he says, 'This horned bird, as it casts a strong
smell, so it hath a foul look, much exceeding the European
Raven in bignes.
' It lives upon carrion, and garbage,
t.e. the carcasses and entrails of animals.' Both these
passages are taken from Bontius, as the reader will per-
ceive. Cuvier considers them as omnivorous—' Ils
prennent toute sorte de nourriture,' and he states that they eat
tender fruits, hunt mice, small birds, and reptiles, and do
not even disdain carcases. The late Major-General Thomas
Hardwicke, who contributed so largely to our acquaintance
With Indian animals, in treating of Buceros galeatus (Linn.
Trusc., vol. xiv.) gives the following description of the
habit of the Hornbill. The progressive motion of the
birds of this genus, although their feet are formed for
walking, is always by jumping or hopping. I have kept
several species alive, and they all moved in the same man-
ner. In a state of nature these birds, in this part of India
(Malacca), live on wild fruits. In confinement they feed
freely on plantains and on boiled rice. At night they perch
with great security, though the largeness of the foot seems
better suited to rest on the ground.' M. Lesson sums up
the habits of the Hornibills thus:—Those of Africa live on
carrion; those of the East Indies seek for fruits, especially
nutmegs, and their flesh acquires from them a delicious
flavour. Their flight is performed by repeated strokes of
the wings, and the air which they displace, joined to the
clattering of their mandibles, occasions a great and very
disquieting noise in the forests, when the cause is unknown.
This noise, capable of inspiring terror, does not ill resemble
those flaws of rough and sudden winds ('grains de vent
brusques et subites') which arise so unexpectedly between the
tropics, and blow so violently. The Europeans established
at the Moluccas think that the furrows which are seen on the
hill of the Hornbills are the result of age, and that each
furrow signifies a year; whence the name of Jeravogel,
which they give to these birds. Mr. Swainson remarks
that the Hornbills are gregarious noisy beasts, generally of
a very large size, and are restricted to the Old World; that
they are omnivorous, feeding both on animals and vege-
tables; that some however seem only to partake of the
latter food; while others, upon the authority of Le Vaillant,
feed upon carrion. The Buceros cavatus dissected by
Mr. Owen was observed to be more attached to animal
than to vegetable food, and would quit any other substance
if a dead mouse were offered to it. This it would swallow
entire, after squeezing it twice or thrice with the bill; and
no castings were noticed. Mr. Owen however adds that
Petiver has borne testimony to its regurgitating habits.
Before we proceed to give examples of the family as
here stands, that is, consisting of the True Hornbills
alone, we may remark that if it should be clearly made out
that some species live entirely on vegetable food, while
others live on carrion, as has been asserted, there may be
good grounds for elevating such species to the rank of
genera; for such a total difference of food must in all pro-
bability be accompanied by a corresponding difference of
internal structure and of general habits. M. Temminck
may be considered as the author who has most success-
fully dissipated the obscurity in which the species were in-
volved; and to his elaborate and beautiful works we refer
the reader. We shall select as examples the following two
species.

Buceros Rhinoceros.—This species is to be found in most
collections, and though there may be some variety from age
and circumstances, the bill will be generally found to be
about ten inches long and of a yellowish white, the upper
mandible red at the base, the lower black. The horn, or
casque, varied with black and white. The body black, of
a dirty white below and posteriorly; tail about twelve inches,
the feathers white at the base and tip, black in the middle;
feet and claws obscure grey.

Locality, India and the Indian islands (Sunda, for in-
stance).

Buceros cavatus.—Throat, ear-coverts, circle round the
eye, and a narrow and at the occipital edge of the mid-
beard, black; neck of straw colour, the feathers of the
back of the neck elongated; body and wings black, greater coverts and quill feathers tipped with white;
thighs, upper and under tail-coverts, white; as is the tail
also, with the exception of a broad black band about three
inches from the tip; beck yellowish, inclining to scarlet at
the tip, under mandible black at the base; tars black.

(Gould.)

Food.—The food of the Buceros cavatus, like that of other
Hornbills, consists of fruits, berries, flesh, and even car-
rion; in short, it may be considered as strictly omnivorous.'
(Gould.)

Locality, India, Himalaya range, Java, and most of the
islands of the Indian Archipelago.

Buceros Rhinoceros.

Buceros cavatus.

HORNBLENDE. [AUGITE.] HORNBLENDE SCHIST. Under this term MacCul-
loch ranks a variety of mineral aggregates, in which hornb-
blende abounds, and which are mostly but not universally
of laminated structure. Hornblende schist is commonly
associated with gneiss, less frequently with mica schist, and
seldom forms alone any considerable mountain masses.
It follows the contours of gneiss, and is traversed like it by granite veins. (Glen Till.) Hornblende is rarely associated with argillaceous slate, as in Ben Lair, in Skiddaw, Cader Idris, and near the granites of Cornwall. In these cases, its stocky form may be the result of transformation of the originally untwisted layered masses, and such rocks may be considered 'metamorphites.' They are considerably different from the hornblende schists of Glen Tilt, Tona, and Rossaich, at Rostaig.

HORNCastle. [Lincolnshire.]

HORNDON. [Essex.]

Horn-work, a fortification usually situated in advance of the principal works of a place, on the front of the polygon, in which case it is supposed to be a rampart on the opposite side of the polygon, supposed to surround a regular fortress; and on each flank a line of rampart returning from the nearest extremity of the front terminates on the direct engine's to give a ravelin on the enceinte of the fire. Place. The work is generally strengthened by a ravelin placed before the curtain between its two demi-bastions, and by a covered-way and glacis beyond the ditch; these relations so great as those of the polygon, which cover the front on the ravelin on the enceinte of the fire. Place. The invention of horn-works is referred to the commissioners of the seventeenth century. At first the plan of their rampart had simply the form of the letter M, the upper point being directed towards the country like horns; from which circumstance the work obtained its name. They appear to be impossible at first sight only for the purpose of strengthening a place in daily expectation of a siege, when there were no outworks and when the bastions were small and very distant from each other. They were then placed in front of the Schilling, or on the fire from whence the approach of the enemy towards their flanks might be opposed.

But the feeble defence which was made by such works was increased, and the work beyond the principal fortress some position from whence, during the siege, the enemy might be annoyed in forming approaches, or which, if gained by the latter, might enable him to command the ground, or immediately improve and extend the work itself, to the horn-work the form first described, and to extend it considerably towards the country. Being however regarded as a work of secondary importance in the defence of a place, the length of its front was seldom or never as great as that of the polygon, which is always considered as of the same nature, and its fortifications were of necessity limited. The lengths of the branches or wings were regulated by the necessity of having the ditch and covered-way in front of the salient angles of the demi-bastions, which is the object of a fire and of the lateral works towards which the ravelins of the wings were directed; and occasionally the latter were broken, on the plan, so as to form short flanks from whence a fire might be directed towards the nearest of those salient points. That which has been found occasionally useful is too frequently, by an improper application, converted into a positive evil; this was the case with the works now being described; and at a very early period the multiplicity and injudicious disposition of them were subjects of animadversion among the best engineers. It often happened that they were constructed at great expense in situations where no work could be gained by them, and so close together that the defenders of their branches could not have avoided firing upon one another.

In proportion as the means employed in the attack of places were increased the earlier fortresses became incapable of affording room for the buildings necessary to lodge the troops, and contain in security the quantities of artillery and stores which the corresponding augmentation of the means of defence demanded; and hence it was not at first found necessary to increase the extent of the advanced works about a place. This was done, at first, not by enlarging the dimensions of the half-bastions and curtain at the head of such works, but by making that head to consist of a line of fortification of a new character, and to look the name of double, triple, etc., horn-works, but more generally crown-works. At a later time however the importance of advanced works was more highly appreciated; and, both by an improved disposition of them and by giving to their fronts dimensions equal to those of the general fronts of the place, they became not only free from the defects to which the old works were subject, but also capable of making a defence equal to that of a regular fortress.

The defects of the old horn-work consist in the expense of the construction being greater than is warranted by the benefit to be derived from them. The rampart is represented to the enemy a front which, from its smallness, may be taken more easily than one of the fronts of the enceinte; in the revetments of the latter being liable to be breached by the ramparts; and the ditches of the wings from batteries formed on the glacis opposite the salient angles of the work; and, lastly, in the comparative security with which an enemy, after having made a lodgment in the interior, can carry on his approaches in the interior with a gentle inclining, till, acting at the distance, the ramparts of the wings against any attempt of the enemy to impede him by sorties directed upon his flanks. It should be observed however that Vauban, who constructed many such works in such a manner as to have a favourable opinion of them. He gives the preference to such as are formed immediately in front of a bastion; the wings being directed neither to that work nor to the collateral ravellons, but towards the bastions adjacent. This means that the ditches of those wings are capable of being defended by the artillery of the curtains, while the revetments of the latter are covered by the tenailles so as to render it impossible for the enemy to get on in an action directed along those ditches. But his best application of a horn-work was made at Belfort, where he executed one entirely in advance of the glacis of the place; in consequence of this he moved a line of fire from whence the work itself from being taken by an assault in that direction.

A nearly similar disposition was adopted by Conrautin in executing the double crown-work at Metz. Around the glacis of that place, on one side, the ground rises with such an elevation, till, acting at the distance, from whence, it forms one side of a deep valley; and along the brow are constructed, nearly on a straight line, three strong fronts of fortification. The ground is terminated on the other by an escarpment, which is at the same time part with its covered-way and glacis; and on the right is a valley watered by a rivulet, which, being dammed, forms a lake capable of securing the works against an attack on the opposite side. The line of fire is from the lunette, or redoubt: that on the right, being surrounded by water, is nearly inaccessible; and that on the left is strengthened by a system of counter-mines.

The invention of the crown-works is due to the directions of their faces, which are such as to prevent them from being entangled; the contraction of the ground before the works, by which the enemy would be reduced to the necessity of making his attack on a smaller extent of front than that of the defenders; and finally, the measures taken to secure the flanks, justly entitle this fortification to the character of being the most complete of its kind in Europe.

HORNE, GEORGE, D.D. Bishop of Norwich, was born November 1, 1736, at Otham, near Maidstone in Kent. At the age of thirteen he was sent to school at Maidstone, under the care of the Rev. D. Bye, and at fifteen was removed to University College, Oxford. He was afterwards elected a fellow of Magdalen; of which college he was appointed principal in 1768. In 1776 he was vice-chancellor; and was appointed dean of Canterbury in 1781, and bishop of Norwich in 1789. He died January 17, 1792, in his 63d year.

Dr. Horne paid particular attention to the study of Hebrew and sacred literature; in which he adopted many of the principles of Hutchinson. His works, which are numerous, consist principally of sermons and pamphlets relating to questions which have long since been settled; of which a list is given by Jones in his edition of 'Horne's Works,' 6 vols. 8vo, 1755. The most celebrated of Horne's works is 'A Book of Psalms,' which the Book of Psalms was originally published at Oxford, 2 vols. 4to., 1776, and has since been frequently reprinted. (Jones's Life of Horne.)
A watch is a pocket timepiece; a repeater, a watch which, by means of any mechanical contrivance can at pleasure be made to repeat the hours, half-hours, or quarter-hours. By abandoning the wheel or pinion, on diagonal line; the escapement is side slightly lowered. (Lamoroux, Tableau Méthodique.)

HORNET. [Vespidae.]

The Hornpipe, a musical instrument, still we believe, known in Wales, consisting of a wooden tube, with holes, and a reed. At each end is a horn; one to collect the wind blown into it by the performer, the other to augment the sound. It is first mentioned in the writings of the English (Archaeologia, vol. iii., 1770) that the ‘tone, considering the materials of which the instrument is composed, is really very tolerable, and resembles an indifferent hautboy.’ In the Welsh language its name is gathorn, which signifies literally, pipe hern. Sir John Hawkins quotes Chaucer to show that the Hornpipe was real, not an imaginary instrument; but in the ‘Tatler,’ No. 157, is a proof not only of its reality, but its actual existence so late as 1710.

It is divided into the name of a dance; and the honourable antiquity above mentioned is of opinion, in which we concur, that the dance-tunes still called Hornpipes were originally composed for the instrument known by the same name. Mr. Bach was the first who introduced the instrument into this country. It appears, from the Dancing Master, 1717, ed., to have been in triple time, six crotchetts in a bar; but the well-known tune, The College Hornpipe, is in duplet or double time.

HORROLOGIUM (Constellation), the Clock, a southern constellation of Lacaille. It is cut by a line passing through Canopus to the southern part of Eridanus. Its principal stars are 24 of the 3rd magnitude; 23 and 24 of the 4th; and 25 and 26 of the 5th.

HORROLOGIO (from the Greek hre, time, or hour, and hro, to divide) to other horological instruments. The earliest authentic records which we have been able to discover in this subject are the following:

1. It is said the first clock at Bologna was fixed up in 1336.
2. Henry de Wyck, or Henri de Vic, a German artist, placed a clock in the tower of the palace of Charles V. about the year 1536.
3. Mention is made in Rymer’s ‘Fcedera,’ of protection being given by Edward III. to three Dutch horologists who were invited from Delitz into England in the 15th century; and it appears to have been the probable introduction of clockwork into England. 4. Conradus Dasypodius gives an account of a clock erected at Strauburg about 1576. 5. According to Protass, Courtier, 1625, the clock which the sun and moon of Athens retains his greatest altitude is called noon for that day; and the time from one noon to the next is a solar day. But as solar days are of unequal length, and as men advanced in knowledge and civilization, many inconveniences must have arisen from this cause; it therefore became necessary to adopt another division of time, which, although an artificial one, is better adapted to the habits and necessities of a civilized community. The year, or one revolution of the earth round the sun, was therefore divided into 365 equal parts or days, the day into 24 equal hours, &c. And thus divided was called mean time. The time as naturally divided by the apparent motion of the sun was called true or apparent time.

Sun-dials, which show apparent time, and clepsydrae, which give a rude approximation to mean time, were the earliest methods of the measurement of time. These are treated of under their respective heads; we shall therefore in this article only treat of those pieces of mechanism which are used for the measurement of time, and are kept in motion either by the constant action of gravity through the medium of a weight, or by the elastic force of a spring, and which have received names varying according to the duties they have to perform: thus the term horology is applied to a separate consideration of these instruments, merely to mark the time without striking the hour; a clock is one which, in addition to showing the time, strikes, every hour, on a bell or spring, a number of strokes corresponding to the hour or number of strokes made by the hands at the time. Quarter clock is applied to one which also strikes the quarters as the hour successively arrives at them.

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engaged, would soon be found an indisputable contrivance; 4. The regulation by a fly being subject to such great changes from the variations of density in the atmosphere, and the tendency of a falling body to accelerate its motion, would necessarily give rise to the alternating motion of the balance, with which invention an escape of some kind must have been coupled; 5. The last-mentioned two inventions are most important ones, and would have induced such a degree of equality in the motion of the wheel-work as would have been necessary to a pendulum at a distance—a band or pointer; lastly, The striking part, to proclaim a distance, without the aid of a person to watch, the hour that was indicated, completed the list of inventions. And thus was De Wyck's clock; a combination of the consecutive inventions of different individuals is confirmed by analogy, for the clocks and watches of the present day have been brought to their present degree of perfection by a series of successive improvements and improvements upon what may now be called the rude clock of De Wyck, which is the most ancient clock of which we have a description. De Wyck's clock was regulated by a balance in the following manner—the teeth of the crown wheel E act on two small levers F, G, called pallets, which project from and form part of an upright staff or spindle C. The staff is horizontal, and B, the mode of adjusting the clock to time was by shifting the two weights W nearer to or farther from the center.

Although this clock of De Wyck's, and indeed all those made with a balance for the regulator, without any regulating spring, must have been very imperfect machines, we find that as early as 1646 Walthier, and after him the landgrave of Hesse, made use of a balance-clock for heavenly observations; and such seems to have been the comparative utility of the clocks thus early for astronomical purposes, that Georg Friesius proposed the use of a portable one for astronomical purposes. In about the year 1650 Tycho Brahe possessed four clocks, which indicated hours, minutes, and seconds, the longest of which had but three wheels, the diameter of one of them being 3 feet, and containing 7,200 teeth, that is, the imperfect state of clockwork at that period. Tycho also observed irregularities in his clocks dependent upon changes in the atmosphere, but does not appear to have been aware how they were produced.

In 1577 Meostlin had a clock which made 2598 beats in an hour, and by counting the number of beats made during the time of the sun's passage over a meridian, the sun's diameter was determined to be 3° 13' 48'' and was used to measure the size of the calix, which in its turn gave rise to some of the most important improvements in clockwork. One of the first additions to the mechanism already described was the alarm or alarm, a contrivance which is in use to the present time, though not for the purpose for which it was originally invented, that of arousing the priest to his morning devotions.

At what time the size of the ancient clocks was reduced to a state of portability is uncertain, but it must have been prior to 1544; for in that year the corporation of master clock-makers at Paris obtained from Francis I. a statute forbidding any one who was not an admitted master to make clocks, watches, or alarms. small or large. Before portable clocks could be made, the substitution of the main-spring for a weight, as the moving power, made it necessary to improve the fusee. The introduction of portable clocks gave rise to a new position of the balance by placing its verge or axis horizontally, and having its suspension on thin edges of hardened steel, called knife-edges, it being previously suspended by a string or thread; and for a long period after their introduction the pendulums of portable clocks continued to be suspended in the same way; and Berthoud pronounces the knife-edge suspension superior to that of a slender spring, which is the method adopted by English artists. In order that a pendulum should perform its duty with as little disturbance as possible from extraneous causes, it is necessary that it should possess considerable weight; and we think that M. Belthoud would hardly assert that a knife-edge is a proper support for a heavy body in continual motion. Such was the case with pendulums used when Galileo Galilei observed that heavy bodies suspended by strings of the same length, made their vibrations, whether in long or short arcs, in very nearly, if not exactly, the same spaces of time, which is also confirmed by what occurred in 1639; and although he never applied the pendulum as a regulator to supersede the balance in clocks, yet his discovery was the prelude to a third era in clock-work, namely, the origin of the pendulum-clock, which continues in use to the present time, and which, in its present most improved form, seems almost impossible to excel. The honour of first applying the pendulum to a clock has been a matter of much contention, which our limits will not allow us to notice further than to say, that all contests between Galilei and Huygens gave rise to an excellent treatise on clock-work, 'De Horologio Oscillatorio,' which laid the foundation of most of the subsequent improvements in clock-work, and therefore cannot be unduly made, or directed the making of a pendulum-clock before the year 1656. Huygens, whether the inventor or not, undoubtedly applied it in the more modern and regular manner, and hence has generally been considered the inventor.

Notwithstanding what has been said above, justice to the memory of a countryman of our own, who appears to have been the first to apply the pendulum to a clock, or Huygens, obliges us to mention a London artist named Richard Harris, who invented and made a long-pendulum clock in 1641; and this assertion is supported by very satisfactory evidence. Very soon after the application of the pendulum to clocks, the pendulum to be realized by the ingenious Huygens in the construction of a marine clock. He also discovered that its pendulum vibrated slower as it approached the equator, which has led the astronomer to a subsequent discovery that the earth is not a globe, but an oblate spheroid. The discovery by the same individual that the isochronal property which Galilei ascribed to the pendulum was only true in circular arcs when the area remained the same (longer arcs requiring some what longer time), gave rise to his cycloidal clocks, which caused the ball of the pendulum to move in the invariable of an ellipse, which, with the pendulum in a detached state, would produce a motion not isotropic, although beautiful in the extreme, both in theory and practice, as regarded the simple pendulum in a detached state, proved of no service to a clock pendulum. Other sources of error, arising from the alteration of the pendulum by heat and cold, and of the string by which it was suspended by moisture, and the impulse given by the clock to the rod through the medium of the fork or crutch (another invention of Huygens), caused the before-mentioned clocks to be abandoned.

In 1676, Barlow, a London clockmaker, invented the repeating mechanism by which the hour last struck could be known by pulling a string. Several artists followed in the same line, and in 1688, one of whom was Collier, Largay, Thiou, &c., on the Continent. Clocks were soon after made to show not only mean but apparent time. The principal artists employed in this more curious than useful part of horology were Collier, a French clockmaker, Father Alexander, a Benedictine, in 1698, Le Bon and Le Roy in 1717, Kriegenauken, Enderlin, L'Admiraud, Passemant, Rivar, Graham, and others.

We now proceed to record an important addition to the improvements in clocks, namely, the invention of the anchor escapement, which, like most others that have stood the test of time, belongs to the English. Even Berthoud confesses the part of horology which has been the work of English clockmakers, in 1690. The great advantage of this escape ment over the old crown-wheel, is that it allows the escape to take place in a small angle of vibration, thereby preventing the necessity for the main spring to adjust itself upon the pendulum with so great a force as by the old plan, and, by the introduction of a heavy ball, leaving that to be done by
the uniform power of gravity which before was dependent upon the impulse given by the wheel to the pallets. This change in the escapement introduced the practice of suspending the pendulum by a thin and flexible spring, another invention of Clement's; though this invention, both of the pendulum and spring, is also claimed by our ingenious countryman Dr. Hooke. The seconds pendulum, which played the same part in the clock that the pendulum had in the horologium.

Another era in the history of clock-work may be said to have commenced with the beginning of the eighteenth century. The expansion and contraction of metals had been known above fifty years; and although the use of the clock for astronomical purposes had been the most important interest of the clock, this did not prevent them from being compensated for the lengthening and shortening of the pendulum by heat and cold, art had not yet supplied this desideratum, until, in the year 1715, George Graham, by substituting a jar of mercury for the pendulum-ball, succeeded in retaining the point of suspension and the centre of oscillation at the same distance from each other. The principal objection to this pendulum is its liability to breakage, of which its author felt the full force, and in consequence suggested the idea of the opposite expansions of different metals as a compensation for a pendulum. John Harrison immediately turned his attention to the subject, and by dint of perseverance, overcome all the difficulties of his humble and retired situation, not only astonished the world by his improvements in horological machines, but absolutely constructed with his own hands a timekeeper which determined the time with limits as great as 1/150000 of the parliamentary reward of 20,000l. [HARRISON] Although the anchor escapement previously mentioned was a great improvement upon all that had preceded it, still it was subject to objections, not one of the least of which was that at every vibration it threw as much force on the pallets as when the wheel was in motion, and in order that the reader may comprehend this point, it is necessary to observe that the pendulum, being a heavy body, vibrates a considerable distance after the tooth has performed its office of pushing the pallets; and as a new impulse is not applied until the complete of a circle, the tooth falls from the pallet to which the impulse has just been given, and another tooth falls on the other pallet, which is at the time moving, together with the pendulum, in a contrary direction, and which it is supposed will move when it receives its impulse from the tooth; and from the peculiar form of the pallets, a retrograde or backward motion is given to the wheel, which motion is called the recoil. This recoil is a escapement, known as the recoil escapement. The inconvenience of this escapement was however removed (about the same time with the invention of Harrison's pendulum) by Graham, who introduced what is called the dead-beat escapement, which is both simple and very perfectly executed: though its performance is not equal to that of any other that has ever been made: with this escapement, and with a gridiron or mercurial pendulum, having a heavy ball moving in a very small space, the wheels are kept in motion by means of a pipe about half an inch long and, on to the upper end of which is riveted the rack-tail 6, in which is a short pin A, pointing perpendicularly downwards to the front plate of the clock. This rack is let into an inch above the front plate; but the pipe which acts on the stud is long enough to carry the rack-tail just clear of the snail when the rack is forced back by the spring 5, whilst the pin A is long enough to strike against the steps in the snail, and yet so short as to allow the rack to be easily removed. When the rack is removed, the pin A is the rack-hook moving freely on a stud; n the lifting piece, also moving freely on a stud p; q is the tail of the lifting-piece firmly pinned on to the other part, and moving with it; r is the pointed end of the rocking piece, which moves through it, and is fixed upon the square end of the arbor q of the wheel g (fig. 1), which revolves once for every blow given by the hammer, as will be seen by referring to the number 64 in the pin-wheel, the number of pins which act on the hammer being eight, and the number in the pin-wheel being eight also. It must be borne in mind that a pin in the warning-wheel A always stands in the same position when the striking part is at rest, which is the position represented in fig. 1. On the end of the lifting-piece is a small piece q (fig. 2), which passes through a slit in the front plate, and resting on the bottom of the slit, keeps the lifting-piece in its place; the piece r rests on the stud n in the rack, and thereby prevents any motion in the internal wheel-work of the striking train.

Mode of Action.—As the hand approaches the hour, a piece in the wheel b (fig. 2) raises the lifting-piece, the other end of which coming in contact with the rack-hook, lifts it out of the rack-teeth; the rack falls by the force of the spring in the tail until the pin A in the tail comes against one of the steps in the snail. This will show that the number of teeth of the rack and the teeth of the snail correspond with the number of teeth which each step will allow the rack to fall past the centre of the gathering pin 1, which by the fall of the rack is released from the pin s, which is the striking pin; the striking pin, which is the pin in the wheel A (fig. 1) coming in contact with the piece q (fig. 2) on the end of the lifting-piece, and arresting their further progress (this is called the warning). At
soon as the hand arrives at the hour, the pin in wheel b will have passed the tail of the lifting-piece, which will fall, and with it the piece q, which again releases the striking-train, and the pins in the wheel f (fig. 1), acting on the hammer-tail, cause the clock to strike; the number of strokes being regulated by the number of teeth to be taken up by the pallet q (fig. 2), one being taken up by the short end of the pallet for every revolution of the wheel g (fig. 1), on whose arbor it is fixed. The rack in fig. 2 is retained in its situation by part of the rack-hook, which falls successively into different teeth as they are taken up. The long end of the pallet q passes over the rack, meeting with no obstruction till all the rack-teeth are taken up, when it comes in contact with the pin r, where it remains till the next hour, when the pin a, by falling upon another step of the snail, causes a different number of rack-teeth to pass the pallet q, and a different number of strokes is the result: x is a piece called the pull-piece, by pulling a string at the end of which the lifting-piece is raised, and the clock is made to repeat the hour last struck at any required time; y is a spring to force the pull-piece x against the pin z fixed in the plate of the clock; z is another pin to limit the motion given to the pull-piece x when the string t is pulled.

After what has been advanced, it might be supposed that the clock had received its finishing stroke as regarded its further improvement; but even after this, we find so many alterations, if not improvements, in the escapement, mode of compensation, &c., that to notice only those which have produced some sensation at the time of their introduction would fill a volume. The principal contrivers of clock escapements are Grignon, Mudge, Cummins, Nicholson, Hardy, Harrison, and others, in England; and on the Continent, Julien and Peter le Roy, Sully, Du Tertre, de Bethune, Le Paute, Amant, Robin, Berthoud, &c. Since, Graham and Harrison, Elliott, Cummins, Nicholson, Troughton, Smith, Reid, Ritchie, Ward, and Captain Kater have each given us a compensation pendulum. The inventors in France have been Regnauld, Deperonieux, J. le Roy, Cassini, and Berthoud.

Watch.—Having entered at some length into the history of those inventions which have contributed to the present perfection of the art of horology, it will not be necessary for us to say much concerning watches. We have described a watch to be a pocket timepiece, and the same general principles apply equally to both a clock and a watch, except that the regulation in the former is a pendulum, and in the latter a balance and spring.

It would be a matter of some difficulty to determine what artist first reduced the portable spring-clock to the dimensions of a watch to be worn in the pocket. The small clocks prior to the time of Huygens and Hooke were very imperfect machines; they did not even profess to subdivide the hours into minutes and seconds until the invention of the balance-spring, which is to the balance what gravity is to the pendulum, and its introduction has contributed as much to the improvement of watches as did that of the pendulum to clocks. The honour of this invention was warmly contested by the last-named individuals previous to 1658; but so far as priority of publication is concerned, the honour is due to Hooke.

**Maintaining Power.**—When clocks and watches had acquired a certain degree of accuracy in their performance, the time lost in winding up (especially when it had to be done every twenty-four hours) became a matter of importance, and there have been several inventions to remedy this evil. By Huygens the clock was kept going while winding by means of an endless cord, as in figure 'Endless Cord.' B is the clock-barrel; C, that portion of the line which comes from the barrel to the weight; P, a pulley for the line to run over; Q, a pulley for the line to run under, and to which is attached a small weight w. It will be seen by inspection that the hand applied to that part of the line marked a will be able to raise the weight W without depriving the barrel B of any portion of the power by which it is urged forward, and which power in this arrangement is equal to one half of the weight W.
The forcing spring (fig. 1) gives another plan, in which a lever A, whose centre of motion is o, has a notch cut in its end, into which is inserted a small lever c. Whose centre of motion is z; this small lever is kept in its proper position against the bottom of the notch, as shown in A, and also in B (which is only another position of the lever), by a slight spring a. D is a strong spring which, when the lever A, having a tendency to force it into the position represented by B, in which it is not in action. Previous to winding the clock up, the end E of the lever is depressed, and brought from position B to that of A, and in its progress in passing a tooth of the wheel the small lever c assumes the position represented in fig. 2, which it is allowed to do by the very slender spring a. In the meantime, the pressure of the base of the lever c turns it to its original place, and by the pressure of its opposite end on the bottom of the notch in which it is inserted, the lever A is prevented from regaining its former position by the pressure of the piece c on the tooth of the wheel, until the wheel shall have advanced far enough for it to have escaped, when the lever regains its position B, where it remains till another winding becomes necessary. It will by this time have become evident that so long as c remains on a tooth, the wheel will be urged forward by the action of the spring D; e, c are two pins which are fixed in the plate of the clock, and serve to determine the quantity of motion given to the lever A.

But Harrison's contrivance for the same purpose is the one now in general use, both in clocks and watches, and is admirably adapted to the purpose, as it requires no attention from the person who has to wind up the machine, like the last, but is always in its place, and ready for action the moment the watch is taking up time; let us describe this as applied in a watch. When this principle is applied to a fusee, it is termed a going fusee; but maintaining power, as a more comprehensive term, is now generally used.

**Maintaining Power, Going Fusee.**—Into the hollow of the fuse-wheel is placed a circular spring a b c, which is secured to the wheel by a pin at about one-fourth of its circumference from the end a, viz. at b; the wheel has a short notch cut through it, near the other end of the spring; the spring passes over this notch, and by means of a pin c, fixed firmly in the spring and projecting through the notch in the wheel, a motion is allowed to the spring, which in extent is equal to the difference of length of the tooth of the wheel and the thickness of the pin which passes through it, and it is the reaction of this spring through the short distance already mentioned which maintains the motion in the watch during the time of winding up; as will be seen when all the parts of this contrivance have been described. Instead of any click and spring being attached to this fuse-wheel, as has been shown in fig. 1, in our description of an eight-days' clock, a circular disc of steel, rather larger than the bottom of the teeth of the fusee, and small slips of the fuse-wheel, having very fine ratchet-teeth cut in its edge, and two clicks a and springs e on its upper surface, in which the ratchet is fixed on the under side of the fusee, and called the fusee-ratchet. The steel-ratchet is called the auxiliary-ratchet, and its teeth stand in a direction opposed to those of the fusee-ratchet. We will now suppose the auxiliary ratchet to be laid on to the fusee-wheel over the fuse-wheel, and the spring a b c is now wound, in the centre of the fusee-wheel retaining it in its situation, and the pin c, which we have described as projecting through the notch in the fusee-wheel, also projecting upwards just equal to the thickness of the auxiliary-ratchet; through which it likewise passes; the pin exactly fitting the hole in the ratchet. In this situation the wheel and ratchet are ready to receive the fusee with its ratchet; but it must be borne in mind, that though the pin c fits exactly in the hole in the auxiliary-ratchet, and thereby prevents it from turning round, it does not prevent its having as much motion as the spring itself has in the notch in the fusee-wheel; the spring must also be conceived to have been forced into its place in the frame with the pin c, so that it bears strongly against the side of the notch o. The fusee is now attached to the wheel by passing its arbor through the hole in the centre of the wheel, and is secured in its place by a pin and collet on the opposite side, which prevents the frame from turning, allowing the fusee to turn with a moderate degree of force.

In this state the fusee, &c. must be considered as placed within the frames of the clock or watch in connection with the other parts of the train of wheels &c., as is sometimes called, a detent, is also placed between the frames, and by means of a slight spring is made to act in the teeth of the auxiliary-ratchet.

A mode of applying the chain being put on, the watch is wound up, say one turn. As soon as the force by which it has been wound up is taken off, the main-spring, through the medium of the chain, pulls the fusee, and with it the auxiliary-ratchet; at the same time the watch can commence its motion the fusee-wheel must be acted upon, which will be as soon as the pin c in the end of the notch o shall have been brought by the force of the mainspring into the position p, acting on this several teeth of the auxiliary-ratchet will have passed under the detent before mentioned. If the power be again applied to wind up the watch, the main-spring, during the time that power is applied, ceases to act on the auxiliary-ratchet; and the mainspring being uncoiled would be at the original position by the endeavour of the spring a b c to regain its former situation, having the pin c at o, but the detent, which is in a tooth of the auxiliary-ratchet, prevents its return; and the mainspring is re-acted on the fusee-wheel to which it is attached at b, and forces the fusee-wheel in the direction of the arrow with sufficient strength to maintain the motion of the watch during the time of winding-up. The space through which the spring a b c acts in the notch o p with sufficient force to maintain the motion of the watch is about equal to two teeth of the fusee-wheel, and the time in which the fusee-wheel goes through a distance equal to two teeth varies in different watches from 10 to 12 minutes, a time more than sufficient for the operation of winding. It will have occurred to the reader that as the detent is at all times in action upon the auxiliary ratchet, the instant the power applied in winding is taken off the pin c regains the position p, and the spring a b c is ready to act with all its energy as soon as rewinding is commenced; so that in winding a watch with a common key, where the hand is on the clock for an average time of ten minutes, there are ten portions of time during which the motion is kept up by the main-spring of the watch, and ten portions during which it is kept up by the spring a b c.

**Eclipse.**—The word eclipse is a term applied to a combination of parts in a clock or watch, which has for its object the conversion of the circular motion of the wheels into a vibratory motion, as exhibited in the pendulum, and in the description of which a little known about to the main-spring of the fusee, the pallets with their arbor or axis, and a bent lever attached thereto, called the crutch, which last piece main-
tains the motion of the pendulum. In a watch this com-
ination consists of the scapo-wheel, together with all those
parts lying between it and the balance, and which are
considered in converting the circular motion of the wheels
into the alternating one of the balance. In Graham's dead-
beat escapement the distance between the centre of motion
p of the pallets and the centre of the scapo-wheel is equal
to one diameter of the scapo-wheel, and the pallets take
over ten teeth of the wheel: this we believe to have been
Graham's mode; and custom has so far converted it into a
rule, that we have met with many clock-makers who con-
idered it highly improper, if not wholly at variance with the
inherent principle of the escapement, to adopt any other
mode of construction. But Mr. Valliery has shown
that which every one acquainted with the elements of
mathematical and mechanical science may easily compre-
end, viz. that a dead-beat escapement may be made in
which the pallets shall include any number of teeth, less
than half the number contained in the wheel, which may
be found convenient; his being a general rule, of which
Graham's is a particular case. Mr. Valliery determines the
centre of motion of the pallets by drawing two tangents
to those two points in the circumference of the wheel which
are opposite the centres of the pallets; these tangents being
produced, will intersect each other, and the point of intersec-
tion is the place for the centre of motion of the pallets. The
above-named gentleman has also given a very good method for
ascertaining the inclined plane which forms part of the pallet
called the pallet Q, on which the pallets are made to roll
without the time it is giving impulse to the pendulum. We say
his method is good, for by it the artist, in drawing off his
escapement, is enabled not only to determine the precise
quantity of time which the escapement, but also with
mathematical precision between the two pallets, so
that each shall lift the pendulum through an exactly
Our figure the tooth \( i \) has just given impulse to the
pallet \( P \) and escapes from it; the tooth \( s \) is then fallen upon that part of the pallet \( Q \) called its arc of rest,
which, in both pallets, is formed by a circle struck from
the centre of motion \( p \) of the pallets. The impulse given by \( i \)
causes the pendulum, and with it the pallets, to rotate
some distance after \( i \) has left \( P \) and \( Q \) has fallen on \( Q \);
but the arc of rest being concentric with the centre of motion
of the pallets, the wheel ceases to rotate, or remains dead,
until the pendulum by its returning vibration raises
the pallet \( Q \) so high as to allow \( i \) to get upon the face of
the inclined plane of the pallet, upon which \( i \) then acts,
driving up the pallet, and with it the pendulum, until the
tooth \( s \) escapes from the pallet \( Q \), when another tooth \( A \)
on the opposite side of the wheel, falls on the arc of rest of
the pallet \( P \), which arc is in this pallet on the outside, and
on which the tooth rests until by the return of the pendulum
the pallet \( P \) is lifted so high as to allow \( A \) to get on the
inclined plane of the pallet \( P \), upon which it acts, raising
the pallets, and with them the pendulum, till it escapes and
again the position \( i \), when the same process is repeated, the wheel alternately giving impulse to one pallet
and resting on the circular part of the other, which we
have denominated the arc of rest. When the pendulum is
in a state of rest some one tooth is always resting on one of
the circular arcs; the pendulum being put in motion brings
a pallet into a position to receive an impulse from the wheel-
tooth, when the process is again described commences.

Vertical Watch.—We shall now give a description of a
common vertical watch. Fig. 1 represents the watch as it
would appear if the dial (which is here omitted) was turned
downwards. A is the barrel; B, the fusee; \( A \), the chain
by which motion is communicated from the barrel to the
fuse, on which is the great or fuse wheel \( C \) acting on the
centre-wheel pinion \( D \), on which is riveted the centre
wheel \( E \), the arbor of the pinion \( D \) being prolonged through
the plate of the watch as far as \( f \); the centre wheel \( E \) and
its pinion \( D \) revolve in an hour. Upon that part of the
arbor \( D \) which is on the outside of the plate or frame is
placed the canon-pinion \( e \), which has a hole quite through
it for the reception of the centre-wheel arbor, on which it
turns spring-like; the degree of lightness may be felt by
applying a key to turn the hand of a common watch. The
canon-pinion is secured in its place by a small pin through
the end of the centre-wheel arbor \( l \), the end \( g \) of the
pinion being squared to receive the minute-hand \( A \); the
canon-pinion has 12 leaves acting in the minute-wheel
\( d \), of 48 teeth, causing the latter to revolve once in four
hours. Concentric with \( d \), and attached to it, is its pinion
\( e \), having a hole through their common centre, through
which passes a stud fixed on the plate, through the end of
which, near letter \( e \), should be put a small pin to retain the
wheel in its proper place, but which is very frequently
omitted. The pinion \( e \), having 14 leaves, drives the hour-
wheel \( m \), of 42 teeth, once round in 12 hours, and which
is placed over the canon-pinion by its socket \( f \), which has
a hole through it for the canon-pinion to pass through;
this socket is fixed the hour-hand. It will be perceived
that by this arrangement the cannon-pinion, minute-wheel
\( d \), and pinion \( e \), and hour-wheel \( m \), together with the hands,
can all be turned backward or forward without affecting the
interior mechanism of the watch, simply by the application
of a key to the squared end of the cannon-pinion. The as-
semble of wheels, &c. thus put in motion is called the motion-work of the watch; that between the plates, the
movement,—our description of which we will now continue.

The centre-wheel \( d \), having its motion transmitted to the
contrate-wheel \( F \), to which is attached the third wheel \( G \), acting upon the
contrate-wheel pinion \( H \), on which is placed the contrate-
wheel \( I \), acting in the pinion \( K \) of the balance-wheel \( L \),
which is also called the escape-wheel. In page 295 we
explained the mode by which the balance-wheel teeth act
upon the pallets \( a \) so as to cause an alternating motion in
the balance \( M \). (By an oversight in the drawing, the teeth
of the balance-wheel \( L \) have been omitted.) One end of
the balance-wheel arbor works in a piece called the
dovetail, which is inserted in a piece \( p \), called the
potence, which is firmly attached by a screw to one of the
plates of the watch; the other end works in a piece called
the follower, which is inserted in another piece riveted into
the plate called the counter-potence, both which are left
out of the figure to prevent confusion. Another part of
the potence, called the foot, \( n \), receives one end of the balance
parts separately,—2, the main-spring in a relaxed state, as it would appear out of the barrel, to which, when in, one end of it is attached, the other being held by a hook in the arm of the barrel, which comes through the plate, as shown in Fig. 1, and is kept from turning by a ratchet and click, and the spring being wound up by the chain acting on the barrel and pulling it round, which operation is performed by turning a key placed on the squared end of the fuse-axor. The effect of the spring to unbind itself after being wound up causes the barrel to revolve in a contrary direction to that in which it moved whilst winding up, and thereby gives motion to the fusee, and with it the fusee-wheel and the rest of the train. Fig. 3 represents the barrel and fusee, with the chain attached. Fig. 4 shows the balance-wheel, balance, and verge, with the hair-spring attached to it.

Duplex Escapement.—AA is the scape-wheel, 1, 2, 3 being the teeth of repose, and a, b, c the teeth of impulse, which are triangular, and stand perpendicular to the plate or surface of the wheel. CD, the impulse pallet, fixed upon the arm of the balance, and standing just above the surface of the wheel AA, receives its motion from the teeth a, b, c, &c. After the tooth a has passed the pallet CD, the tooth b comes in contact with a small roller made of ruby, and placed on the lower part of the axis of the balance, where it remains till the balance is brought back by the balance-spring to such a position that the notch, shown by the dotted line in the ruby roller, will allow the tooth c to enter it, and thereby pass the balance-axor, or escape, which it does by the wheel AA being constantly urged in the direction from 3 to 1. As soon as tooth b escapes from the notch, tooth b gives a fresh impulse to the pallet CD, and the act of escapement is thus repeated; the wheel moving forward one whole tooth, and the balance making two vibrations for each impulse given by the upright teeth.

Lever Escapement.—The figure represents a detached lever-escapement, in which the lever l is placed on the pallets in a position at right angles to that in which it is usually placed in a watch, by which means we think the principle will be more apparent to the general reader. AA is the scape-wheel moving in the direction of the arrow; b d the pallets, whose centre of motion is c; to the pallets is pinned the lever l, in which is the guard-pin e, pointing upwards from the lever l; the roller r is fixed on the axis of the balance, and stands just above the lever l, having a piece cut off from its circumference to allow the guard-pin e to pass and repass the roller, which it does when the escape takes place; o is a ruby pin fixed in the roller, and pointing downwards through the notch in the end of the lever l. When the balance is quiescent, the pin o is in the notch in the end of the lever l, and the guard-pin e in the position shown in the figure, where the tooth l acts on the pallet b, which causes the balance to vibrate, the guard-pin e proceeds a short distance to the right of its present position, and the lever is prevented from returning by the guard-pin e coming in contact with the circular edge of the roller, if any sudden jerk which the watch might receive should overcome the locking which takes place in this escapement, and which will be presently described. The effect of the locking is to retain the pin e at a very small distance from the edge of the roller during the vibration of the latter; for if the pin e rubbed against the roller during the vibration, the friction occasioned thereby would materially affect the motion of the balance, if not altogether stop the watch, and moreover the escapement would cease to be a free or detached one. When an impulse is given by a tooth to the other pallet d, the lever l impels the ruby pin o to the left hand, where precisely the same effects take place with regard to the guard-pin e, &c., as have been already described.

If the pallets b and d were of the form shown by the dotted lines (which are supposed to be circular arcs concentric to the centre of motion c of the pallets), it would be a perfect dead beat, like the clock-escapement previously described; but in order, after the escape has taken place, that the guard-pin e may be retained at a small distance from the roller, the soon of each pallet on which the tooth rests when it falls on the pallet is taken off, as shown in the figure; and as the faces of the wheel-teeth are considerably undercut, the wheel advances a small distance, after leaving fully on that part of either of the pallets which is within the dotted line. This further advance of the wheel draws the pallet down towards the centre of the wheel, and thereby keeps the guard-pin e at a slight distance from the edge of the roller r. By this advance of the wheel and drawing down of the pallets after the teeth have fallen upon them is produced what is termed the locking of the pallet, which means holding the pallets and lever l in such a position that the guard-pin shall be very near to but not quite touch the edge of the roller. If the watch
should receive a jerk so violent as to offset the partial unlocking of the pallet, the pin would for an instant of time touch the roller \(f\), but the constant effort of the wheel to go forward would immediately unlock the pallet and bring the guard-pin \(e\) away from the edge of the roller. As soon as the balance has performed so much of the returning vibration as to bring the guard-pin \(o\) into the notch in the lever, the momentum of the balance, acting through the medium of the ruby pin \(p\) upon the lever, moves it a short distance, and thereby lifts the pallet outwards from the centre of the wheel and unlocks it, during which unlocking the wheel retrogrades (before it can get upon the face of the pallet to give a fresh impulse) just as much as it had previously advanced after falling on the pallet. By this retrogression the tooth gains the inclined plane or face of the pallet, gives a new impulse, and the same process is repeated by another tooth on the opposite pallet, of falling on, advancing to lock, retrograding to unlock, and then giving impulse to the pallet; \(p\) are two pins, called banking-pins, against which the lever \(p\) presses when locked, and which prevent the guard-pin \(e\) from being drawn too far away from the edge of the roller \(f\), when the locking takes place. This escapement admits of a very large angle of vibration, and when well executed performs very well.

**Horizontal Escapement.**—ABD represents the balance on its axis, which is a hollow cylinder C cut away in its circumference, as shown in the figure; the teeth of the escape are arranged in a series of inclined planes, which stand on stems perpendicular to the plane of the wheel, the inclined part forming the extreme edge or actuating-face of the tooth. These planes coming in contact alternately, with the two edges of that part of the cylinder which has the least portion of its circumference taken away, when a tooth is in the cylinder, the point rubs against the internal surface until the balance by its vibration gets into such a situation that the plane of the tooth can act upon its edge, when it escapes the cylinder in the direction from D to A, until the highest part of the plane escapes from the inside of the cylinder, and the next tooth falls upon the outside, where it continues to rub until the balance completes its vibration and has returned so far as to permit the point of the tooth, which has been rubbing on the outside of the cylinder, to get upon its edge, where it gives impulse to the cylinder, and when its heel escapes, the point falls on the inside of the cylinder, and the former process is repeated. That part of the cylinder on which the inclined planes act occupies about 210 degrees of a circle, 130 degrees being taken away; the part below the place of action has a still greater portion of its circumference taken away, which is done for the purpose of enabling it to clear that part of the plane of the wheel which supports the stem, and against which, but for this contrivance, the teeth of the cylinder would strike during the vibration of the balance. 1, 2, 3, &c., are teeth of the horizontal or sccape-wheel, one of which is seen inside the cylinder; the dotted lines represent the face or inclined plane of the tooth, which is just coming in contact with the edge of the cylinder; the direction of the motion of the wheel is from 1 to 3; the proportion of the cylinder to the wheel is such, that a tooth of the wheel, when in the cylinder, may just have sensible shake, and the outside diameter must be sensibly less than the distance between two teeth. We have thought it unnecessary to give a more particular description of this escapement, as its use has been almost wholly superseded by that of the lever.

**Detached Escapement.**—A A is the scap-wheel, made either of brass or steel, the teeth 1, 2, 3, 4, &c. of which are considerably undercut on the face; the steel-roller or main-pallet B B B, which is fixed on the arbor of the balance, has an opening in it, the face of which is also much undercut as shown near B, and has set in it a piece of hard stone, such as a ruby, for the points of the teeth to act upon; S is a stud firmly fixed to one of the plates of the timekeeper, and to which stud the detent-spring E E is secured by a screw \(c\): this spring is made extremely slender and weak in the part \(E\) near the steel, and it is only by the yielding of this thin part of the detent-spring that any motion can be given to the detent for the purpose of unlocking the wheel, so that some part of this spring may be considered as the centre of motion of the detent; D is a stud also fixed to the plate of the watch, into which is inserted a screw \(d\), against the head of which the detent rests; \(o\) is a ruby pin inserted in the detent, pointing downwards for the detent, so that one of the teeth of the wheel which is supposed to pass under the detent may rest on the pin, and in this state the wheel is said to be locked; the screw \(d\) serves also to adjust the distance of the ruby pin from the centre of the wheel, and consequently the strength of the locking: to the inner side of the detent is attached a very delicate spring, called the lifting-spring, which rests upon and extends a little beyond the end of the detent. Concentric with the main pallet, and just above it, is a small lifting-pallet \(q\), which should be flat on its face or lifting-side, and rounded off on the other side.

**Mode of action.**—In the position given in the figure, the lifting-pallet \(q\) is just coming with its face in contact with the lifting-spring \(p\), which in the course of vibration it lifts and with it the detent (on whose point the lifting-spring presses), so as to raise the pin \(o\) clear of the wheel-tooth \(3\). By the time the wheel is free from the ruby-pin, the main-pallet has advanced so far as to be ready to receive an impulse from the tooth 1; and before the tooth escapes the lifting-pallet \(q\), parts with the spring \(p\), and the lifting-pallet \(q\) remains in position on the head of the screw \(d\), in which position the ruby-pin receives the point of tooth 6, as soon as tooth 1 has escaped from the ruby-face of the main-pallet B B B. The balance, having performed this vibration by the impulse given to the main-pallet, returns by the force of the balance-spring, and with it the lifting-pallet \(q\), the rounded side of which, pressing against the lifting-spring \(p\), raises it from the detent, and passes without disturbing the detent, which is not again lifted till the balance has completed the present vibration, and returning for the next, again brings the face of the lifting-pallet in contact with the lifting-spring, which (with the detent) it raises, and the act of escaping again takes place, the balance making two vibrations for every impulse, as in the duplex. This escapement, which was invented by Earnshaw, stands unrivalled for simplicity and for performance.

For further details connected with the subject of this article see Pendulum.
Horrobow, Peter, a Danish astronomer, was born in the year 1679. After studying medicine for several years he became the pupil of the celebrated mathematician and astronomer Olaus Roemer, whom, in 1710, he succeeded as professor in the University of Copenhagen. The duties of this office, however, proved too cumbrous for him, and he left Copenhagen about the year 1740, when he resigned in favour of his son Christian. Horrobow died at Copenhagen in 1764, at the advanced age of eighty-five years. His works are: "Questio Astronomica," ib. 1714, 4to.; "De Sphaera," ib. 1724, 4to.; "Astronomia," ib. 1725, 4to., an attempt to explain the formation of the planets on the system of Descartes; *Copernicus triumphant," sive de Paralaxi Orbis Annui Tractatus Epistolaris," ib. 1726, 8vo.; "Lettres sur l'Orbite de la Lune," from Roemer's observations, that Sirius and a Lyre have each 30° of annual parallax; *Aurioc Astronomie, sive Tractatus de inveniendis Rectificationibus, Obliquitate Eclipticæ, etque Elevatio Poli," ib. 1732, 4to.; *Basia Astronomie, sive Astronomia pars Mechanica," ib. 1735, 4to.; *Consilium de novd Methodo Paschali ad perfectum Statum pertinuedæ, ac deinceps omnibus Christianis commendanda," ib. 1736; *Elementa Philosophiae Naturae," ib. 1748, 4to.; besides a few papers upon astronomical subjects in the *Acta of Leipzig." His works were collected and reprinted in 1740—41, at Copenhagen, in 3 vols. 4to. To his name the *Astronomie," prefixed the *Life of Roemer," in which he omitted nothing that could tend to perpetuate the memory of his predecessor. Horrobow, Christian, son of the above, died in 1776, and besides a Latin treatise on Spherical Trigonometry, *De Paralaxi et Distantia Orbis Martis Demonstratio," ex Observationibus Ann. 1742 et 1743 deducita," Copenhagen, 1744, 4to.; *De Paralaxi Fixarum Annui et Rectificationibus quam post Roerumen et Par. Proin demonstravit," ib. 1747, 4to. (Montucla, Hist. des Mathém., tom ii.; and the Biographie Universelle.)

Horrocks, Jeremiah, often spelled Horrox, an astronomer of Lancashire. He was born at Halton, through Lancashire, the son of a man of moderate means, placed him, before 1633, at Emanuel College, Cambridge, and there he soon began to turn his attention to astronomy. In the prolegomena to his astronomical writings he describes the difficulties under which he laboured in finding even so much as direction to good authors. A treatise by Gellibrand led him to purchase the writings of Lansberg, on which he afterwards greatly regretted that he had wasted so much time. Subsequently he became acquainted with those of Tycho Brahæ and Kepler. Though his papers which he left behind him contain many good observations and ingenious remarks, he must now be considered as a great astronomer, for the first who saw Venus on the body of the sun, and he was the first who remarked that the lunar motions might be represented by supposing an elliptic orbit, provided that the eccentricity of the ellipse were made to vary, and an oscillatory motion given to the line of apsides. [Gravitation.] Newton afterwards showed that both suppositions were consequences of the theory of gravitation, and (book iii., prop. 35) showed that the motions of the planets are really due to Horrocks, as explained by Flamsteed. But Horrocks has been more than avenged by the foolish statement of Martin, in his *Biographia Mathematica,* that Newton's *Principia,* second book, was drawn from all his astronomy. This palpable misconception was copied by Dr. Hutton into his Mathematical Dictionary. The account given by Horrocks of his observation of Venus, November 24, 1639, entitled "Venus in Sole vissa," was printed by Hevelius at the end of his *Mercurius in Sole visus," published at Danzig in 1662. The remainder of the works of Horrocks were published by Dr. Wallis, London, 1672, some copies bearing the title-page *Opera Astronomicæ," and some the title-page *Præcautæ," and the lunar theory of Horrocks was there developed by Flamsteed, but Wallis afterwards added the original letter to Crabtree, in which it was contained, but only to some copies, which were therefore enlarged for publication. Cybele the Lalande states that he had a copy with a third title-page, dated 1678, and containing some additional tracts of Wallis. This publication contains various astronomical tracts, with extracts from the *Companion to the Almanac* for 1837 will be found a list of the astronomical works in his possession, taken from a list written by himself at the end of his copy of Lansberg's *Tabulae Perpetuae," which was preserved by his friend Townley. The spelling of his name is taken from his own handwriting in this list.

2. William Crabtree, who died a few months after his friend Horrocks, at a very early age, was a clothier at Broughton near Manchester, and many of his observations were published by Wallis in the work above cited, and after wards in the discussion about Gascogne, presently to be mentioned.

3. William Milburn, curate at Brancsopeth near Durham, was, according to Sherburne, well versed in algebra, and having extracted the approximations by means of an equation of the fifth degree before he had seen Harriot's work. In astronomy he had, by his own observations, detected the errors of Langes's tables, and verified those of Kepler. His observations on Halley's comet are given in astronomy, 1639, and some tables which he had sent to London for publication during were, in 1675, in the hands of Sir Jonas Moore.

4. William Gascogne, of Middleton in Yorkshire, was killed also at an early age, fighting for Charles I. at Marston Moor. He invented methods of grinding glasses, and Sherburne states that he was the first who used two convex glasses in the telescope. When Auzout announced, in 1665, his invention of the microscope, Richard Townley, nephew of Christopher above mentioned, presented Hook with a modification by himself of a similar instrument made by Gascogne; and it appeared from a letter written by Crabtree to Horrocks, that Crabtree had some particulars of them, from which, with other sources, our account is taken.

1. Jeremiah Horrocks was born, it is supposed, about the year 1611, at Barnoldby-le-Wold, a town in Lincolnshire. His father, a man of moderate means, placed him, before 1633, at Emanuel College, Cambridge, and there he soon began to turn his attention to astronomy. In the prolegomena to his astronomical writings he describes the difficulties under which he laboured in finding even so much as direction to good authors. A treatise by Gellibrand led him to purchase the writings of Lansberg, on which he afterwards greatly regretted that he had wasted so much time. Subsequently he became acquainted with those of Tycho Brahæ and Kepler. Though his papers which he left behind him contain many good observations and ingenious remarks, he must now be considered as a great astronomer, for the first who saw Venus on the body of the sun, and he was the first who remarked that the lunar motions might be represented by supposing an elliptic orbit, provided that the eccentricity of the ellipse were made to vary, and an oscillatory motion given to the line of apsides. [Gravitation.] Newton afterwards showed that both suppositions were consequences of the theory of gravitation, and (book iii., prop. 35) showed that the motions of the planets are really due to Horrocks, as explained by Flamsteed. But Horrocks has been more than avenged by the foolish statement of Martin, in his *Biographia Mathematica,* that Newton's *Principia,* second book, was drawn from all his astronomy. This palpable misconception was copied by Dr. Hutton into his Mathematical Dictionary. The account given by Horrocks of his observation of
lateral toes. The following is the form of description belonging to this family of Psathyridns:

Incisor, 1,1; Canines, 1,1; Molars, 7,7; = 42.

We shall not detain the reader with the various fabulous species as recorded in the description, and figures of some authors; such as the Bisulcated Horse, which has a mane of teudig the whole length of the animal from head to tail, and figured by Jonston as the *Althociphas Pferd, Equus Althociphas,* or the *Old Ezl, Onager,* figured by the same author with a unicorn-like horn in the midst of the forehead. These may be classed with the figures of monstrous horses collected by Aldrovandus, a horse with a human head and face for example, and another with hands by way of forefeet. In the same manner, as according to Sibonius, belonged to Julius Caesar, and would suffer no other one to mount him—*Caius Julius Caesar uterque equus insigni pedibus prope humanis, et in modum digitorum ungulis fas.* &c. This last was probably a case of malformation of the hoof; but the painter has given the animal two human hands, with four fingers and a thumb on each, and nails to match. Leaving then these romantic writings, we proceed to the view of the systems of the modern and more sober-minded zoologists.

Linnaeus, in his last edition of the *Systema Naturae* (12th), left the family among his Beline (the sixth order of *Mammalia* in his arrangement), together with the genera Hipposponias, Sus, and Rhinoceros. His genus *Equus* consists of the following species: E. Caballus, E. Animosus, and E. Zebra, and is thus defined by him—*Incisor teeth (Dentum incisum) 1,1; canines (Canini) 2,2; the molars (Molares) 4,4; 5,5; 6,5; divided into two sections, in each section three, below two, above one.* Carus, in his *Revisions of the Family Equidae* (Zool. Journ., vol. 1), observes that the other authors speak of the Horse, Mule, Onager, Ass, and Zebra, the last of which they generally describe as having the body (corpus) stripped of black, brown, and white bands, three inches broad, but too narrow for the legs; but Jonston’s figure they are distinctly handed. After referring to the other figures in Jonston and to Molina’s *Gnemel, or Haurmal, Equus bisiricus* of Gmelin, which, if it exists, Mr. Gray considers to be probably a species of Llamas (Lama), he notices the figures in Edwards’s *Gleanings,* the species recorded by Linnaeus, Pallas, and Burchell,—the Quagga sent by Captain Gordon from the Cape to Amsterdam, where it was first described and figured from his drawing in the Dutch edition of Buffon, and afterwards in the supplement of the French editions, and *L’Anne Isabelle* of Le Vaillant. With regard to the last, which is described as having a pied or black and white colour without any band, Mr. Gray observes, that nobody since Le Vaillant’s time, as far as he can learn, has mentioned it, and he asks whether it may not be an albino variety of the Zebra or Quagga, as the case is sometimes found of yellow cross, in its domesticated state. To this however Mr. Gray adds that a year or two ago (he writes in 1824), as he was informed by Mr. Cross, a specimen said to be of this species was brought to this in the description.

Mr. Gray thus defines the Family of Equidae:—This family (which is distinguished from all other animals by its undivided hoof, formed of the two anterior toes soldered together, its simple stomache, and its female having the teat placed on the belly) is divided into two very distinct types of form: the one, the Asses and the Zebras, which are always whiter and more or less banded with blackish-brown, and always have a distinct dorsal line, the tail only bared at the end, and have warts only on the arms and none on the hind legs; and the true horses, which are not banded, have no dorsal line, are furnished with warts on their arms and legs, and have long hair on the tail, from its insertion to its extremity. He further proceeds with his definition thus: *Equus: Solidangular antiquorum, Cuviier, &c.*

**Genus Equus, Linn.:—Dentes incisores, 1,1; canins (mores) 6,6; molares 6,6 = 42. Pedes ungulatus indivisa.*


Mr. Lesson, in his *Systema Zoologicum,* divides the Horse, of Gray, comprise only the genus *Equus,* which Mr. Gray has proposed to advance to the rank of a family under that name, comprising the genera *Equus and Arinus,* but adds *M. Lesson,* there is nothing to induce us to admit a division which reposes only upon superficial characters.

Mr. Bell is of a different opinion, and in his *British Quadrupeds* follows Mr. Gray in considering the *Ass* as being there is one character which, if in itself to be considered of primary value, is yet interesting; and yet unparalleled as a collateral distinction: I mean the general tendency of the coloration and marking in the two forms. In the Horse’s coat there is a particular disposition of several minute round spots of a different shade or hue from that of the ground, and this is the case whether the general colour be black, chestnut, or grey; in the genus *Arinus,* on the contrary, the markings are invariably disposed in stripes. The Zebra, the Quagga, and the Dzigta, or *Equus Zebra,* are too familiar to require more than this allusion; and in the common Ass, not only is the same tendency evinced by the cross-mark on the shoulders, but in the young Ass there are frequently observed some obscure darkish bands on the legs. These tendencies to a peculiar character of coloration and marking are well worthy of especial notice in the mammals, among which will be found numerous instances bearing upon the same point. In birds and insects it is still more general and striking, and has always attracted the attention of naturalists; but in the present class it has certainly been too much overlooked.

**Geographical Distribution of the Equidae.**—Although the Horse, the Ass, and the Mule are now spread over the whole face of the civilized earth, and although the Horse is found wild, or rather has been reared by man from the New and the Old World, there can be no doubt that the form which we are now considering was originally entirely confined to the latter portion of the globe, where the truly wild species of the family, the Quagga and Zebra, *Eurippus,* are still to be found in all their native state. This leads us to consider the time and the place where the Horse was first subdued by the powerful hand of man.

Mr. Bell, who appeals to the sacred scriptures in proof that the Horse is of Eastern origin, is of opinion, from the same authority, that the Egyptians were probably the first who
broke the proud spirit of this noble animal and reduced it to obedience and servitude. The books of Genesis and Exodus abound with passages which prove that the Horse had been long under the dominion of man at the date of the events then recorded. It was expressly prohibited (Deut. xvii. 16) that the king should multiply horses to himself, or should cause the people to return to Egypt, to the end that he should multiply horses. Solomon however does not seem to have regarded this prohibition, for his stables were filled with those noble animals; he had 40,000 stalls of horses for his chariots, and 12,000 horsemen. (1 Kings, iv. 25.)

The grand description in Job (xxxix. 19-25) is familiar to most, but Egypt (1 Kings, x. 28), and not Arabia, seems to have been the source whence Solomon's supplies were obtained. In very early Egyptian monuments the horse is seen with great frequency, circumstances which denote long subjugation and experienced training.

It seems to be quite clear that the wild horses of Tartary are as much the descendants of a domesticated race as the wild horses of America, whose ancestors were introduced by the Spaniards; nor have we any evidence to show the time when the Horse existed in a primitive state of nature.

EQUINE.

Genus Equus.

Natural History and Denition of the Horse.—It has already been observed that the native country of the horse is Asia, and that it has been long known in Europe. The Horse has been found in almost every part of the Old World, but his appearance on the continents and the islands of the New World, whether of the Atlantic or Pacific Ocean, is of comparatively recent date. Everywhere he is recognised as the most useful of the servants of man, and he yields in intelligence to the dog alone. In the earlier ages of the world he seems to have been devoted to the purposes of war or of guarding the flocks our ancestors had to serve; but his beauty, and strength, and tractability, have now connected him, directly or indirectly, with almost all the purposes of life. If he differs in different countries in form and in size, it is from the influence of climate and cultivation; but otherwise, from the war-horse, as he is depicted on the friezes of ancient temples, to the stately charger of Holstein and of Spain, or from the fleet and beautiful Arabian, to the diminutive Shetland, there is an evident similarity of form and destination which clearly stamps his common origin.

He is naturally and of choice an herbivorous animal. His thin and muscular lips, his firm and compressed mouth, and his sharp incisors, are all too adaptly adapted to seize and to crop the grass; and although we know nothing of him in his natural state, yet when he has escaped from the bondage of man, and follows his own propensities, the grass which was his food in Asia, his home, ever he was destined to live partially or chiefly on other aliment, and that of a much harder kind—the various species of corn; therefore while man and the carnivorous animals can only champ and crush their food, a provision is given to the horse, in the structure of some of the bones of the face, by means of which he can comminute and grind down his food as perfectly as in the best contrived mill.

The teeth of the horse require some lengthened consideration, not only from their admirable adaptation to this purpose, but as indicating, by the various changes which they undergo, almost beyond the possibility of error, the age of the animal. He may, when young in years, be reduced nearly to the decrepitude of age by the hasty usage of those who ought to be his most zealous protectors; the cavity above the eye may be deepened, the under lip may fail, the limbs may be bowed, and the feet may be battered and distended,—but it is not easy to alter the character of the teeth.

The colt is generally dropped with the first and second molar and grinding teeth having forced their way through the gums; after the eruption of these roots the young animal, as well as the mother horse, will have nearly attained their natural level. A third grinder will then have appeared, and a little before or after the eighth month the third nipper, above and below, will be seen. The teeth of the colt will now have his full complement of front or cutting teeth.

These teeth are beautifully adapted to their purpose. They have in front an elevated cutting edge of considerable sharpness. It is formed of enamel, a polished substance almost too hard to be acted upon by the file, which covers the tooth. This elevated edge is bent somewhat inwards and over the tooth, so that there is a depression behind it. It is a cap at the mouth of the tooth. This constitutes what is called the 'mark' in the mouth of the horse.

This elevated edge, or enamel, hard as it is, is gradually worn down in the teeth of nipping and eating grass; and as it wears away the hollow behind becomes diminished, and is at length totally obliterated. By the degree in which this mark is effaced, the horseman, not only with regard to the first, but the second and third, can judge of the age and vigour of the animal. This obliteration begins to be marked at an early age. At six months it is sufficiently evident in the four central nippers. At a year and a half the mark will be very faint in the central nippers, diminished in the second and third, and the surface of all of them will be flattened.

At twelve months a fourth grinner protrudes, and a fifth at the expiration of two years.

These are all temporary teeth. They were only last during a very early period of the life of the animal; and when his jaws were considerably expanded, they were destined to give way to another set, larger, firmer, and that would probably last during life. The permanent teeth had been growing within the sockets of the deciduous ones, and had been pressing upon their roots, and that pressure had caused an absorption of these roots, until at length they lost all hold and were displaced.

When the animal is about three years old the central pair of nippers, above and below, are thus removed, and two fresh teeth, easily distinguishable from the first by their increased size, make their appearance, so that a three-year-old colt is easily recognised by these two new and enlarged central nippers.

A three-year-old colt has his form and energies much more developed than a two-year-old one, and is considerably more valuable; therefore some dishonest breeders endeavour to pass him upon the unwary as being a year older than he really is, and they accomplish this in an ingenious but cruel manner. This cannot however be effected until a portion of the second year is past, when the permanent teeth below have by the pressure of their predecessors, and then the breeder extracts the central milk-teeth. Those below having no longer anything to resist their progress, grow far more rapidly than they otherwise would have done, and the colt gains four or five months in the apparent age of his colt.

Can this trickery be detected? Not always, except by him who is well accustomed to horses. The comparatively slow growth and the slow wearing away of these teeth prevent the development of these nippers in the upper and under jaw— for the breeder usually confines his rogacity to the lower jaw, the upper one being comparatively seldom examined. These circumstances, together with a deficiency of general development in the colt, will alone enable the purchaser to detect the attempted cheat.

The honest mouth of a three-year-old horse should be thus formed:—the central teeth are palpably larger than the others, and have the mark on their upper surface evident and well defined. They will however be lower than the other teeth. The mark in the next pair of nippers will be nearly worn away, and that in the corner nippers will begin to be effaced.

At three years and a half the second nippers will be pushed from their sockets, and their place gradually supplied by a new pair; and at four and a half the corner nippers will be undergrowing; the same process is repeated when the old central nippers will be fully grown; the next pair will be up, but will not have attained their full height; and the corner nippers will be small, with their mark nearly effaced. At five years old the mark will begin to be effaced from the central teeth, the next pair will be fully grown and the blackness of the mark a little taken off, and the corner pair will be protruding or partly grown.

At this period, or between the fourth and fifth year, another change will have taken place; the incisors; the tines will have begun to appear. There will be two of them in each jaw, between the nippers and the grinders,
considerably nearer to the former than the latter, and particularly so in the lower jaw. The use of these tushes in the domesticated state of the horse is not evident; but they were probably designed as weapons of offence in the wild state of the animal. Attempts are too frequently made to hasten the growth of the second and the corner teeth, in the same manner as described with regard to the first, and the gum is often deeply lanced in order to hasten the appearance of the tush.

At eight the mark on the central nippers will be diminished, if not obliterated. A depression and a mark of rather brown hue may remain, but the deep blackened hole in the centre will no longer be found. The other incisors will have worn down, and their mark will be but faintly developed. At seven the mark on the next pair of incisors will have nearly disappeared, and the tush will be rounded at the point and edges.

At eight the mark will have disappeared from all the incisor teeth, and the tush will be evidently rounder and blunter.

At this period another piece of trickery is occasionally practised. The breeder had told the animal was five years old, been endeavouring to give him an older appearance than his years entitled him to, because in proportion as he approached the period when his powers were most perfectly developed his value increased; but now he endeavours, for occasional reasons, to make the horse is every way so that with a sharp-pointed steel instrument a little hole is dug on the surface of the corner incisor, to which a red-hot iron is afterwards applied. An indelible black mark is thus left on the teeth. Sometimes it is carried further, for occasionally the next tooth is slightly touched with the engraver and the cautery; but here the dishonest dealer generally overreaches himself, for the form and general appearance of a six-year-old horse can rarely be given to one who has passed his eighth year.

The eighth year having passed, it is difficult to decide on the exact age of the horse. The incisors of the upper jaw are then the best guides. At nine years the mark is said to be worn out, but the central teeth are at least from the next pair; and at twelve, from the corner ones. The tush likewise becomes shorter and blunter.

There are many circumstances which render a decision as to the age of the horse very difficult after the marks are effaced from the lower incisors, and even before that period. Horses always kept in the stable have the mark much sooner worn out than those that are at grass, and it is impossible to form any calculation at all as to orb-_bitsers.

Of the age to which the horse would naturally arrive it is impossible to say anything satisfactory. Many have exceeded thirty, and some of them even forty years; but, from ill usage and over exertion, the majority come to their end between nine and nine and ten years of age. The Proper Conformation of the Horse.—A very general account only can be given of this, for it varies essentially with the breed and destination of the animal. There are some points which are very valuable in the description. The head should not be disproportionately large, and should be well set on, i.e. the lower jaw-bones should be sufficiently far apart to enable the head to form that angle with the neck which gives free motion and a graceful carriage to it, and prevents its bearing too heavy on the hand. The eye should be large and a little prominent, and the eyelid fine and thin. The ear should be small and erect, and quick in motion. The lip-end indicates dullness or stubbornness; and when it is habitually laid too far back upon the neck, there is too frequently a disposition to mischief. The nostril in every breed should be somewhat expanded; and it should be too much the hunter, the roadster, and the couch-horse, for this animal breathes only through the nostril, and would be dangerously distressed when much speed is required of him, if the nostril could not dilate to admit and to return the cold air. The neck should be long rather than short. It then enables the animal to graze with more ease, and to throw his weight more forward, whether he is in harness or galloping at the top. It should be well defined, and gradually become fine as it approaches the head. The withers should be somewhat high in every horse, except perhaps that of heavy draught, and it does not harm him, for it gives a larger area for the attachment of the muscles of the back, and they act at greater weight.

A slanting direction of the shoulder gives also much mechanical advantage, as well as an easy and pleasant action, and a greater degree of safety. It must not however exist in any considerable degree in the horse of draught, and particularly of heavy draught. The chest must be capacious, for it contains the heart and the lungs, the organs on which depends the speed and endurance of the horse. Capacity of chest is indispensable in every horse, but the form of the chest admits of variation. In the waggon-horse the circular chest may be admitted, because he seldom goes at any great speed, and there is comparatively little variation in the quantity of air expired; but in the race-horse it is often fearful. The quantity of air expended in the gallop is many times that required in hard work. Here we must have depth of chest, not only as giving more room for the lungs, but for the expansion of the diaphragm, and the admission of more air into the lungs. The expansion of the chest depends, but a conformation of the chest which admits of that expansion. That which is somewhat straight may be easily bent into a circle when greater capacity is required; that which is already curved admits of no further expansion. A few words more are all that our limits permit us to add, and they contain almost all that is necessary to be added on the conformation of the horse. The loins should be broad, the quarters long, the thighs muscular, and the hocks well bent and well under the horse.

General Management of Horses.—The foal, as soon as it is dropped, should be turned with its dam into a sheltered place, and good care should be taken to conceal the place from wind and rain. The colt should retire from the wind and rain. Some hay or corn, or both, should be allowed, if it is early in the season, or the grass has scarcely begun to shoot. There is nothing so detrimental to the colt as insufficient food. It is supposed that its food should be increased in summer, in regard to the amount of greenstuff. Good grass in breeding, that the growth is checked by starvation, and energy and stoutness will rarely be displayed in fall and winter.

In five or six months, according to the growth of the foal, the colts or fillies are to be separated from the dam. The colts should be removed from their father's haunts to some distant rick-yard, or confined to a stable, until he becomes a little reconciled to the loss of his dam.

In the horses' case the same system should be pursued. A process on which will materially depend the temper and value of the horse, and the pleasure of the rider. The foal should be hand-tied and halted, and led about by the servant who has several times handled him, and whom he should always be kind. 'The principle,' says the author of 'The Horse,' on which the after-usefulness of the animal is founded, is early attachment to confidence in man, and obedience resulting principally from these.' With regard to the breaking colt, the processes of breaking and training are injuriously and cruelly completed in the second year, and thousands of horses are irremediably injured by this early exhibition of labour and speed: but in the hunter, the jumper, the hack, the carriage horse, the service of the rider is of serious part of this business is not entered upon until the third year.

A horse is well broken when he has been taught implicit obedience and cheery obedience to his rider or driver, and dexterity in the performance of his work. A dogged, sullen, spiritless submission may be enforced by the cruel and brutal usage to which the breaker so frequently has recourse; but that prompt and eager response to the slightest intimation of the rider's will—that manifest aim to anticipate every wish, that gives to the horse so much of his value, must be built on habitual confidence and attachment. The education of the horse should be that of the child. Pleasure should be as much as possible associated with the early lessons; while firmness, or, if need be, coercion, must establish the habit of obedience.

The hay is eaten, the work accomplished, the management of the horse will vary according to his breed and destination; but the good usage of our domesticated stables should be regarded as a principle that ought never to be violated. The agricultural horse should be fed generally as well fed; perhaps, in many cases, too much above his work. This however is an error on the right side. A very slight inspection of the animal will always enable the owner to determine what is good for his horse. He should carefully observe the growth of the horse, and the nature of the work, and the season of the year, will make considerable difference in the quantity and the quality of the food. The following accounts will sufficiently elucidate the general remarks:—

A horse uses seven acres per week, the year through, on strong land with a team of three horses, and allows to each weekly two
bushels of oats, with hay, during the winter six months, and during the remainder of the year one bushel of oats per week, with green food. Mr. Elliman, of Glynde in Sussex, allows two bushels of oats, with pease-haulm or straw, but with very little hay, during winter, three bushels of oats with green food during the summer. There is very little difference in the management of these two gentlemen, and that probably arising from circumstances pretty far to their principle of feeding with reference to agricultural horses are, to keep the animal rather above his work, to give him good and wholesome food, and, by the use of the nose-bag, or otherwise, to work more than four or five hours without being baited.

The horse of quick work, the stage-coach horse and thePoster, should be allowed as much as he will eat, care being taken that he is not got into the habit of being readily disposed of. The quantity actually eaten will depend on the degree of work and the natural appetite of the horse, but it may be averaged at about 66 pounds of chaff, 173 pounds of beans and 77 of oats per week. When the work is unusually hard, the quantity of oats may be diminished, that of beans increased, and a portion of barley added.

During the sporting season the hunter is well fed, and in a kind of food which contains a great proportion of nutriment in little compass. A small quantity of hay, rarely more than eight or ten pounds per day, is allowed, and less than that on the day before work. The quantity of corn may be varied according to the weather, but the most hunting stables, and probably well founded, against fast, and it is seldom that the beans and oats are bruised. A bran-mash is given after a day of more than usual fatigue, and it is a service to the horse, if he has not been more than ordinary work, provided that at least two days are suffered to elapse before the horse is again taken into the field.

The horse should be urged on after he has exhibited unequivalents of distress, such as a drooping pace, a staggering gait, a heavy bearing on the hand, a rapid inspiration like a hurried sigh, and a peculiar convulsive action of the diaphragm, as though the lungs were violently beating against the side. The loss of blood, the administration of some cordial medicine, and slow leading to the nearest stable, are the best restoratives at the moment of distress; although the cordial would be absolutely destructive a few hours afterwards, when inflammation had commenced.

The hunting season having passed, the horse used to be turned into the field as soon as the grass had begun fairly to spring. Coolness of the herbage which they tread at that period, and there is no physic which so safely and effectually as the spring grass carries off every humour that may be lurking in their frame.

A good sporting hunter for his work is a simple affair. It is, by means of exercise and of physic, getting rid of all superfluous fat and flesh, without debilitating him. The physic is useful; it is indispensable; but the chief thing is gradually to accustom him to the exertion of every power that he possesses, without so much hurrying his breathing or overtraining or injuring him.

The training of the race-horse is of a similar character, but it is far more severe, for his strength, his speed, and his endurance must be tested to the utmost. The hunter has to carry his rider gallantly and well through perhaps a long burst, and if he tires, and the sportsman has the good sense to gradually to acustom him to the exertion of every power that he possesses, without too much hurrying his breathing or overtraining or injuring him.

The training of a horse should undergo some degree of training as to the pace, the distance, and the burden. When there has been no preparation the stables must at first be short, and the pace gentle. For a journey of 300 miles the horse may travel from 20 to 25 miles a day, resting on the Sunday, and doing the work in two stages, at the pace of six miles an hour. This requires a seasoned horse, and the number of working hours per day is about four.

Hunting races are not always as steep as they occasionally exceed twelve miles an hour, and the run is short, soon over, or interrupted; yet soft sinking ground, hills, and jumps make this pace severe even on the best horses. The
time for preparation varies from two to four months. On the day before work the horse should have exercise enough to empty the bowels. If he has a good feeder he should have no hay within eight hours of starting, nor water within four hours, nor corn within three hours; but if he has five or six miles to go to cover, these restrictions are less necessary. The working days will vary according to his condition and the height of the weather. He must be able to go out every second day, and sometimes not more than once in six or seven. His spirits and appetite, and the state of his legs, will decide this. Even on the blank days some exercise should be taken in order to evacuate the bowels and create an appetite.

Coaching.—The horses are best prepared for their work by good feeding and gradual increase of speed and distance. A length of eight miles during the winter, that a horse is required for every mile, or a coach running between two places forty miles distant employs forty horses to take it away and bring it back. The pace being calculated to eleven miles an hour, no horse works quite an hour in the day, and none more than three-quarters of an hour, except that, occasionally, an able horse may perform a double journey in order to relieve a sick companion. No horse therefore leads so easy a life as an English coach-horse in a well regulated establishment. The muscular exertion is severe while it lasts, but it is soon over. The excitement however of high keep and excessive exertion on the horse down, and it is rare that he continues in a fast coach more than four years.

(Nimrod, On the Road.)

Carting.—Cart-horses usually work from eight to ten hours, six days in the week. The pace varies from two to four miles an hour, four to half per hour; the weight rarely exceeds 24 cwt., besides the cart, which probably is seven or eight more. All beyond this in weight or time of work is too much for them.

Ploughing.—The average work is about eight hours in the day. The severity of it depends on the pace, the nature of the soil, and the breadth of the furrow-slice. The pace is from a mile and a half to two miles per hour; the furrow-slice from eight to ten inches. If ploughed well, a horse so occupied is travelled from twelve to sixteen miles. The horse and the man can well support this as long as the ploughing season continues.

Diseases of Horses.—It may be readily supposed that the animal doomed to the manner of living just traced in every variety of the horse will be peculiarly exposed to numerous forms of suffering. Every natural evil will be aggravated, and many new and formidable sources of pain and death will be superadded.

Interest and humanity require that we should become acquainted with the nature and causes and remedy of the diseases of horses. Only a slight idea of diseases can be given here, but sufficient perhaps to enable the owner to recognise their existence, to avoid their causes, or to induce him to apply to the proper quarter for their removal or alleviation.

The principal diseases of the horse are connected with the circulatory system. From the state of habitual excitement in which the animal is kept, in order to enable him to execute his task, the heat of the horse and the blood-vessels will often act too impetuously. The vital fluid will be hurried along too rapidly, either through the frame generally or some particular part of it, and there will be congestion, accumulation of blood in that part, or there will be inflammation, either local or general, disturbing the functions of some organ or of the whole frame. Congestion.—Take a young horse on his first entrance into the stables; feed him somewhat highly, and what is the consequence? He has swelling in the legs, or inflammation of the joints, or perhaps of the lungs. Take a horse that has lived somewhat above his work, and gallop him to the top of his speed: his nervous system becomes highly excited—the heart beats with fear and rapidity, the blood is pumped into the lungs faster than they can discharge it—the pulmonary vessels become gorged, fatigued, and utterly powerless—the blood, arrested in its course, becomes viscid, and the animal paralysed. Eddy has swelling of the legs, inflammation of saving our patient, via, the instantaneous and copious abstraction of blood; and one means of preventing the recurrence of this dangerous state, namely, by not suffering too great an accumulation of the saurine fluid by overfeeding, and, by regular and systematic exercise, injure the circulatory vessels to prompt and efficient action when they are suddenly called upon to exert themselves. The cause and the remedy are sufficiently plain, and the animal suddenly drops powerless. A prompt and copious abstraction of blood, or in other words a diminution of this pressure, can alone save the patient. Here is the nature, the cause, and the treatment of apoplexy.

Sometimes this disease assumes a different form. The horse has not been performing more than his ordinary work, or perhaps he may not have been out of the stable. He is found with his head drooping and his vision impaired. He is staggering about; he falls, and lies half unconscious, or he struggles violently and dangerously. There is the same congestion of the blood-vessels, but the blood is not suddenly incapable of being discharged by the lungs, for the stomach was completely distended and unable to propel forward its accumulated contents. Thus distended, its blood-vessels are compressed, and the circulation through them is altogether suspended; the blood is still forced on by the heart, and driven in accumulated quantity to other organs, and to the brain among the rest; and there congestion takes place, as just described, and the animal becomes sleepy, unconscious, and, if he is not speedily relieved, he dies. The horseman calls it stomach stagger. It is caused by improper feeding. The division of the hours of labour, and the introduction of the nose-bag, have much diminished the frequency of this occurrence. The remedy is plain, bleeding, physicking, and the removal of the contents of the stomach by means of a pump contrived for that purpose.

Congestions of other kinds occasionally present themselves. It is no uncommon thing for the blood to litter in the complicated vessels of the liver, until the covering of that viscous has burst, and an accumulation of congealed blood, and in the black blood, the spleen. In this case it constitutes the swollen legs to which so many horses are subject when they stand too long idle in the stable. Congestion is the source of many of the accumulations of serous fluid in various parts of the body, and particularly in the abdomen, the abdomen.

Inflammation is opposed to congestion, as consisting in an active state of the capillary arterial vessels; the blood rushing through them with far greater rapidity than in health, from the excited state of the nervous system, by which they are supplied. Inflammation is either local or diffused. It is confined to one organ, or to a particular portion of that organ; it involves a disease affecting the surrounding or the whole frame. In the latter case it assumes the name of fever. Fever is general or constitutional inflammation, and is said to be symptomatic or symptomatic when it can be traced to accidental local causes, but remains chronic when we cannot so trace it. The truth probably is that every fever has its local cause, but we have not a sufficient knowledge of the animal economy to be able to discover it.

Inflammation may be—proved with reference to the membranes which it attacks.

The mucous membranes line all the cavities that communicate with the external surface of the body. There is an inflammation of one channel of the mucous membrane of the mouth. Blist, or stomatitis, is a vascular inflammation which runs along the side of the tongue. Its cause is unknown. It should be lanced freely and deeply, and a little aperient medicine administered. Barbs, or paps, are smaller enlargements, found more in the neighbourhood of the bridge.
of the tongue. They should never be touched with any
instrument, a little cooling medicament will generally remove
them. Lepas is inflammation of the palate, or enlargement
of the bars of the palate. The roof of the mouth may be slightly
lanced, or a little aperient medicine administered, with the hope of the
mouth should never be destroyed by the application of the heated iron. Canker
and wounds in the mouth, from various causes, will be best
remedied by diluted tincture of myrrh, or a weak solution of alum. Foreign bodies in the
gullet may generally be removed by the sucking out of a spoon of
honey of clover; or the esophagus may be opened, and the obstruc-
ting body taken out. It is on the mucous membranes that
poisons principally exert their influence. The use is the most
controllable, and in the horse, the horse is usually treated by
timey recourse to equal parts of vinegar and water in-
jected into the stomach, after the poison has been as much
as possible removed by means of the stomach-pump. For
arsenic or corrosive sublimate there is rarely any antidote.
Spasmodic colic is too frequently produced by exposure
to cold, or the drinking of cold water, or the use of too
much green meat. The horse should be walked about;
strong friction used over the belly, and spirit of turpentine
given doses of two ounces, with an ounce each of laudan-
um and spirit of nitrous ether, in warm water, or ale. If
the spasms is not soon relieved the animal should be bled,
an aperient blood-administered, and injections of warm water
with a little spirit of turpentine, and friction of the bases of the
bowels, when long continued, is liable to produce
intronseption, or entanglement, of them, and the case is
then hopeless. Superpurpuraion often follows the admin-
istration of brandy, and must first be subdued by the use
of opium. The torture which it produces will be evident by the agoni-
ased expression of the countenance, and the frequent looking
at the flanks. Plenty of thin starch or arrowroot should be
given, and the bowels kept open and free, both at night and,
and two hours having passed without relief being experienced,
chalk, catechu, and opium should be added to the gruel.
Worms in the intestines are not productive of much
mischief, except when they are accompanied by concomitant
of a strange roaring noise, and an evident enlargement and
great tenderness of the loins when felt externally. The windpipe must be opened in such cases, and the best advice
will be needful. Sometimes the subdivisions of the
trachea, before or when it enters the lungs, will be the
part affected, and we have bronchitis. This is character-
ised by a quick and hard breathing, and a peculiar wheezing
sound, with the coughing up of mucus. Here too decisive
measures must be adopted, and a skilful practitioner em-
ployed. So he does in distemper, influenza, and epidemic
catarrh, names indicating the same disease, and produced by
atmospheric influences varying in each country; but too
usual is an inflammation of the mucous surfaces, and by rapid and utter prostration of
strength, and in all demanding the abatement of that
inflammation, and yet no expenditure of vital pot.

Among the consequences of these severe affections of the
lungs are chronic cough, not always much interfering with
the usefulness of the horse, but strangely aggravated at
times by any fresh accession of catarrh, and too often
degenerating into thick wind, which always materially interferes
with the use of the horse, and in a great proportion of
cases terminates in bronchitis. Wind.

Glanders, the most destructive of all the diseases to which
the horse is exposed, is the consequence of breathing the
atmosphere of foul and vitiated stables — the winding up of
almost every organ, and in almost every horse, it is,
most contagious. Its most prominent symptoms are a small,
but constant discharge of sticky matter from the nose, an
enlargement and induration of the glands beneath and
within the lower jaw, on one or both sides; and, before the termi-
nation of the disease, chancres and inflammation of the nostril
on the same side with the enlarged gland. Its contagious-
ess should never be forgotten, for if a glandersed horse
is once introduced on a stable, almost every horse in it
will sooner or later become infected.

The urinary and genital organs are also lined by mucous
membranes. The horse is subject to inflammation of the
kidneys from eating masty oats or mowburnt hay, from
the exposure to cold, and from the influence of the
physic, and counter-irritants over the region of the loins
should be had recourse to. Diabetes, or profuse staling, is
difficult to treat. The inflammation that may exist should
be subdued by the use of opium. It is rare that this in the
horse. A stone in the bladder is readily detected by the
practitioner, and may be extracted with comparative ease.
The sheath of the penis often becomes diseased from the
presence of corrosive nucous matter; it may easily be re-
moved with warm soap and water.

To the mucous membranes belong the conjunctival tunic of
the eye, and the diseases of the eye generally may be
here considered. A scabby thickness on the edge of the
margins of the eyelids, Hor in the eyelids may be
occasionally taken for smallpox, and, two or
hours having passed without relief being experienced,
chalk, catechu, and opium should be added to the gruel.
Worms in the intestines are not productive of much
mischief, except when they are accompanied by concomitant
of a strange roaring noise, and an evident enlargement and
great tenderness of the loins when felt externally. The windpipe must be opened in such cases, and the best advice
will be needful. Sometimes the subdivisions of the
trachea, before or when it enters the lungs, will be the
part affected, and we have bronchitis. This is character-
ised by a quick and hard breathing, and a peculiar wheezing
sound, with the coughing up of mucus. Here too decisive
measures must be adopted, and a skilful practitioner em-
ployed. So he does in distemper, influenza, and epidemic
catarrh, names indicating the same disease, and produced by
atmospheric influences varying in each country; but too
usual is an inflammation of the mucous surfaces, and by rapid and utter prostration of
strength, and in all demanding the abatement of that
inflammation, and yet no expenditure of vital pot.

Inflammation of the Bladder. — A bladder inflammation may
prove fatal in twenty-four or even in twelve hours. It is mostly characterized by
tinctorial, or a metallic influence on the end of a
bronchial cone, a very satisfying sensation of the
mucous surfaces, and by rapid and utter prostration of
strength, and in all demanding the abatement of that
inflammation, and yet no expenditure of vital pot.

Inflammation of the Brain. — Mad staggerers fall under this
division. It is inflammation of the brain, espe-
devolves of the brain, produced by over-exertion, or by any of
the causes of general fever, and it is characterised by the
wildest delirium. Nothing but the most profound bloodletting,
active purgation, and blistering the head, will afford
the slightest hope of success. Tetanus, or Locked Jaw, is a
constant spasm of all the voluntary muscles, and particularly those of the neck, the spine, and the head, arising from the injury of some nervous fibril—that injury spreading to the origin of the nerve—the brain becoming affected, and then a broken synovia—result. Bleeding, physicicking, blistering the course of the spine, and the administration of opium in enormous doses, will alone give any chance of cure. Epilepsy is not a frequent concomitant. It is, of course, but with relapses of the same. It is also very apt to return at the most distant and uncertain intervals. Paraly is the suspension of nervous power. It is usually confined to the hinder limbs, and sometimes to the fore. The state of the being is physicking, and all the rational applications, but they too often utterly fail of success. Rhabdomy, or madness, is evidently a disease of the nervous system, and once being developed is altogether without cure. The utter destruction of the bitten part with the lunar caustic, soon after the infliction of the wound, will however, in a great majority of cases, prevent the development of the disease.

Pleurisy, or inflammation of the serous covering of the lungs and the lining of the cavity of the chest, is generally connected with inflammation of the substance of the lungs; but it occasionally occurs independent of any state of the lungs. The chest is felt hard and tender instead of being oppressed; the extremities are not so intensely cold as in pneumonia, the membrane of the nose is little reddened, and the sides are tender. It may be of importance to distinguish this affection from plethysma, because a more severe purgation may be pursued, and the effect of counter-irritants will be greater, from their proximity to the seat of disease. Copious bleedings and sedatives here also should be had recourse to. In a case of the kind, the union of a warm fluid is effused in the chest, the existence and the extent of which may be ascertained by the practised ear, and which—in many cases may be safely evacuated. The heart is surrounded by a serous membrane, the pericardium, which secretes a fluid, the interposition of which prevents any injurious friction or concussion in the constant action of this organ. If this fluid increases to too great a degree, the oxygen of the heart becomes destroyed,—this is dropes of the heart: it is difficult to detect, and more difficult to cure. The heart itself is often diseased; it sympathises with the inflammatory affection of every organ, and therefore is itself occasionally inflamed. Carditis, or inflammation of the heart, is characterised by the strength of its pulsations, the tremour of which can be seen, while the sound can be heard at a distance of several yards. Speedy and copious blood-letting will afford the only hope of cure in such a case.

The outer coat of the stomach and intestines is composed of a serous membrane, the peritoneum, which adds strength and security to the texture of the coats, and confines them in their respective places. It secretes a fluid that prevents all injurious friction between them. This coat is exceedingly subject to inflammation, somewhat gradual in its progress; the pulse quickened, but small; the legs cold; the belly tender; there being constant pain, and every motion increasing it, there also being great and rapid prostration of strength. These symptoms will sufficiently characterize peritoneal inflammation. Bleeding, aperient injections, and extensive counter-irritation will afford the only hope of cure.

The time for castration varies according to the breed and destiny of the horse. On the farmer's colt it may be effected with safety when it is a month old, and it is comparatively seldom that a fatal case then occurs. For other horses much depends on their growth, and particularly on the development of their fore quarters. Little improvement has been effected in the old mode of castrating, except the opening of the scrotum, and the division of the cord by the knife, instead of the heated iron.

Synovial or joint membranes are interposed between the cartilage and the bone in the joints, and frequently between the tendons, in order to secrete a certain fluid that shall facilitate motion and obviate friction. Occasionally the membrane is lacerated, and the synovia escapes. This is termed opened joint, and is inflammation rapid and sharp. The practitioner is to close this opening, and as quickly as possible. Nothing is so effectual here as the old application of the cautery. A great deal of inflammation and engorgement is produced around the opening, partially, if not altogether, closing it; or at least enabling the coagulated synovia to occupy and obliterate it. Perhaps, in order to assure the desired result, the whole of the joint should be blistered; a bandage should then be applied, and kept on as long as possible. If after this the joint is still tender, the synovia, the cautery must again be had recourse to.

The Nervous Disease is a bruise, or inflammation, or perhaps destruction, of the cartilage of the navicular bone, or, in short, of the bone itself. This is a very common disease of those of the horse sustaining a very unequal degree of concussion and weight. The cartilaginous substance which unites them to the shank bone takes on inflammation, it becomes red, and then the bone becomes, to a very considerable extent, useful. Carb is an enlargement of the back of the hock, three or four inches below its point. It is a strain of the ligament which there binds the tendons down in the hock. The treatment should be to apply a large plaster bandage to the almost absolute rest; a plaster should be applied over the back of the tumour, and, occasionally, firing will be requisite to complete the cure. Near the fetlock, and where the tendons are exposed to injury from pressure of weight. The treatment is to apply a bandage to the limb, to allow the lubricating mucous fluid constantly escapes. In the violent tasks which the horse occasionally has to perform these become bruised and inflamed, and enlarged and hardened, and am and are termed carbages: they are seldom a cause of lameness after the inflammation has subsided, unless they become very much enlarged. The cautery will then be the best cure. Immediately above the hock enlargement is prescribed as in the case of carbages. If, from swelling, they project both inward and outwardly, they are termed thorough-pins. They are seldom a cause of lameness, but they indicate great and perhaps injurious exertion of the joint. On the inside of the hock tumours of this kind, but of a more serious nature, is found. It is one of these enlarged mucous bags, but very deep seated, the subcutaneous vein of the hock passing over it. The course of the blood is thus obstructed; the vein is distended, and a portion of the vessel becomes distended. This is a serious evil; for, from the deep-seatenedness of the mucous bag, it is almost impossible to act effectually upon it. It is termed bog or blood hock.

The cleft or fissure which fills the interstices of the various organs, or enters into their texture, is the seat of many diseases. From the badness of the harness, or the brutality of the attendant, the pool of the horse becomes contused. Inflammation is set up, considerable swelling ensues, and an ulcerative process soon commences, and chasms and sinuses of the most frightful extent begin to appear. The withers are probably bruised, and the same process takes place there, and sinuses penetrate deep beneath the shoulder, and the bones of the withers are frequently exposed. These abscesses are termed poll evil and fistulous ulcers, and in the treatment of them the horse is put to the greatest of all pain. A better mode of management has however been introduced: setons are passed through the most dependent parts; no collection of sanious fluid is permitted to exist, and milder stimulants applied than were before of the utmost interest.

An abscess of a peculiar character is found between the branches of the lower jaw in young horses; it is preceded by some degree of fever. It is usually slow in its progress, but in the case of the male of the species it usually happens in the male, and the treatment of it is now simple and effectual. It is cured by blisters and by blisters: it is punctured as soon as the fluctuation of a fluid within it can be distinctly perceived, the pus speedily escapes, and there is an end of the matter.
To one disease of the absorptive system a brief reference must be made.

Parry.—While the arterial capillaries are engaged in building up the frame, the absorbents are employed in removing that which not only is useless, but which would be poisonous and destructive. They take up the matter of glands and of every ulcerating surface, and they are occasionally irritated, inflamed, and ulcerated, from the acrimonious nature of the poison which they carry. The absorbents are furnished with numerous valves; the fluid is for some arrested by them, and there the inflammation is greatest, and ulceration takes place. This is the history of the farcy cords and buds. Parry is a highly contagious disease, whether or not it is connected with glands. It however occasionally admits of cure from the application of the cautery to the bud, and the administration of the corrosive sublimate or the sulphate of iron internally.

The skin of the horse is subject to various diseases. Large pimpls or lumps suddenly appear on the skin, and, after remaining a few days, the cuticle peels off, and a circular scarly spot is left. This is called surfeit. The cause is obscure, but principally referrible to indigestion. A slight bleeding will always be serviceable; physic rarely does good, but alternatives composed of nitre, black antimony, and sulphur will be very beneficial. Monge is a disease of a different character. It is the curse of the stable into which it enters, for it will almost certainly affect every horse. Thorough dressings with Barbadoes tar and linseed oil, in the proportion of one of the former to three of the latter, will be the most effectual external application, while alternatives and physic should be given internally. Hide-bound is a very approbative term for the tanning of the hide to the ribs when a horse is out of condition. The subcutaneous adipose matter is all absorbed. The alternative above recommended will be very useful here. Grease is an undue secretion of the fluid which was designed to lubricate the skin of the heels, and that secretion being also altered in quality. The hind legs begin to swell, a fluid exudes from the heels, the hairs of the heels become erect like so many bristles, and the skin of the heel is hot and greasy. Soon afterwards cracks appear across the heel; they discharge a thick and offensive matter, and then deepen. They spread up the leg, and so does the tumefaction of the part. In process of time the skin, inflamed and ulcerated, undergoes an alteration of structure; prominences or granulations appear on it, assuming the appearance of a collection of grapes, or the skin of a pine-apple. They increase, and a fatal discharge appears from the erucives between them.

The cause is generally neglect of the horse. He is suffered to stand in the stable with his heels cold and wet, and this must necessarily dispose them to inflammation and disease.

In the first stage of grease, bran or turnip or carrot poultices will be serviceable, with moderate physic. Then astringents must be employed, and the best are alum or sulphate of copper in powder, mixed with eight times the quantity of Bole Armenian, and sprinkled on the sores. These should be alternated every three or four days. The grapy heels are a disgrace to the stable in which they are found, and admit not of radical cure.

As to the structure, shoeing, and diseases of that admirable organ the foot of the horse, the reader is referred to Goodwin 'On Shoeing,' Blaine's 'Veterinary Outlines,' and the treatise on 'The Horse,' published by the Society for the Diffusion of Useful Knowledge.

Genus. Asinus. (Gray.)

Asinus Hemionus, Equus Hemionus of Pallas; the Dhabbiketei, Dragguetoi, Deshtian, or Dragiun;—Vulgarly, the Donkey.

Description.—Mule-like in form, with the head and ears large; colour Isabella yellow; mane, tail, and dorsal line black. Gr. C. Desnouets. [As. vulg. 1.] We have to add to the article quoted, that the Ass of Dukhan (Dean) is very large, and little larger than a good mastiff or Newfoundland dog, according to Col. Sykes. (Zool. Proc., 1830-31.)

Asinus Quaggia, the Quagga. Less than the Zebra, with the hinder parts higher, and the ears shorter. For of the head, neck, mane, and shoulders blackish brown banded with white, the ground colour gradually becoming paler, and the bands less distinct and diffused, as we proceed along the back, till it is greyish on the rump; the dorsal line is black, margined on each side with a white line. Belly, tail, and legs white; ears with two irregular black bands and white tip. The young is pale brown, with the mane, a few scattered spots, and the dorsal line of a deeper colour, the latter of which is slightly extended down the tail. The belly and legs whitish grey, with a dark ring just above the hoof. The forehead, cheeks, neck, and mane marked with transverse whitish bands, which are visible in peculiar positions on the back also. (Gray.) Associates in troops, but does not herd with the Zebras.

Locality. Southern Africa, near the Cape of Good Hope. Mr. Gray observes, that according to Captain Gordon, Quaggas are employed by the natives for the purposes of draught, but he goes on to remark that as Buffon very justly observes, it is curious that he could only get a young specimen. Mr. Gray further states that an individual at Exeter 'Change was not very docile, being much more wild than the Zebra; its name, he adds, is derived from its voice, which resembles the barking of a dog.

Mr. Gray informs us (loc. cit.) that when the skin of the animal, which he considers to be and which agrees with M. Buffon's figure of the young of this species (except in having the brown ring above the hoof), was shown to Professor Temminck by Mr. Children, he declared it to be the Ass Isabella of Le Vaillant; but with all due respect to the knowledge of M. Temminck, who, Mr. Gray observes, so greatly excels in the knowledge of species, he is sorry that he cannot agree with that naturalist in this instance, although he allows that M. Temminck ought to know Le Vol. XII.—2 S
Veilant's animals better than any other person, as that celebrated traveller constantly corresponded with M. Tem-minne. 'If it be that animal,' Mr. Gray continues, 'Le Veilant must have lost his bent, and I can hardly call it Isabell colour.'

*Annis Burchelli* (Gray), Burchell's Zebra. Body white; head with numerous narrow brown stripes, which gradually unite together and form a bay nose; the neck and body with alternate broad stripes of black and narrow ones of brown, the latter of which nearly fill up the interspaces between the black stripes, and only leave a narrow whitish margin. The dorsal line is narrow, and becomes gradually broader in the hinder part, distinctly margined with white on each side. The belly, legs, and tail quite white; the mane alternately banded with blackish and white. Mr. Gray, whose description this is, has given a figure of the animal (*Zool. Journ.*, vol. i., pl. ix., fig. 1) from the skin in the British Museum, which was brought home by Mr. Burchell.

**Locality.** Southern Africa; the flat parts near the Cape. (Burchell.)

In the catalogue of the African Museum, lately (1838) dispersed, No. 24 was stated to be *Equus Burchelli*, the same animal, we presume, as that described by Mr. Gray under the name of *Annis Burchelli*. 'This,' says the catalogue, is the young of a species intermediate between the South African Quagga and the Zebra, which was found occurring in herds in every district north of the Orange River, and was probably caused by the expedition. In the districts south of the river, on the other hand, it is very rarely met with, its place in the colony being supplied by the *Equus Quagga* of Linnæus. It is an animal that admits of being tamed to a certain extent with considerable facility, and occasionally a half-domesticated specimen is exposed for sale at Cape Town, with a rider on its back. The persons however who have had most opportunities of becoming acquainted with its character regard it, even in the most tractable state to which it has yet been reduced, as wicked, treacherous, obstinate, and idle.

Mr. Gray remarks that the hoofs, as Mr. Burchell very justly observes, offer a good distinguishing character between the Zebra of the Mountains and that of the Plains. In the latter, *A. Burchelli*, the edge of the hoof is narrow and sharp, the hinder part is flatish, and the central is extended and concave; and in the former or true Zebra the edge and hinder part are thick and convex, and the centre deep and contracted. Figures of the hoofs of the two species are given in the plate above quoted, Figs. 2 and 3.

*Annis Zebra*, the Zebra. White, with close narrowish black bands on the neck, and legs, and brown ones on the face; nose, bay; dorsal line indistinct from the others. Belly and inside of the thighs bandless. Tail blackish. Mane erect, thick, bushy, banded with white. Ears with two black bands and white tips. The Zebras live in troops, on hard dry herbs, and are incapable of being tamed unless they are taken very young. (Gray.)

**Locality.** Mountainous districts near the Cape (Burchell and others), Congo, Guinea, and Abyssinia (Ludolphi).

Mr. Gray considers this species to be the *Equus montanus* of Mr. Burchell.

The Zebra.

**HYBRIDS.**

The offspring of the male Ass (*Annis vulgaris*) and a Mare is a *Mule*, which has generally the form, in a great degree, of the dam, and the head, ears and tail of the sire. The Spanish mules are well known for their symmetry, sure foot, and unwearied activity, and are the produce of a breed of asses far beyond those of this country in stature, shape, and general appearance. The *Hinnier*, which is the offspring of the Horse and the female Ass, is altogether inferior, and is less esteemed than the *Mule*. Hybrids have been produced between the Arab and the Ass breeding with the Zebra or the Quagga. Two mules that belong to the Zoological Society are the offspring of the Ass and the Zebra. The earl of Morton bred a female hybrid from a female Quagga and a Mare of nearly pure (seven-eighths) Arabian blood.

It may be expected that we should here notice the question as to the power of reproduction in animals so bred between different species. Mr. Bell, in his 'British Quadrupeds,' has treated this subject in a very ingenious manner. After observing that the inquiry how far the power possessed by two animals of producing young on the one hand, or fertile young on the other, bears upon the generic, or specific identity of the parents, is one of the greatest interest in the investigation of zoological relations, he proceeds thus:—'It has been ascertained, and with very considerable probability, that the production of male and female progeny which are fertile, is to be considered in itself a positive proof that the parents are of the same species, how much soever they may differ in external form and appearance. It is well known that there are many instances of distinct species of animals not producing young, which become fertile in conjunction with one or other of the parent kinds. This has been proved in the case of several species both of gallinaceous and natalorv birds in a domestic state; but there is not, I believe, an instance on record of a sterile male and female of such distinct progeny being mutually fertile. On the other hand, the production of sterile hybrids between distinct species of the same group is a circumstance so commonly occurring, that it is reduced to common allusion; and the present animal ('the Mule') is a sufficient illustration of the fact. But the power of reproduction even of such progeny is considered by some as indicative of a generic relation between the parent species, and has been put in a manner against the separation of the Horse as a distinct genus from the Ass and its congeners. Before this observation however can be allowed to have any weight, it rests with the objectors to define the precise meaning of a species or genus; and until this has been done, which has never yet been satisfactorily attempted, such an argument is a mere begging of the question. The Mule has been occasionally known to produce young with the Horse or the Ass: these cases are, however, of rare occurrence, and are instances of the statements which I have already made, as there is no instance on record of two Mules having bred together.'

Mr. Bell notices the following fact, as one which must doubtless be accounted for on the same principle as the cases in the Mule. A small Mare was turned into a paddock in the Gardens of the Zoological Society of London (Regent's Park), in company with a male white Ass, and a male hybrid between the Zebra and the Ass. She had a foal which was distinctly marked with black stripes across the legs. While upon this subject, we may as well advert to the curious point, that the characters of the male parent of the mother's first progeny show themselves in her subsequent offspring by other males, however different those males may be in form or colour. Mr. Bell observes that this truth has already been illustrated by him when treating on the Dog and on the Cat, where he adds that it is both singular and interesting confirmation from the case of the Mare (belonging to the earl of Morton) quoted by him and above alluded to. In that case the Mare was young, and after producing the female hybrid by the Quagga, as his生产力, and afterward as a Colt, by a fine black Arabian Horse. They both resembled the Quagga in the dark line along the back, the stripes across the forehead, and the bars across the legs: in the Filly the mane was short and stiff, like that of the Quagga; in the Colt it was long, and arched upwards and hung clear of the sides of the neck: in other respects they were nearly pure Arabian. This and other such cases should not be forgotten by breeders of animals, who are so anxious about the perfection of their stock, and should make them particularly careful as to the male influence which first makes its impression on the female.
which was regarded by the friends of the church as a most
mastery defendere of the orthodox faith, and as the secure
foundation of a high and lasting theocratic reputation.

The tide of preferment now began to flow in upon
Thurloe, who was then chancellor, presented him with a
prebendal stall, in the see of Gloucester, observing, as it
is said, that "those who defend the church, ought to be
supported by the church;" and in 1786 he was made bishop
of St. David's.

In parliament he distinguished himself by the very hearty
support which he gave to the measures of Pitt's admis-
nistration, and some of his declarations of public
amenagement were thought by many persons to be as little in
accordance with the true spirit of the English constitution
as with the spirit of his own time. Yet his conduct in judging
on such a point as this, the circumstances of many
persons to be considered; opinions as strong in another direction being
by many persons promulgated, and a disposition manifested
by some to act according to their political conduct
however gained him the favour of the court; in 1793 he was
translated to Rochester, and in 1802 to St. Asaph.

We have mentioned but a few of his published writings,
which are very numerous. But a list, it is believed, com-
plete, may be found in a work which is an immense store-
house of information respecting many of the distinguished
persons of the last century,—"Literary Anecdotes of
the Eighteenth Century," by John Nichols, F.S.A., in six large
volumes, published in 1812, with several volumes of sup-
plementary matter.

HORTENSIIUS, QUINTUS, born n.c. 114, of an eques-
trian Roman family, began to plead at a very early age,
and he had already a great reputation in his profession
when Cicero made his appearance in the Forum in the
same that time Cicero and Hortensius were considered as profes-
sional rivals, but they lived on friendly and even intimate
terms with each other; as Cicero acknowledges in several
of his writings. At the beginning of the time of Cicero's
Oratoribus,' Cicero pays an eloquent and apparently sincere
tribute of praise to the memory of Hortensius, who was
then lately dead. He styles him his friend and adviser, who
often assisted him, and is commended to the world by
such many imagined, a rival or detractor of his fame, but a fellow-
labourer in a glorious vocatio.' And yet in some of his
letters (Epist. iii. of the 1st book Ad Quintum Pratrem)
Cicero had bitterly complained of the duplicity and un-
genrous conduct of Hortensius towards him when he was
obliged to quit Rome in the Ciodian business. Hortensius
went through the regular career of public offices and ho-
nor; he was consul in 1747, and was likewise elected a
Fellow of the Royal Society, to which body he became the
successor of the celebrated Sir Isaac Newton.

His more public career he may be said to have com-
mented a little after the middle of his life. In 1759 he
was elevated to the dignity of a Fellow of the Royal
Society, to which body he became the successor of the
celebrated Sir Isaac Newton.

His earliest publications were certain small tracts on scien-
tific subjects; but in 1776 he projected a complete and un-
iform edition of the philosophical works of Sir Isaac Newton.
This design was not accomplished till 1784, when the fifth
and last of the four quarto volumes made its appearance.

In the earlier years of his public life he found patrons in
the earl of Aylesford, and in Lord, bishop of London; but
we pass over, as uninteresting and unimportant, the present-
tations to his various livings, and the dispensations which
the number of his minor prelendes rendered necessary.
In 1781 he was appointed archdeacon of St. Alban's.

It was not till the date last named that he first ap-
peared in the field of theological controversy. In which
he soon showed himself a very powerful combatant, powerful
from the great extent of his knowledge and from the vigour
of his intellect. Against this attack was Dr. Joseph Priestley, a minister
among the Presbyterian dissenters, who in a series of
publications defended with great subtility and skill the doctrines
of the annihilist, Unitarianism, and Unitarianism.

Dr. Horsey began his attack in the 'Twenty-

but not in his opinion of his works. Dr. Priestley's 'History of the
Corruptions of Christianity,' which was published in 1785, introduced

and was also an eloquent reasoner on the subject.

HORSEA (1617; 1733), one of the twelve minor
Hebrew prophets. We possess no particulars respecting
the place of his birth, or his history; but it appears proba-
ble that he lived in the days of Uziah, Jotham, Ahaz, and He-
nehiah, kings of Judah. In the days of Josiah the son of
Joash, king of Israel. The reign of Josiah extended from n.c. 883 to 783; and that of Hezekiah began n.c. 726.

It is therefore evident, if this inscription is correct, that
Hosea could only have entered upon his prophetic duties in
the latter part of the reign of Jeroboam; and the prophe-
sion is also rendered probable by the tenor of his prophe-
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cies, which describe the kingdom of Israel as in a weak and divided state, and obliged to seek assistance from foreign powers; whereas in the book of Kings (xv. 25—26) the affairs of the kingdom of Israel are represented as in a very prosperous condition during the reign of Jeroboam II. But the prophecies of Hosea are quite in accordance with the period of anxiety which followed the foreign invasions which followed the death of Jeroboam II. (2 Kings, xvi. 11.) It is therefore probable that the prophecies of Hosea extended over a period of about 60 years (c. 794—742); and that he was contemporary with the reign of Manasseh, Micaiah, and Josiah.

The principal object of the prophecies of Hosea is to reprove the people of Israel on account of their sins, and to denounce the divine judgments which awaited them if they continued disobedient. The book may be divided into two parts: in the first, which occupies more than one third of the whole book, the wife of the prophet, and the infidelity of his wife, represents the spiritual infidelity of the children of Israel, and foretells the judgment of God against them, and at the same time promises that God would at some future period receive them again into his favour. (c. i.—iii.) In the second part, this symbolical representation is dropped; and the prophet foretells in express language that the country would be devastated by the Egyptians and Assyrians, and that the people would be carried away into captivity, and he concludes with an exhortation to repentance, and a promise that God would heal their backslidings, would love them freely, and would turn his anger away from them. (c. iv.—xi.)

'The style of Hosea,' Bishop Lorth檪 remarks, 'exhibits the appearance of very remote antiquity: it is pointed, energetic, and concise. It bears a distinguished mark of poetic composition, in that pristine brevity and conciseness which distinguish the language in which the sentence, verse, and which later writers have in some measure neglected. This peculiarity has not escaped the observation of Jerome, who remarks that this prophet is altogether laconic and sententious. (Pref. in xiii. Proph.) But this very circumstance, which antiently was supposed to impart uncommon force and elegance, in the present state of Hebrew literature is productive of so much obscurity, that although the general subject of each prophecy is evidently obvious, yet the most dextrous interpreters are perplexed and perplexed of all the prophets.' (Protest. xxxii.) Compare also Bishop Horsey's remarks on the style of Hosea, in the Preface to his translation of this prophet. (p. xxix.—xxx.)

The canonical authority of the prophecies of Hosea has never been disputed. They are frequently quoted in the New Testament; compare Hos. vi. 6, with Matt. ix. 13, xvi. 21; Hos. vii. 11 with Luke vii. 36; Hos. vi. 15 with Matt. ii. 15; Hos. i. 10, ii. 23, with Rom. ix. 25, 26, and 1 Peter ii. 10; Hos. xiv. 2, with Hebr. xii. 15. (The Introductions of Bichhorn, Jahn, De Wette, Augustii, and Hengstenberg, by permission of the University of Oxford, 1865; Kiiuloel's Hosea Viracula, Hebraica et Latina, Leips., 1792; Horsey's Hosea, translated from the Hebrew, with notes explanatory and critical, Lond., 1801, 1804; Stuckey's, Lond., 1825; Lejoly, 1825; Gall Collection.)

HOSIERY. The principal seat of the hosiery manufacture in England is in the three midland counties of Leices-
ter, Nottingham, and Derby. In the first of these woollen hosiery was made on the principal branch of the manufacture, while in Nottinghamshire the material chiefly used is cot-
ton, and in Derbyshire silk goods are mostly made. It is computed that the number of persons engaged in the manufacture of hosiery in the three counties amounts to 35,000.

The stocking-frame, by means of which this manufacture is carried on, is, next to the common warp and weft loom, the oldest machine in existence applicable to textile fabrics. It was invented about the close of the sixteenth century by the Reverend William Lea, of St. John's College, Cam-
bridge, but a considerable time elapsed before the produce of this frame took the place of the true hosiery then used by all who could afford such an article of dress. For this reason Mr. Lea settled at Rouen, in Normandy, where his manufacture was carried on under the patronage of Henri IV., but the assassination of the king and the political troubles of the time caused the abandonment of Mr. Lea's establishment, and that gentleman shortly after died in a state of poverty at Paris.

From the time of its first invention the stocking-frame -not received a considerable improvement, but at important period (July, 1838) stocking-frames with a rotary action, and worked by steam-power, have been successfully brought into use at Nottingham, and bid fair to supersede altogether the use of the old reciprocating engine. The economy in the process of manufacture that will be thus effected is very great, and may be the means of securing to our manufacturers for some time longer the supply of foreign countries, a branch of trade which was fast leaving us.

The working of a rotatory machine impelled by steam-
power, in which twelve fashioned stockings are made at the same time, will require the superintendence of only one man and a boy, whereas in the old frame, but one stocking can be made at once by a single workman. The principal seat of the cotton hosiery manufacture abroad is at Clermont, in Saxony, where, owing to the low rate of wages paid to the hosiery workers, the total consumption of the country, goods made, with yarns imported from Lancashire, at prices which have excluded Engish goods from third markets, and have even brought them into con-
sumption in this country after paying a duty of 20 per cent. Notwithstanding this fact, the hosiery trade in England has been and continues in a fair state of prosperity, owing to the extension of the home market. More stock-

The substitution of steam-power frames for the old la-
frames not only removes the production of some of the best hosiery, those to the present race of cotton stocking makers, only a part of whom will, for a time at least, be able to find employment in the rotatory frames; but it may be hoped that the great exten-
sion of demand which is already shown by many a con-
siderable establishment of any manufacture will speedily remove this evil by causing employment for at least as many hands as may at first be disengaged. The cotton branch of the hosiery manufacture differs from the woollen and silk branches of that manufacture in the positive propor-
tions of the cost of labour as compared with the cost of the material, and it therefore does not appear probable that the manufacturers of Leicestershire and Derbyshire have so far been able to compete with those of the northern counties, who have hitherto monopolized the northern hosiery trade. The advantage of the hosiery trade would not exceed 20 per cent of the value, and in silk goods the proportionate cost of labour is still much smaller.

It is not possible to furnish any statement of the quantity or value of the shipments of hosiery from this country, because the custom-house returns include with hosiery many arti-
cles of haberdashery, under the name of 'small wares.' The value of the shipments of cotton and woolen hosiery, and small wares, in each of the ten years from 1828 to 1837, was as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Cotton</th>
<th>Woolens</th>
</tr>
</thead>
<tbody>
<tr>
<td>1828</td>
<td>£1,165,763</td>
<td>£201,216</td>
</tr>
<tr>
<td>1829</td>
<td>1,041,855</td>
<td>178,653</td>
</tr>
<tr>
<td>1830</td>
<td>1,175,133</td>
<td>242,005</td>
</tr>
<tr>
<td>1831</td>
<td>1,118,672</td>
<td>150,155</td>
</tr>
<tr>
<td>1832</td>
<td>1,175,003</td>
<td>136,655</td>
</tr>
<tr>
<td>1833</td>
<td>1,331,317</td>
<td>192,048</td>
</tr>
<tr>
<td>1834</td>
<td>1,173,219</td>
<td>168,125</td>
</tr>
<tr>
<td>1835</td>
<td>1,246,284</td>
<td>205,135</td>
</tr>
<tr>
<td>1836</td>
<td>1,326,925</td>
<td>237,598</td>
</tr>
<tr>
<td>1837</td>
<td>912,192</td>
<td>167,564</td>
</tr>
</tbody>
</table>

HOSPITAL (sometimes called simply epital, from the French Asile, a place to dwell in, the recouperation of the sick or support of infirm persons. Hospitals intended merely for the relief of poor and indigent persons in England are peculiarly called Asiles, or hospitals. At an earlier date hospital signified a place of shelter or entertainment for tra-

The Maison de Dieu at Dover, St. John's Hospital at Warwick, and some others, were expressly founded for the reception and entertainment of pilgrims and travellers.

Many of the charitable endowments in England are called hospitals, and are incorporated bodies, consisting of a
master, brethren, and occasionally other members. Some of them also held large houses for the use of the poor, to which As to the management of their revenues and their general superintendence, hospitals on the same legal footing as other charities. [COL.1]

HOSPITALLERS. Hospitalier, in its literal acceptance, is not a hospital, in order to receive the poor or stranger; from the Latin hospitalarius, a word found only in the language of the lower age. The Knights-Hospitaliers were an order of religious formerly settled in England by Edward the Confessor, and a hospital was built at Jerusalem for the use of pilgrims going to the Holy Land, dedicated to St. John Baptist. The first business of these knights was to provide for such pilgrims at the houses of the hospital and inns on the road. They were instituted about A.D. 1092, and were very much favoured by Godfrey of Bouillon and his successor Baldwin king of Jerusalem. They followed chiefly St. Austin’s rule, and wore a black habit with a white cross upon it. They soon came into England, and had a house built for them in London A.D. 1100; and from a poor and mean beginning obtained so great wealth, honours, and exemptions, that their Superior here in England was the first lay-baron, and had a seat among the lords in parliament; and some of their privileges were extended even to their tenants. There were also sisters of this order, of which one house only existed in this country, at Buckland in Sommerset. Upon many of their mansions and estates in the country the Knights Hospitalers placed small societies of their brethren, under the government of a commander. These were intended to look after the poor and sick, and to give them care, and accounted for the remainder to the grand prior on London. Such societies were in consequence called Commanderies. What were commanderies with the Hospitallers were priories with the Templars, but the latter term was in use with both orders.

The Knights Hospitalers had several other designations.
They were at first called Knights of St. John of Jerusalem; after the loss of the western part of their kingdom in Rhodes, and the loss of that island, A.D. 1522, Knights of Malta, from the island which had been bestowed upon them by the emperor Charles V. (Tanner, Notit. Monast., edit. Nasmith, pref. p. xv.; Newcourt, Report. Eccles., vol. i. p. 539; ii. p. 199; Diggle, Monasticon Anglicanum, new. edit., vol. vi., p. 786.)

HOSPOCAR is the title of the persons sent by the Turkish sultan to govern Moldavia and Wallachia, the two provinces north of the Danube. These positions have from the remotest past have been taken by the principal Greek families of the Fanari, such as Maurocordato, Souto, Caradja, Mousi, Callimachi, Ypsilanti, &c. These Hospocras or governors have generally been called the Fanaric dynasty, the more so as they have been in charge of the office for a century past. They held in their respective capitals, Bucharest and Jassy, a numerous court, consisting chiefly of Panaric Greeks, and were in fact almost absolute sovereigns during the time of their administration, which however over might be shortened at the pleasure of the Porte, which often recalled them, and put them to death. At the time of the Greek revolution in 1821 the Hospocrat of Moldavia, Prince Michael Souto, escaped to the Russian territory, and his relative the Hospocrat or Prince of Wallachia was poisoned. For the present government of these two principalities, as agreed upon between Russia and Turkey, see Moldavia and Wallachia.

HOT. The term is generally given to gardeners to a heap of fresh stable litter in a state of fermentation, upon which a glazed box is placed for the cultivation of certain plants requiring heat and moisture in greater quantity than those agents exist in the external air. Formerly hotbeds were more exclusively used for various purposes in horticulture than they now are. This is owing to the perfection to which other means of producing and applying artificial heat have now attained; but still the hotbed is a useful ornamental, or for the propagation of tender annuals, and of other plants, either culinary or ornamental, hotbeds continue to be advantageously employed, as they likewise are for the striking of cuttings.

Hobeds may be formed of various substances, such as unrotten dung, tan, leaves, or a mixture of these with moist litter; in short, any substance capable of producing and retaining fermentation, and which will admit of being built up so as to support a frame with ashes. The substance however that is most generally used is fresh stable-dung; for the preparation of which it is requisite to have in its being thick in a heap, and the water, if it contained, very little; and as fermentation proceeds it should be turned two or three times, and mixed thoroughly in the process.

The situation in which hotbeds ought to be formed should be dry, open, well ventilated, and well sheltered from every other direction, either by walls backed by high and close-growing trees, or by very close and lofty hedges. Such extensive shelter, though desirable, cannot always be obtained; but some mode must be employed to kako the force of sweeping winds. The basis on which the bed is to be formed should be marked out from 4 to 6 inches each way beyond the dimensions of the frame intended to be placed upon it; and a bed of straw or of manure, as a foundation, it will admit heat completely under when the bed requires the application of a lining, which is a quantity of fresh materials added to the outside, should a diminution of heat require a support. The bed is then built of successive layers of the prepared materials, each layer being beaten tolerably compact with the fork as it is laid on, to the height of 4 feet in front, and 4 feet 9 inches at the back: the sides and ends should be quite perpendicular. The top layer should be as free from litter as possible. When thus finished, the frame and lights are placed upon it, and as soon as the violence of the fermentation has diminished, mould is put in; and when the latter has acquired a proper temperature, the plants are put in the bed, or mould, rotten tan, or leaf mould, or sand, is spread over the surface of the bed, when pots containing seeds or cuttings are to be plunged.

As soon as the temperature of the bed begins to decline, a lining of fresh materials must be applied. This may however be composed of substances that have not undergone any previous fermentation, and may consist of fresh stable-dung, merely shaken up as it is placed against the side of the bed, or of grass mowings, or of leaves, or of a mixture of such substances.

A bed formed of well-prepared materials, and raised to a proper temperature, will, in a short time, produce hotbeds for which a strong bottom-heat is required; but a very mild bottom-heat is frequently all that is wanted. In this case the bed is made lower and more compactly beaten or trodden. Substances that ferment violently are likewise excluded from its composition.

It sometimes happens that, notwithstanding every precaution with regard to its formation, a hotbed will become too hot for plants or seeds that may have been placed above it. In this case the only remedy is to remove as much of the lower boxes are for which a strong bottom-heat is required; but a very mild bottom-heat is frequently all that is wanted. In this case the bed is made lower and more compactly beaten or trodden. Substances that ferment violently are likewise excluded from its composition.

HOTCHPOT. (Law.) The word has been thus quaintly explained by Littleton:—"It seems that this word hotchpot is in English a pudding, for in a pudding is not commonly put one thing alone, but one thing with other things together." The common law prescribed the rule, that where a daughter to whom lands had been given in frank marriage claimed a portion of the lands descending upon her together with her sisters from the father in fee simple, she should not take any share unless she mixed and blended the lands given to her in frank marriage with the descending estate. That they were usually divided among all the daughters. The rule is founded upon the same grounds as the Collatio honorum of the civil law. (Dig. xxxvi. 6; De Col- lationibus.) The statute 22 and 23 Chas. II., c. 10, § 5 (the Statute of Distributions) provides, that in making disposition of the personal estate of intestates, advancements made by them in their lives to their children shall be brought into hotchpot. The like rule prevails by the customs of London. In the transactions of a deceased tenant, the children are entitled to a third of his personal estate. (Co-Litt., 176; 2 Bl. Com.)

HOTHOUSE, in horticulture, is a structure in which exotic plants are cultivated under conditions simulating as closely as possible to those under which they naturally exist; or it is used for accelerating the production of flowers and fruits of other indigenous or exotic plants. Hot-houses appropriated to the latter purposes are very frequently termed forcing-houses.
In the beginning of the seventeenth century that description of hothouse generally termed the greenhouse began to be constructed in Germany; and one in the Apothecaries' Garden at Chelsea is now 167 years old. These, like many others of later construction, had glass only in the front, which was perpendicular; and the mode of applying artificial heat exhibited little more knowledge of means for the end than the remains of flues found in the ruins of the nymphaeums and bath-houses of the Romans.

In 1724, when Switzer published his treatise entitled 'The Practical Fruit Gardener,' the principles of managing hothouses were still very imperfectly understood; for he observed: "People are apt to believe that fruit won't love to be forced; at least the fruit is very seldom good: there being much occasion to keep the glasses close, the fruit is always rendered flat and insipid. This is not pure speculation, but the result of experience that I have observed in the glass houses at Brompton." Considerable alterations, particularly in houses for grapes, were made towards the end of the last century. The most material improvement was the substitution of a slanting glass roof for a perpendicular glass front; but the advantages of this were much diminished by the heaviness of the sashes, and the large quantity of opaque matter which it was thought necessary to employ in order to ensure the durability of the structure.

In the present century great advances have been made in hothouse building, and more particularly since 1815. The application of heat by steam or hot water, and the admissibility of a little variety of glass, have been introduced. Bars instead of wooden sashes, are the principal features of these improvements.

The principles by which the construction of hothouses must be governed with reference to the three great agents in vegetation—heat, moisture, and light. With regard to heat, the building must provide for a sufficient amount to raise the internal temperature of the house, from that of the lowest degree of external air that occurs in the climate, and which prevents for any length of time in the countries of which the plants intended to be introduced are natives. This rule is unexceptionable as far as plants strictly tropical are concerned; a slight relaxation may be allowed in some cases with regard to plants of temperate climate, such as, for instance, the vines when it is only intended to be forced late in the season, after the severity of the winter is over. With the extremes of temperature should always be made the data for calculating the extent of the requisite heating power. The consequences of too limited a heating power will, in the same degree, be as great as the deficiencies in the adduced for certain cases make for the few hours may occasion an injury that cannot be remedied in as many years.

Moisture is of the greatest importance, and a due proportion of it is frequently more difficult to maintain in the atmosphere of the house than heat, and more so by some modes of heating than by others. It therefore follows, that as all applications of fire-heat have a tendency to produce too great a degree of dryness, that mode is the best for the growth of plants which allows the greatest quantity of vapour to remain uncondensed in the atmosphere of the house.
The cultivation of the tropics, natives of the torrid zone, are adapted for existing under a very dry atmosphere. Instead of developing a thin expanded foliage, they form thick succulent masses, which no degree of atmospheric dryness seems to injure. Plants of such a nature of course require a dry store, and a period of extreme dryness is perhaps as necessary for their future vigorous development as the cold of winter is to the deciduous trees of the north. But with regard to the generality of plants from tropical regions, a different atmosphere is necessary. Within the tropics, the dryness of the air seldom exceeds 10% of Danieli's hygrometer; whereas, in the neighbourhood of London, between 20° and 30° are frequently indicated during the days that are closed over by the air during the night, or at least it is but very rarely otherwise in the open air. But if due precautions be not taken, and temperature only is attended to, without regard to moisture, a degree of dryness will prevail at night in hothouses, which is double that of the tropic during the day. At this severe depression in the dew-point, the air may be raised to a point of saturation, and yet causes may operate so as to occasion a speedy condensation and a consequent dryness.

Light cannot be admitted too freely into hothouses. This will appear evident from the circumstances of the most transparent medium that can be used reflecting a great proportion of the sun's rays when they impinge obliquely on its surface. According to Bouguer's Table of Rays reflected from Glass, the angle of incidence of 54° per cent. of the sun's rays are reflected; and at angles of incidence of

\[
\begin{align*}
50° & & 70° & & 80° & & 90° & & 95° & & 100° & & 101° \\
41 & & 24 & & 11 & & 5 & & 3 & & 2 & & 2 & & 2 & & 2
\end{align*}
\]

per cent. are reflected, omitting fractions.

Besides this, in wooden roofs, even although of good construction, 22 per cent. of the rays of light are obstructed by the rafters, &c. In iron roofs the obstruction is reduced to 7 or 8 per cent. On the other hand, in the case of glass, 54° per cent. of the rays of the sun at 6 A.M. will run parallel with the roof; at 7 A.M. 30 per cent. of the rays will be reflected from the glass alone, independent of the quantity from other causes. A few hours later in the day, 19 A.M., 54 per cent. will be reflected. From this time till 3 P.M. the proportion reflected will be only from 2 to 4 per cent. If we therefore take from 6 A.M. to 6 P.M. a length of time from which the tropic days never differ much, we may calculate the loss of rays to be from 8 to 20 per cent.

Reflection of glass, say on an average 10 per cent.
Obstruction from rafters (iron) 8
Ditto from glazing laps 3
23 per cent.

But if wooden rafters are employed, 15 per cent. additional must be added, making in this case a loss of 38 per cent. In old and heavily constructed houses, it certainly would not be too much to state the loss of rays at 50 per cent.; and under this privation of light it is not surprising if the plants are found to exhibit a yellow sickly foliage. The above calculation of the reflection of rays is made on the supposition that the pitch or elevation of the roof forms an angle with the horizon corresponding with the latitude of the place, say for London 51° 4', or forming an angle with the horizon of 51° 4' in London, 50° 14' inlatitude, or 38° 5'. The period of the season is that of the spring or autumn equinox. A plane elevated to the above angle would have the sun's meridian rays more nearly perpendicular throughout the year than could be the case with any other angle. But the sun's rays being slanted, and the angle of elevation, except perhaps in the case of a very early forcing vineyard or peach-house, where the direct rays of the sun are more especially required at an early period of the season. The principal objection to this elevation is, that it occasions the house to be built too high in proportion to its width; and the heat accumulates in the upper angle where it is least wanted; in short, the higher the back wall, the colder is the air of the house at its base, and the warmer at the top, compared with the mean temperature throughout the house. It will therefore be proper to inquire how far the above elevation may be deviated from without greatly affecting the transmission of light. The rays were lowered so as to form an angle of 20° with the horizon, the loss from reflected rays at noon would average about 3 per cent.; but in the morning and afternoon the loss would be considerably greater, more especially in the winter season; and it is of course proportionally less in summer. So far therefore as light is concerned, any angle may be chosen that is found in other respects the most convenient between 20° and 30°. Pine pits and frames are even lower than 30°. Above 30° the support of light is, as well as the descent of the sun, it is not advisable to have the roof flatter than 20°.

Although the necessity of admitting as much light as possible is not to be overemphasized, yet the cloudy weather advantage will be derived from the roof rendered as transparent as possible, yet the generality of
tropical plants do not thrive in bright sunny weather when placed under shade. A point of extreme importance in this climate; and the necessity of a screen of netting will appear obvious from the effects of solar radiation observed in the tropics as compared with what is rather surprising, the still greater energy of the sun in this climate frequent fluctuations, notwithstanding the greater general deficiency of the sun's rays, of about one half in diameter horizontally, long enough for a thermometer placed in the sun to rise 50° F. above one in the shade. At Cumana, Humboldt never found the sun's rays to have the effect of raising the thermometer more than a degree or two. The rays of the sun appear to be still greater in this climate. Between lat. 60° and 81°, Captain Scoresby states that the thermometer was 18° below freezing on one side of the ship, whilst on the other the pitch was heated to a temperature of 90° or 100°. This is a greater radiating effect than has perhaps ever been observed in this climate, and certainly unequalled in the tropics. The body of the atmosphere surrounding the earth is supposed to have the form of an oblate spheroid, flattened at the poles and elevated at the equator. Indeed if this were not the case, as it is found to be considerably denser at the poles than at the equator, a different barometrical indication would be the consequence; but this is not the case, and the matter is left unexplained. This difference in density may have some effect in weakening the sun's rays, but probably not so much as the circumstance of the atmosphere having a much greater capacity for absorption than the sea. In the one case we have an equilibrium, and at the same time the process of evaporation is so powerful that the atmosphere is maintained on an average much more nearly in tension than is the case with the sea. The circumstances doubtless contribute greatly to temper the solar rays.

Plants from a great elevation, from within the tropics as well as from the higher latitudes, are means of sheltering them from the rays of the sun. The sun's rays have been ascertained to be more powerful at 4000 feet above the level of the sea on the mountains of Jamaica than at Port Royal. Hence the potato, a native of the high table-land of South America, will not thrive under glass unless placed very near it; and if placed at a distance from it at which the pine-apple, a native of the same country, but near the shore, will grow robust, the potato will become pale and languid.

These facts are too important to be omitted in explaining the principles by which the construction of hothouses ought to be regulated, and it will be found that those houses are the best that are devoted to the propagation of plants in which such principles have been most considered.

With regard to the means of supplying artificial heat, the old system of using brick flues is now rapidly being superseded by that of hot water. Brick flues occupy a large space; and are also liable to crack and emit sulphuric fumes to an extent that the crops of early forcing fruits have often been entirely destroyed. These objections do not apply to hot-water pipes. When once fitted up they require no repairs for many years; whereas the brick flues must be frequently broken up in order to clear out the soot. By hot water the distribution of heat can also be better regulated, and the uniformity of temperature better maintained than by any other known method. The heating by hot water are various. The oldest and perhaps the best for small houses is extremely simple, consisting of a boiler, and, at the further end of the house, a cistern on a higher level communicating with the boiler. To heat this the water is introduced into the boiler, and communicating with the cistern at the same level, conveys the heated water slowly from the former to the latter. Another pipe, situated lower than the proposed to be employed in this connection in the transverse section is a parallelogram, and as a circle contains more space than any other figure of equal perimeter, these flat pipes contain less water in proportion to their surface, and consequently the water in them is soon or heated to its maximum; but this, as previously shown, is no advantage, if in fact it be not a disadvantage, since it cooks so much sooner.

With regard to a supply of moisture, the above hot-water system, in which the pipes are level, or nearly so, presents several advantages over other methods of heating. Troughs can be arranged along the whole length of the pipe, which, when filled with water, will produce a gentle but constant evaporation. In addition to this, a certain quantity of steam may be safely introduced from the boiler, provided the violence of its ingress be a little broken by a perforated sheet of metal, or any similar contrivance. Another advantage is that, with moisture from the soil in which the plants are grown, and from the wetted floors, ought to keep the atmosphere of the house sufficiently moist during the night. The air of the hothouse is not always the vapour of water as in cold nights when much fire-heat is required; and in such a state of the climate the condensation from the coldness of the glass will be increased. The atmosphere of the house is not only deprived of its moisture by this process, but a serious loss of heat by radiation from the glass takes
place at the same time. This loss of heat and transmutation of moisture resulting from the radiation of the glass, although slight, is an evil. Ventilation is required. It admits of no remedy but the interposition of some medium between the glass and cold sky; and such substances as are the worst conductors of caloric, and which will also keep the glass clean and clear of dew, are, of course, the best. A woolen net mounted on a roller with pulleys attached, would have a very beneficial effect if closely covered by light wooden shutters or a tarpaulin. And as it has been pointed out before, too powerful a current of air for hothouse vegetation, the netting would likewise be occasionally very useful as a shade; and with this provision the roof cannot be made too transparent, as previously stated.

It is also shown that iron roofs occasion an obstruction of light to the extent of only one-third of that which takes place when wood is employed. The iron roofs are therefore preferable, although, apart from the greater original expense, there are still some objections to them. Formerly the chief objection was the breakage of glass likely to result from the expansion of the metal; but the severity of the frost in 1838 has proved that this objection was groundless; for very little breakage occurred in the iron roofs compared with what took place in wooden ones; and it may be fairly asserted that none whatever was broken from contraction of the metal: nor can any breakage take place from the strain of wind, since a thin iron sheet of 10 by 15 centimeters, or the glass cut so as to fit in with ease, or the panes made one-thousandth part of an inch less than the bed between the rebates of the bars in which they are placed. The principal remaining objection is that of the rapid abscission of iron or the other alloys do they stimulate by heat, the iron as in that of wood, and this is probably owing to the wood being a slower conductor of caloric. Supposing a bar of iron is heated to 100° by the sun's rays, and then syringed with water, it will instantly become very cold in consequence of the rapid loss of heat. And if any plant be in contact with it, or nearly so, the juice will experience a chill. In many instances therefore where plants require to be close to the glass, instead of the syringing houses, wood is certainly preferable to iron. Again, when a wide and also lofty house is to be glazed iron is more proper; for besides the quantity of rays lost by reflection of glass and obstruction from rollers, those that do pass into the interior are so weakened, that when they reach vegetation remote from the glass they do not appear to be effective in performing the requisite functions in a perfect manner; but of course better when the roof is of iron than when wood is employed.

Various modes of ventilation are in use. One which was considered a great improvement has not been found to be so, namely, the having ventilators in front at the lower and rear end and corresponding ones in the back wall near the top inside, communicating with the air by means of the openings on the side of the parapet. Sometimes this mode appears to have little effect, and the temperature ascends too high, till the movement of a slight breeze outside causes a steady current of cold air, which will be so contrived as to be sufficiently effective in preventing excess of heat; but at the same time it should be perfectly at command, so that it may be employed when requisite in the most limited degree. No method should be finally adopted until it is put to the test by whether, under any agitation of the external air, a candle will burn steadily inside if placed near the apertures by which the air is admitted.

In all forcing-houses tanks should be placed for supplying water of a temperature more suitable to the nature of the vegetation than that from a pump out of doors. Nothing can be more truly appreciated than the value of heat and tops of tropical plants, or others in a forcing state, under a high temperature. The rain and dews which supply the plants of warm climates cannot be much below the maximum temperature of the glass; and if only equal to the minimum, it would still be between 20° and 30° above that of spring-water in Britain.

To these general remarks upon the principles of constructing greenhouses, the following observations of detail require to be added. Greenhouses and conservatories included in the appellation of hothouse. The only difference between them is, that fires are seldom used in the greenhouse unless in very severe weather, while the hot-house is constantly kept at a high temperature; but so far as the building is concerned they may be considered as the same. A greenhouse is for keeping and growing the plants of temperate countries, and for producing tender fruits, or for growing plants which are indigenous to tropical regions. Hothouses may be classed under four different heads, namely, the dry store, the damp store, the dark store, and the forcing store.

The dry store, as the name implies, is used for the cultivation of plants which do not require much water; such as the different species of Cacti, some Euphorbias, and other South American plants. The management of such a house is very simple. The temperature in the winter months should never exceed 65° of Fahr. No water should ever be given at that period, unless the plants show signs of suffering from want of it; indeed very little water should be given even during the summer, except when the air is very dry. In spring, or early in summer, most of the plants will show an inclination for growth, and then they may be watered about twice a week, but this must be done with great caution, otherwise they are very apt to rot. During summer fires may be discontinued, and plenty of air given in fine weather. The plants will probably get covered with dust and will be unsightly; in this case they may be syringed, but care must be used in doing this, especially with melon-shaped Cacti, as the water lodges in their hollow tops, and eventually destroys them, if allowed to remain.

The damp store requires treatment of an opposite description. Instead of being kept dry like the last, its atmosphere should be always excessively humid, except in the winter season, when the sky is generally cloudy, and the sun's rays weak. Various methods are adopted to keep the atmosphere in this state; but probably the best is to cover the place with common smoke flues, the most simple way is to throw water frequently upon them, and also upon the passages and other places, from which it will evaporate, and surround the plants with a cloud of fine water. When a channel is formed with cement, upon the upper surface of the flue, which keeps the water from running off. This is a very excellent plan, as it may be so made that it will keep the house cold a certain time, and when the water is continually evaporating, and serve the same purpose as that of a person frequently throwing water upon it. When the house is heated with hot-water or steam-pipes, it is a good plan to get small ridges cast upon the sides of the pipes, if they are flat, or, if they are round, small cisterns made of lead or zinc will answer the purpose, which can be used in the same manner, and will have the same effect as the channel upon the humid flue. With the exception of a few months in winter, the damp store is syringed twice every day. This is indispensable to the health and vigorous growth of the plants, and also necessary in order to keep down insects. The quantity of water which should be employed is to be proportioned to the plants, keeping in view the state of the weather and their own growth; in winter they will need little, as spring advances they may be watered more freely, and in the summer season they will all require water to be watered twice and some of them three times a day; of course those which are growing vigorously will require the most. It is a very bad plan, although one which is too often practised, to water almost at random, giving all the plants almost an equal share, regardless of their different capacities. Some will require a very abundant and constant supply, others will almost live upon the atmospheric moisture that surrounds them. Another thing to be attended to in the treatment of this store is the air circulation. Most of the kinds grow very freely, and if they have not plenty of room they will very soon get crowded, and instead of growing bushy and handsome, the result will be an un-healthy, shrubby plant; all which can be got over by good air circulation and by turning the plants round. In the middle of summer, fires may be discontinued for about three months; but this must depend entirely upon the weather. The thermometer should never be allowed to sink lower than 60°.
HOT

HOT

The Bark-clone, when it is of large dimensions, consists of a pit in the middle of the house, surrounded by a brick wall, leaving as much room round the sides as will form a passage to walk in. This pit is generally from four to six feet in depth, one-half below and the other half above the level of the floor of the house; but this depends chiefly upon the height of the roof and the object in view. In smaller houses no space is left for a passage, and the inside is entirely occupied by the pit. The pit is filled with bark common to the tree, having been opened by the branches and trunks, and to sink a little and ferment, the fomes containing the plants are plunged more or less deep in the pit; the better way is to plunge the pots only about one-third at first and deeper afterwards. Sometimes leaves are mixed with the bark; the reason being that they are in some parts of the country more easily procured. When the heat begins to decay, the bed must be turned over and a little fresh tar added; and whenever a new bed is made, a little of the old tar should always be mixed with the new. This is heated independently of the bark, of which the principal use is to warm the roots of the plants. A bark bed is found useful in the cultivation of all those kinds of plants which are valuable for their medicinal virtues, for example, succeed admirably in this way. The treatment of it, so far as the temperature, watering, and syringing are concerned, is precisely the same as is recommended for the clamp stones.

Hothouses are called Palm-houses, Musa-houses, Orchidea-
coueus-houses, &c., are merely damped stoves of different dimensions, for the cultivation of those different subjects.

The only other hothouse distinct from those already noticed is the forcing-house. The treatment which this requires is essentially different from any which has been described, the object being not merely to grow the plants, or to make them produce flowers, but to obtain fruit, and that at any season of the year. For example, many fruits can be obtained in forcing a greenhouse during the winter. Hothouses are more expensive than greenhouses because of the additional cost of heating and lighting; however, they are more productive and can extend the growing season for certain crops.

Hothouses are also used for the propagation of plants, particularly for the production of seedlings. The temperature in a hothouse can be precisely controlled to meet the needs of different plant species. The use of hothouses for such purposes has been a significant factor in the development of modern agriculture, enabling farmers to grow a wider variety of crops and to extend their growing season.

HOTMAN, FRANÇOIS, called also by his Latinized name HOTOMANUS, was born at Paris in 1524, of a family originally from Silesia. He studied law in the university of Orleans, and in 1543, he embraced the Reformed religion, in consequence, it was said, of seeing the constancy with which Anne du Bourg, a counsellor to the parliament of Paris, supported the ignominous cause of the people. He was afterward professor of law at Strasbourg. He afterwards returned to France under the protection of the king of Navarre, and became professor of law at Valence, and then at Bourges, where he taught humanity in the year 1559; he afterwards concealed himself during the massacre of St. Barthélemy, and repaired to Geneva, and then to Basel, where he died in 1560.

A collection of his works, in 3 vols. fol., was published at Paris in 1582, and 1616, and in 1640.

1. 'Commentarius de Verbis Juris, antiquitatem Romanae Ericam Elementa amplificatus; 2. 'Commentarius in P. C., No. 764.'
HOU
ever oaks are expensive, hot-salls are not to be recom-
}mended, except for the sake of forming a kind of brush
assistance towards screening the wood in autumn, and ward-
ing off the effects of frosty nights in spring.

One furnace is allowed for hunting about 40 feet of wall,
that is, 20 feet on each side of the place where the fire
is situated. Thus four furnaces are made to take four
courses, or two returns; the first course being a little above the
surface of the ground, and the upper 4 or 5 feet below the
coping. An improvement consists in admitting, by means of a
portion of the wall, the upper 4 or 5 feet of the furnace into the
second course of flues. A thick double woolen netting ought to be provided for the protection of the
plants on the wall, and so attached to rollers as to be
easily removed. The furnace itself is made of clay, and if
this with a close fitting wooden coping, projecting at least 12
inches, will, in a great measure, obstruct the radiation of
heat. By such means very excellent crops of cherries have
been obtained at an early period of the season; and as
this species of fruit is precarious to force in a hothouse, a por-
tion of a hot-wall where the trees are planted permanently
may be very properly set apart for such an object.

Instead of flue, hot-water pipes might be introduced into
the cavity of a common hollow wall, a little above the level of
the border. One range of 4-inch pipe would be sufficient
for at least 200 feet of wall, the boiler being placed at the
back of the wall, and having an upper and lower pipe ex-
tended to it. In such a case, a glass case is erected in front of a hot-wall, a hot-water pipe should
be made to pass along in front of the trees, about
two feet from the wall, and the return-pipe only might be
placed between the trees. Thus the saving of fuel
would be the consequence of such an arrangement.

HOUBIGANT, CHARLES FRANCIS, a priest of the
Oratory, and an eminent Biblical scholar, was born at Paris in
1724. He was distinguished in early life by his great
attainments, and lectured successively on the belles-lettres
at Julli, on rhetoric at Marseille, and on philosophy at
Soissons. He afterwards removed to Paris, where his de-

tivation to study, and the duties of his profession produced a seri-
ous effect on his health, which, after a long illness, was
thus incapacitated for public duty, he devoted all his time
to study, and directed his principal attention to the study of
the Hebrew language, in which he followed the system of
Masefer, who was a strenuous opponent of vowel
points. In 1732 Houbigant published his ‘Racines Heb-
raiques’; and in 1746, his ‘Prolegomena’ to a new edition of
the Hebrew Bible, in which he attempted to show that
numerous errors had been introduced in the text. His
great work, entitled ‘Biblia Hebraica cum Notis Criticis et
Versione Latina ad Notas Criticas factae,’ appeared at Paris in
1753, in 4 vols. fol.; each page is printed in two parallel
coloums, containing on each a word of the Hebrew text, and
other the Latin translation. The Hebrew text is that of
Van der Hoogh’s without points; and in the margin of the
Pentateuch the various readings of the Samaritan Pen-
tateuch are given. The notes and emendations of the text
are printed at the end of each volume. Those who wish
for further information concerning the critical value of this
work may consult Bishop Marsh’s ‘Divinity Lectures,’ part
ii., pp. 101-104. The critical notes and prolegomena were
reprinted at Frankfurt, 2 vols. 4to., 1777; and the Latin
version, which is usually considered very elegant and cor-
rect, at Paris, 5 vols. 8vo., 1733. Houbigant learnt the
English language late in life, and translated into French
Shakespeare’s ‘Tale of a Tub’ by Pope, and Lea’s ‘Stories
Deists,’ and Forbes’s ‘Thoughts on Natural Religion.’ Hou-
bigant died on the 31st of October, 1783, in the 97th year of
his age. An account of Houbigant’s life, together with a
list of his works, is given by Adry in the ‘Magasin En-
cyclopédique,’ May, 1806.

HOUND (from the German HUND), a name generally
applied in the British Islands to those varieties of the
dog which are trained for pursuing the stag, the deer, the fox, the
turkey and the otter, by scent. The hounds are of various
sizes and breeds, and are so used in the old Border times, as
called a blood-hound. [BLOOD-HOUND.] The Greyhound,
which follows its four-footed game by the eye [GREYHOUND],
is not a hound in the propriety of the term adopted
by sportmen; for that appellation is confined to those vari-
eties of the dog which are trained to that species of chase
called hunting, which implies that the dogs so employed
follow their four-footed game by the scent principally.

In addition to the Blood-hound, the Slag-hound, the
Hog-deer, the Fox-hound, the Harrier, and the Beagle,
and the Squirrel-Hound, and the Beagle [BRAHAN],
were the hounds of greatest note. Some of these varieties, the old Southern Hound
for instance, which was slow but very sure, and with a fine
drop; the Harrier, which gave tongue in earnest, are gradu-
ally disappearing; and indeed the greatest care is taken to
find him nowhere on a good day in Leicestershire, could
be now be present. His horses and hounds were bred with a
view to endurance rather than speed; and, if he were to
be examined, he would be seen sitting down at a gentle
crouch, in the most kind of hunting, except otter-hunting, but especially
in fox-hunting, has brought into demand a breed of hounds
whose fleetness requires the best and fastest horses. The
Greyhound, the Fox-hound, and Fox, have been the chief
concept of the system. The Southern Hound for revolution has taken place in the system.
Whether this is an improvement which will be answered dif-
fery, according as the respondent may prefer the old-
fashioned slow hunting, where all the sagacity of the hound
were minutely developed, not without a good deal of
‘music,’ or the rapidity which makes a good run now-a-days
like a race. The young, bold, and well-mounted rider
will generally prefer the latter.

The Southern-Hound, which is supposed to have been of
very high antiquity in Britain, in large size, strong and
of majestic aspect, long but round in the body, deep in the
chest, and his ears are long and sweeping. The tone of his
voice is deep, and he is disposed to give the note in a soft,
perverse sound, after longer and lighter hounds have given it up;
but he is very slow. The author of ‘Rural Sports’ saw
a pack of these hounds in Lancashire, where they were kept
on the hunt, which was twenty-two inches.
The huntsmen went with a pole on foot.

As a contrast we may notice the celebrated match made
between Mr. Barry and Mr. Meynell, to run a couple of
each other’s fox-hounds a drag, from the rushing of the
hounds at Newmarket town-end, to the rubbish-house at the
starting-post of the Beacon-course, for five hundred guineas.
The match came off on the last day of September, and was won
by Mr. Barry’s Bluecap and Wanton, which came in very
close to the other. Colonel Blakemore, who was in the
Speed, being beat by upwards of a hundred yards. The
ground was crossed in eight minutes and a few seconds;
and of sixty horses that started with the hounds only twelve
were up. Cooper, Mr. Barry’s huntsman, came in first, but
it is asserted that the mare that carried him was completely
blinded at the conclusion of the run. The famous Will Crane,
who rode Rho, a king’s-plate horse, was only in the
twelfth. The hounds were performed in a minute and a
quarter for four hogsheads of claret, the seller to have two couple of
her wholes, ran a private trial of four miles in seven minutes
and half a second.

Our next subject will not permit us to go into the details of
this, to many, interesting subject; and we must refer the
reader to Somerville’s ‘Chase,’ Beckford’s ‘Thoughts upon
Hunting;’ ‘The Sportsman’s Cabinet;’ Daniel’s ‘Rural
Sports;’ the Sporting Magazines; and, most especially,
‘Nimrod, for further information.

HOUR, HOUR-CIRCLE, HOUR-LINE. The first
word always means the twentieth part of a day, by what
revolution sooner the day may be measured. [TIME.] In
angular measure (ANGLE) it signifies the twenty-fourth
part of a complete revolution, or 15°.

Any great circle on the sphere which passes through the
two poles is called an hour-circle, because the hour of the
day is reckoned according to the position of the sun
certained upon which the sun is for the time being. But
the two semicircles into which the poles divide such a circle
belong to different hours, and are twelve hours sunder.
In fact, each hour-circle which is contained under the term
hour-circle. [SPHERE, DOCTRINE OF.]

The hour-lines of a dial are the lines on which the shade
drops at different hours, and are the intersections of the
hour-circles with the plane of the earth. According to
clocks, the science of dialling was of considerable importance, and many works
were written on the subject, in which the forms of such instruments were
varied without end, and also the methods of constructing them.
One work on this subject was the ‘Theory of reflecting the sunne beames upon a diall, contrivde on a plane
which the direct beames can never shine upon.’ In the rest
of this article we propose to show how to construct any
plane dial, or rather how to calculate the hour-lines for it.
oy means of spherical trigonometry. A maker of dials should form a table for every species of dial which he wishes to construct, once for all.

Firstly, suppose the dial to be perpendicular to the meridian, which is the case in the horizontal dial and in the vertical south dial. In this case the line drawn through the dial, in a vertical east and west plane, must be horizontal. The style of the dial is of course to point towards one of the poles. Let O be the centre of the globe, and of SBM the circle on which the dial is to be drawn, and let SPB be the meridian. Then at noon the shadow of the style (a portion of the line OP) is ON. Let the position of the sun in the afternoon be in the plane of the hour-circle OPB, and let the real solar time be a (hours or minutes), and turn A into degrees, &c., at the rate of 15° to an hour of time. Let H be the angle thus obtained. Let a be the angle by which the plane of the dial is to dip below the horizontal plane, and I the latitude of the place. Then in the right angled spherical triangle PNB, the side PN or PC - NC is I - a, and the angle BPN (= SPA) is H. But NB (answering to the angle NOB) is the angle made by OB, the hour-line wanted, with ON, the true hour-line: let it be called H'. And by the properties of right angled spherical triangles,

\[
\tan H' = \tan H \times \sin (i - a);
\]
from which H' may be calculated for as many values of H as may be necessary. If the dial be horizontal (the most common case), we have (a = 0)

\[
\tan H' = \tan H \times \sin i;
\]
and if the north side of the dial dip instead of the south, by an angle a, the formula is

\[
\tan H' = \tan H \times \cos i.
\]

Secondly, suppose the dial to be not perpendicular to the meridian. In that case the circle SPN, perpendicular to the dial, is not the meridian, and it must be ascertained what angle it makes with the meridian, and thence, what hour-line is ON. This being found, the dial is constructed in the same manner as before, and the hour lines follow the same law, with this exception, that the preceding formula does not measure the angles from the twelve o'clock hour-line, but from some other. It is not worth while to pursue this case further.

HOUSE. The degree of comfort exhibited in the arrangement of their houses is one and a very important characteristic of a nation's degree of civilization; and we may mark the progress of this civilization in its successive stages from a rude condition to a high state of perfection by studying the architecture of a people as shown in their ordinary dwellings.

We have but little information about the houses of the Egyptians and Greeks; but as to the houses of the Romans, we have ample means of ascertaining the domestic arrangement, and even the minute details, from the numerous houses discovered and excavated in Pompeii.

There is a model in the British Museum representing most probably a part of an Egyptian house. It appears, to judge from the figures, to be about 10 or 12 feet square and 14 or 15 feet high. It is called a granary, which is not unlikely, as it is similar in character to a granary represented in Rosellini's work on Egypt. (I Monumenti dell'Egitto e della Nubia.) The steps of the stairs are of a different proportion.

In the lower part of this model, which has two stories, there is a court, the angles of the walls of which are raised a little higher in a sweep. The door into the court is low and roughly constructed, the hinges being merely wooden pins let into a socket above and below. The stairs leading to the upper part of the house appear to be formed of a solid beam placed aslant and the steps notched out. The risers bear a proportion to the tread of six to one. The walls are plastered, and the door and doorcase are painted red. As much of the roof as is visible on the model is, there are three clamped and partly framed square-shaped doors to the mouths of the granaries. In the court a figure is represented kneading bread, from which it might be inferred that the building was a bakehouse, and the doors those of ovens.

In No.68 of Rossellini's work is a section representing an Egyptian house. The doorway is similar in form to the doorway of an ancient Egyptian temple; above are folding windows, not unlike the latticed windows of the houses of many of the Athenians in Cairo as described by Lane: a staircase leads up to the floor where the windows appear, and above them is an open gallery supported on columns; the garden, in a court, is shown attached to the house. The best description of a modern Egyptian house is given by Lane in his 'Manners and Customs of the Modern Egyptians.'

Vitruvius (vi. 10) gives a general description of a Greek house, which, although it differs from the Roman one not having a vestibule and atrium; and the Greek practice of separating the apartments of the females from those of the males, led to an entirely different internal arrangement.

It appears from the oration of Demosthenes against the Macedonians (c. 534) that the houses of many of the Athenians were in their time very magnificent; while in the time of Themistocles and Miltiades they were comparatively mean; and indeed it may be inferred from various passages in the orators and other writers that a wide difference existed at any time in the houses of the Athenians, according to the number of persons that inhabited them. In the lower story of the houses many of the Athenian houses continued to be very small and inconvenient. A Greek traveller who visited Athens about a.c. 300 says that most of the houses were mean, and only a few goods.

The modern Greek house is of a quadrangular form, with a court in the interior; the staircases are placed on the external part of the house, leading to a gallery round the first floor. The entrance is the sitting apartment of the women; a bow-window is placed in this apartment over the door: here, on a daïs, the women sit and amuse themselves by watching the passers by. In the lower story the cattle are often placed. The upper apartments are separated from the men's, as was the custom among the ancient Greeks. Many Greek houses are exceedingly mean and ill furnished.

The most perfect remains of Roman houses are at Pompeii: They are all subdividings of both the rich and the poor; the latter are small and meanly finished; the former are in comparison extensive, and often richly decorated with columns, paintings, and mosaics. The principal features of a Roman house are the atrium, the tablinum, and the peristyle. The accompanying plans, with a description of the disposition of the various apartments of two of the principal Roman houses in Pompeii, will serve to convey some idea of their arrangement and uses.

The ground plan of the house of Pansa is an entire insula, about 200 feet by 100, part of which however is occupied by shops, and part by a garden.

1. Prothyrum with mosaic. 2. Tuscan atrium. 3. Impluvium, with mosaic. 4. Open tablinum, paved with mosaic, serving as a passage to the peristyle. 8. There is also however a passage (fauces) 6, beside it; and though the tablinum was left open for the sake of the effect produced by the perception of the whole length of the house visible at once, it was probably closed by a bronze or wooden railing, so as only to allow the master of the house or the family to pass through it. 7. The apartments on each side of the atrium proper were meant for the reception of guests entitled to the claim of hospitality, who came to the house of Pansa when pleasure or business brought them to Pompeii. 9. The larger room beside the tablinum marked 10 might serve for a winter reception-room for entertainment of a winter court. 10. Private entrance to the peristyle. 11. Basin. 12. Bed-chambers. The centre one seems to have been a procyton, or anteroom, since it communicates with the one beyond it. 13 is called by Donaldson the library; by Mazois a pantry, or room to

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Arrange the dishes before they were introduced into 14, the trierlinium. 15. Winter oecus, or trierlinium; Donaldson calls this room the lararium. 16. Large summer oecus. We may call this a cyziciene oecus, or hall, so called by the Greeks. It is spacious, has a northern aspect, and a large opening towards the garden. 17. Fountains leading from the peristyle to the garden, to avoid making a passage-room of the oecus. 16. Kitchen. 19. Servants' hall, with a back door to the street. 20. Cabinet looking to the garden. 21. Portico of two stories, a clear indication that this house had at least one upper floor. The staircase however has so entirely perished that its site is unknown, although there is some indication of one in the passage (26). 22. Garden; in one corner, 27, is a reservoir supplying a tank. 23. Four shops let out to tenants. 24. Shop belonging to the house, intended for the sale of the space produce of the owner's estates. The produce of the farms of the Italian nobles is still vended in the same way, in a small room on the ground-floor of their palaces. 25. 29. Two baking establishments. 26. Baker's shop. 26. Entrance to the peristyle from the side street. On the pier, between the two doors, is a painting representing one of the guardian serpents, by the side of which is a projecting brick to receive a lamp lighted in honour of the Divi Custodes. In the centre of the large apartment 29 are three miles, a, a, and near them a large table. Flanking the entrance to the oven are three large vases, e, and in the left-hand corner is a kneading-trough, a, with two copper pans over furnaces. The apartment 31, from its communication both with the shop and the bakery, was probably used as a store-room.

The two compartments marked 30 are houses of a very mean class, having formerly an upper story. Behind the last of them is a court which gives light to one of the chambers of Pansa's house. On the other side of the island are two houses (32), small, but of much more respectable extent and accommodation, which probably were also meant to be let; or we might conjecture that one or both served as hospita. The view above offers to the eye successively the doorway, the prothyrum, the atrium, with its impluvium, the Ionic peristyle, and the garden wall with Vesuvius in the distance. The entrance is decorated with two pilasters of the Corinthian order. Besides the outer door there was another at the end of the prothyrum, to secure the atrium against too early intrusion. The latter apartment was paved with marble, with a gentle inclination towards the impluvium. Though the tablinum the peristyle is seen with two of its Ionic capitals still remaining. The columns, a sort of pseudo-Corinthian, are sixteen in number, fluted, except for about one-third of their height from the bottom. The drippings of the roof were conducted by metal conduits into the central basin of the peristyle, which is about six feet in depth and was painted green. In the centre of the basin was a jet d'eau. This apartment, if such it may be called, was unusually spacious, measuring about 55 feet by 20. The height of the columns was equal to the width of the colonnade, about 16 feet. Their unfluted part is painted yellow, the rest is coated with white stucco.

The floor is elevated two steps above the level of the tablinum. In the kitchen is a singular painting, representing the worship offered to the Lares, under whose protection and custody the provisions and all the cooking utensils were placed. Another object of interest in the kitchen is a stove for stews and similar preparations, very much like those charcoal stoves which are seen in extensive kitchens in the present day.
most part whether they built on a regular or irregular area. The practice of surrounding the owner's abode with shops enabled them to turn to advantage the sides and corners of any piece of ground however misshapen. Thus in the

plan before us the apartments of the dwelling-house are almost all well shaped and rectangular, though not one of the four angles of the area is a right angle.

1. Prothyrum. 2. Large hall serving as a vestibule, as is pretty obvious from its arrangement. In the comparatively humble edifices of Pompeii we cannot expect to find a splendid provision for the convenient reception of a crowd of importunate suitors, as in the spacious palaces of ancient Rome; still it is interesting to trace the same disposition of apartments on a smaller scale, especially as this throws some light upon the contested question of the Greek or Roman origin of the private houses. There are four doors; one opening to the prothyrum, another to the street,—a large opening, closed, according to Mazois, with quadrivalve doors, or doors folding back upon themselves, like window-shutters. Of the other two, both communicate with the atrium, one directly, the other through an intermediate room, 16, probably the cells ostiarii, the porter's closet; so that at night, when the doors of the atrium were closed, no one could enter without his knowledge. 3. Shop communicating with the house for the sale of the produce of the proprietor's estates. Jars are set in the counter, probably to receive his oil or olives. 4. Shop. 5. Shop called a thermopolium, with two rooms backwards. Between 4 and 5, in the party wall, is the opening of a cistern, common to both. 6. Bakehouse. There were rooms over it, as is proved by a staircase. The four first steps, steep and inconvenient, were of stone, and still remain. The sites of three mills a a a are laid down. 7. Oven. 8, 9. Rooms belonging to the bakehouse. 10. Tuscan atrium. 11. Marble impluvium. 12. Antechamber of a large aedus, or hall, 13, which perhaps was the winter triclinium. This was used partly on its neighbourhood to the oven, which would keep it warm and dry, and in a comfortable state for winter use; partly from its size and shape. The length is about 24 feet, the breadth 15, which exactly agrees with the descriptions of Vitruvius, that the length of a triclinium should be double its breadth. A further reason for thus appropriating it may be found in its central situation, which is such that it must have been very ill lit, if lighted at all. It was perhaps therefore intended chiefly for evening use. 14, 15. Rooms, probably for the reception of strangers, which, where there was no hospitium, generally were placed round the atrium. The walls of 15 are preserved up to the cornice, and are stuccoed and painted. 17. Altar. That on the right opens into a cabinet, probably of the atrium. To correspond with the doorway, there was in the other aula a false doorway, which served as a portico, as the paintings which were found in it prove. 18. Open room and staircase leading to a winter apartment placed above the oven. 19. Tablinum. 20. Fauces. 21. Portico. 22. Summer triclinium. 23. Cabinet. 24. Garden, or xystus. 25. Triclinium in the open air, covered by a trellis. 26. Kitchen. 27. Back entrance. 28. Chamber. 29. Entrance to venarium. 30. Lodge for a slave whose duty was to keep the door and prevent intrusion. 31, 32. Portico, and court of the venarium. 33, 34. Cabinet, opening from the portico. 35. Triclinium. 36. Open space containing a stove, and staircase to the terrace above the portico.

'The general view of this house is taken from the street in front, and runs completely through to the garden wall. One of the pilasters which flank the doorway has its capital still in good preservation. It is cut out of grey lava, and represents a Silenus and a Pan, side by side, each holding one end of an empty leather bottle thrown over their shoulders. Ornaments of this character are common to Pompeian houses. On the right is the large opening into the vestibule. In the centre of the view is the atrium, easily recognised by the impluvium, and beyond it through the tablinum are seen the pillars of the portico. Beyond the impluvium is the place of a small altar for the worship of the Lares. A bronze hind, through the mouth of which a stream of water flowed, formerly stood in the centre of the basin. It bore a figure of Hercules upon its back. The walls of the atrium and tablinum are curiously stuccoed, in large raised pannels, with deep channels between them; the pannels being painted of different colours, strongly contrasted with each other.

'The altar in the atrium, and the little oratory in the left hand aula, belong to the worship of the lares domestici or familiares, as is indicated by the paintings found in the false doorway. They consist of a serpent below, and a group of four figures above, employed in celebrating a sacrifice to these gods. In the centre is a tripod, into which a priest,
his head covered, is pouring the contents of a patera. On each side are two young men, dressed alike, apparently in the pretexts. In one hand each holds a patera; in the other each holds aloft a cow's horn perforated at the small end, through which a stream is spouting into the patera at a considerable distance. In the back ground is a man playing on the double flute.

Passing through the tablinum, we enter the portico of the stactus, or garden, a spot small in extent, elegantly decorated by the hand of art, and set apart as the favourite retreat of festive pleasure. The portico is composed of columns, fluted and corded, the lower portion of them painted blue, without pedestals, yet approaching to the Roman rather than the Etruscan Doric. From the portico there is an ascent by three steps to the stactus. Its small extent, not exceeding in its greatest dimensions seventy feet by twenty, did not permit trees, hardly even shrubs, to be planted in it. The centre therefore was occupied by a pavement; and on each side boxes filled with earth were ranged for flowers, while, to make amends for the want of real verdure, the whole wall opposite the portico is painted with trellises and fountains, and birds drinking from them, and above with thickets enriched and ornamented with numerous tribes of their winged inhabitants. Exactly the same style of ornament is described by Pliny the Younger, as existing in his Tuscan villa. (Plin. Ep. lib. v. 6.) At one end of the garden, which is shaped like an L, we see an interesting monument of the customs of private life. It is a summer triclinium, elegantly decorated. The couches are of masonry, intended to be covered with mattresses and rich tapestry when the feast was to be held there; the round table in the centre is of marble. Above it was a trestle, as shown by the square pillars in front, and the holes in the walls which enclose two sides of the triclinium. These walls are elegantly painted in pannels in the prevailing taste; but above the pannelling there is a whimsical frieze, appropriate to the purpose of this little pavilion, consisting of all sorts of eatables which can be introduced at a feast.

In front a stream of water pours into a basin from the wall, on which, half painted, half raised in relief, is a minnie fountain, surrounded by a stag. Between the fountain and the triclinium, in a line between the two pillars which supported the trelise, was a small altar, on which the dus libations might be poured by the festive party. In the other limb of the garden is a small furnace, probably intended to keep water constantly hot for the use of those who preferred warm potions. At the other end of the garden, opposite the triclinium, was a cistern which collected the rain-water, whence it was drawn for the use of the garden and of the house. There was also a cistern close to the triclinium.

On the right of the stactus a suite of apartments existed, carefully detached from the remainder of the house, and communicating only with the atrium by a single passage. The disposition and the ornaments of this portion of the house prove that it was a private venerium. The strictest privacy has been studied in its arrangements; no building overlooks it; the only entrance is closed by two doors, both of which, we may conjecture, were never suffered to be open at once; and beside them was the apartment of a porter, whose duty was to prevent intrusion. Passing the second court, the visitor found himself under a portico supported by octagonal columns, with a fountain in the centre, and in the middle of it a small basin: at each end of the portico is a small chamber, with appropriate paintings. These rooms were paved with marble, and the walls lined with white marble on the whole. Among other things found in one of these chambers were eight small bronze columns, which appear to have formed part of a bed. Both chambers had glazed windows, and it is conjectured that they were provided with water-courses. The ground of the walls is black, while its sombre aspect is redeemed by a profusion of gold-coloured ornaments, and bright green and red colours, composed in the most elegant taste.

The columns were painted with a species of red ochre, of brilliant tint. Between the chambers is a large painting representing the story of Actaeon, from which the house derives one of its names. The large apartment 35 was a triclinium, for the use of this portion of the house: over the left-hand portico there was a terrace. The space marked 36 contained the staircase which gave access to it, a stove, connected probably with the service of the triclinium, and other conveniences. It is not a little remarkable that in many houses in Pompeii and Herculaneum the entrance to the house was directly into the court or open area in the front of the houses. The walls of Roman houses were decorated with arabesque paintings, which added an agreeable charm to the light and airy appearance of the houses.

The houses of which we are speaking are among the most extensive hitherto discovered in Pompeii; most of the dwellings are on a very small scale; but the principal feature, the atrium, is found in almost all of them. The decorations vary of course according to the wealth of the owner. Though the houses in the city resemble each other in the principle of their arrangement, there is one house without the walls of Pompeii very different in this respect. This dwelling is called the Suburban Villa of Diomedes, and is described in length in the volumes on Pompeii, published by the Society for the Diffusion of Useful Knowledge, from which, with a few verbal alterations, the account above given of the Roman house is taken.

Three centuries ago the English house was constructed in a very different manner from the houses of the present century. The chief materials were wood and plaster, and a common but peculiar feature was the projecting upper floor. The internal arrangement was adapted to the wants of the day, and the external architecture had often a picturesque appearance. The Butter-market at Ipswich contains a remarkable specimen of a house of this period. After the great fires of 1666 and 1676, the advantages of brick or stone became so apparent, as well as the adoption of some regularity, that a great change took place in house-building in the metropolis, which extended by degrees to the houses of the middle class from time to time throughout the country. In this gradual change have almost entirely disappeared the projecting floors with large bow-windows, the wooden galleries round the quadrangular courts, the boldly-projected dripping eaves, and the high-pitched roofs with their large windows. In the latter part of the last century an act of parliament was passed for the improvement of house-building in the metropolis, as far as regarded strength, protection from fire, and a gradual removal of the old-fashioned projections. This system has no doubt gradually led to improvements in house-building all through England.

The modern English house, which is most commonly of brick, varies in its arrangement according to the wealth of the occupier, or the skill and taste of the architect. The houses of the middle class, especially in cities, are nearly the same in their chief features. In cities, and particularly in London, for want of space, the basement is often so constructed as to be entirely below the level of the ground, the earth being excavated for that purpose. This floor usually contains the kitchen and the rooms for the use of the domestics. The ground-floor, or the floor over the basement, is laid with the greatest of the following manner:—the entrance is mostly at the side, leading into a passage, at the end of which is the staircase, which in double flights, with landings between, ascends to the top story. On one side of the passage-way is usually placed the dining-room, and the drawing-room
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is placed on the first floor above the ground-floor. On the other floors are arranged the bed-rooms: the highest floor is called the attic. In the houses of the wealthy the drawing-room is formed of a suite of rooms, and the apart-ments are much more numerous. The servants' rooms are often placed in a contiguous wing of the house, near enough to be within immediate call, and yet so separated from the house as not to interfere with the privacy of the family. The best arranged English houses are the country mansions of the rich.

English houses are in general well provided with means for heating off water and all impurities which require to be removed from the premises. The large towns of England which have sprung up or greatly increased within the present century, and particularly London, contain numerous capacious rooms, built to be entered beth side, and thus are kept in a state of cleanliness and propriety which no other houses in any country enjoy in an equal degree. The convenient arrangement of baths is also one of the striking features in an English house, and is no

The floors of English houses are constructed of wood, and boarded; and the roofs, which are pitched, or at an angle, are covered with slates or tiles. The rooms are heated with open grates, with flues over them, the exit for which is above the roof. The chimney-flue is a very important feature of an English house, for it is the comfort of having the apartment free from smoke. According to Nicholson, 'in stone walls of ordinary buildings the most common dimensions for the sections of the flues of sitting-rooms are from 12 to 14 inches square, and for the brick-work of the chimney its sides are often 15 to 18 inches. The chimney is also so constructed that a current of air may pass immediately over the fire, as so as to be raked in its passage, and not to pass entirely through the fire, as many have erroneously imagined. For this purpose the throat should be so near the fire as to prevent a current of air from passing over it, and its horizontal dimension in the thickness of the wall should not exceed 4 inches or 5 inches at the most.'

The necessary construction is to be formed by facing up the back, and bevelling the covings, so that no cold air may be admitted by the ends of the fire: by thusobliging the over-plus above the quantity necessary to produce combus-
tion to pass over the fire, it becomes so heated as to consume the smoke in part, and to drive the remaining portion before it. The covings are generally placed at an angle of 135 degrees with the back and breast of the chimney, and should be made to form an abrupt plane on their top, so as to break the current of air that passes up the flue, and in general the higher the chimney, the more velocity and force will it ascend with. The flue ought therefore to be carried as high as convenience will admit.

The tops of flues should not have such wide apertures as to permit a greater quantity of air to rush down the chimney and counteract the force of the ascending raised stream.

Smoky chimneys are frequently occasioned by the situ-
ation of doors in a room, the grate being placed too low or the mantel too high.'

The staircases are, with some reason, supposed to be more favourable for the venting of smoke than those whose sections are square or rectangular. (Nichol-
son's Dict., art. 'Chimney.')

The plan of an English house is usually constructed of wood; the stairs are technically called steps and risers; they are both parallel and radiating or winding at the turns. The staircase has a protecting baluster, with a handrail on the top to assist a person in ascending and descending; the handrail is usually made of dark wood, and requires a skilful workman to execute it. (Nicholson's Dict., art. 'Handrail').

Every convenience which ingenuity can contrive is now found in the arrangement and details of English houses, even of those which do not belong to the wealthy class. Those luxuries which the richest nobles could not formerly procure at any price, are now at the command of every man of a moderate income. The windows are hung with pulleys and weights, so that they are opened and shut with the greatest ease. The shutters which close them at night are made to fold and to fall into the smallest possible compass. The ceilings and walls are beautifully plastered, and the latter, if not painted, are carefully papered with paper printed of various colours; and the wood-work is often painted in imitation of the most costly materials.

The houses of the poorer classes are generally called cot-
tages. In their construction, economy, convenience, and a wholesome ventilation should be mainly kept in view, and these may be united with as much as possible. The houses of the middle class as to the nature of the materials will admit of without increasing the expense. In cottages of two stories the upper should be warmed by a flue from the fire in the lower; in order to effect this the flue is made to pass through the partition wall between the two stories, as thin as possible. In a single cottage of twelve or fourteen feet square the conveniences should consist of a common dwelling-room on the ground floor, and a sleeping apartment on the upper floor, which should be partitioned off to separate the sexes.

When cottages are built in rows they may be arranged with a living-room on the ground floor, about sixteen feet square, with a door and window in the front, and a lean-to leading into a lean-to at the back. The fireplace should be on the side away from the door, with an oven opening into it by means of a flue; under the stairs a pantry with an oven, and a small room for washing clothes. The chimney should be placed in the gable wall, and the doors and windows divided in the gable wall, and the doors and windows divided, and the front part they projected on the outside of the wall. The roof was covered with straw, reeds, or slate. An upper chamber was sometimes formed in the roof, and lighted by a dormer window in the side of the roof, or a window formed in the gable wall. The front walls being low, the windows were made much longer than high, and the long lintel, or head part of the window, was supported by one or more uprights or columns of masonry, and a piece of masonry of the same size set in the wall at the bottom, and the jambs of the windows were continued downwards beyond the top of the wall and projected from it. This method preserved the building in some measure from damp. The chimneys, which formed a part of the main structure, were built up singly in one or both ends of the building, and for the most part they projected on the outside of the wall.

The frames for the glass revolved on hinges with an up-right axis, and were glazed in borders of lead stiffened by cross pieces of wood or iron, called saddle-bars. These squares of glass are sometimes in open forms, having a round, rhombus-shaped, and the leaden bands are fixed to an iron frame. A small shed for a cow was frequently added, with occasionally a lean-to at the end or back, for the conven-
ience of the cottager. It is most probable that cottages were constructed originally of but one story, and in such cases the projecting roof would well protect the walls from wet, but when a second story was raised the windows and doors were more exposed to the rain; to protect the heads of the doors and windows, a projecting piece of wood or slate was placed over them, and in some cottages the second floor was projected over the lower or ground floor. The best English cottages of recent construction are built of brick with slate. The use of these materials has changed the character of this class of dwellings. In many cottages the chimney-stack forms the principal bearing for the floors and roof. The Scotch cottage has not only a different appearance when compared with the English cottage, but is so much wider that it admits of two apartments being formed on the ground floor; this is also a matter of necessity, as they are seldom raised more than one story. The material of construction is generally of very large and heavy in appearance, and has but a small projection beyond the walls; the gable walls also run up frequently above the roof, forming a parapet, which is sometimes notched so as to resemble steps or has a battlement appearance.

The windows and doors, being without the projecting label, are not so well protected from the rain; the walls however are thick, and the window openings, on account of the size of the stones, are narrow; the windows slide ver-
tically, being placed in a frame. The squares of glass employed are larger than those used in English cottages, in order to obtain more light; the sides of the windows are also splayed.

Mr. Nicholson, in his account of Scotch cottages (Arch. Dict.), says—"The chimneys are either carried up in one or both gables, in the partition wall, which separates the two apartments in the length; when they are carried up in the ends, as the walls are always made sufficiently thick to receive the flues, the materials, which are of crude stone cemented with mortar, not being of sufficient value, the walls are therefore built upon the foundation of ches, and heads of chimneys in order to save them." The chimney shafts are finished with a coping of hewn stone.

In many old constructions of Scotch cottages the chimneys were in the front of the house, a large number all round the fire, which gave great advantage, in admitting more than double the number which the modern construction admits of. The old roofs of thatch, turf, or heath, have given place to slate and tile. The common kind of the present cottages in the north are made very wide, either to receive a framed bedstead and press, or to form recesses, by means of a partition, for the reception of the bed and cupboard on the side of the apartment opposed to the window.

Some valuable information on cottage-building is contained in Loudon's 'Architectural Magazine,' and in the Encyclopaedia of the same author. In the latter it is instructive to enter into a description of the construction of a house, but rather to point out those general arrangements of houses which mark, in some degree, the national character, and the adaptation of a building to the wants of the inhabitants and the climate. In the present work, we proceed to mention some of the most striking features of foreign domestic architecture.

As the French and Italians of the middle classes do not generally live in separate houses like the English, but on floors containing a series of rooms, it follows that the arrangement of their houses differs from that of the English. The staircase, as in public chambers, is common to each floor. Communication is made by staircases, and generally with a passage or balcony on one side: chimneys are rare, stoves being most commonly used to heat the rooms. The windows are not hung with pulleys and weights, but are generally in semicircular glass doors on hinges. The Mazzano (Messanae) is common in French and Italian houses. The houses have generally projecting roofs with often broad overhanging eaves, while in England the gutter is usually concealed within a parapet wall. French and Italian houses are mostly built in brick, a material which in the thirteenth and fourteenth centuries was so seldom boarded, being paved with glazed tiles or unglazed bricks. So rare are bricks in Paris that it is not unusual to see the chimney shafts painted in imitation of red bricks; but they are however employed in the construction of their flues.

The Spanish houses are very spacious: they have large courts in the interior, and are formed with galleries round the inside of the quadrangular courts; families occupy the separate floors, as in France and Italy. The chief door, which is large, has a small wicket, from which any one applying for admission is first scrutinized. It is a peculiarity of the Spanish house, at least in the south of Spain, that it is without chimneys.

The houses in Switzerland are smaller than those in Italy, France, and Spain; and the people are accustomed, as in England, to live in separate dwellings. The most remarkable of the Swiss houses are those which are built in the neighborhood of the great pine forests; these are really log-houses, though they are generally finished very carefully and consist in great accuracy. The walls are formed of whole trees nailed together, one on the other at the ends where the walls cross. The roof is of wood: short pieces of pine split into thin layers are used as tiles, and held together by small spars laid across them, which prevent them from falling off. This kind of building is much used in the United States of North America.

Many of the cottages have wooden chimneys, the whole of the flue being formed of and lined with wood; the fire is then placed in the chimney, and preserved by a varnish which preserves it from taking fire. The beams supporting the roof are formed into bold cantilevers, and the principal front is often varied, sometimes with elaborate ornaments, and inscriptions in German text are painted in several colours. These houses have altogether a picturesque appearance, and are much warmer than houses of stone or brick. The houses in many parts of Germany are much nearer to the English in their arrangement than the French and Italian houses. In many places the houses are a framework of wood, and the interstices are filled with unbaked bricks, and are plastered over. The mode of heating houses in Germany and Switzerland is principally by stone (Gfen), which, in the better houses, are so arranged that the domestic feeds the fire without entering the apartment which is heated.

In North Prussia the peculiar feature of the houses is that they are framed of wood with bricks between. In the same country the upper stories project over the lower, and are supported on columns, generally of wood.

The Italian houses in the first order of architecture, both in its effect and arrangement, resembles the architecture of Italian and French houses, except that the roofs are covered with sheet-iron painted with vivid colours, mostly green and red. The windows are double. The village houses are all log-houses (mostly of rounded logs), and very similar to the Swiss log-house, with the exception that the staircase is for the most part in the interior of the house; the roof is high-battened, and covered with sawed boards projecting six feet from the walls; while the Swiss roofs are flat, and generally covered with wooden shingles. The chimneys of the Russian house are of brick. On the less frequented roads the village houses are of the rudest construction. The projecting cornice projects above the ridge, and form by their closeness the roof covering; the projections above the ridge are sometimes cut off, and the ridge-piece is introduced, on which is rudely carved the representation of the head of some animal.

The French houses have a figure of certain houses present on each side a range of bold projecting gables. The houses are of two stories; some of the better village houses have a third storey in the roof, and a colonnade with a balcony from the attic; but such balconies are always in the gable front.

In the villages there is a side entrance, with a penthouse roof over it, leading into the court where the sheds for the cattle are placed.

The Russian stoves are well adapted for economizing heat. The flue is carried up and down, so as to fill a space of about four feet square, and to the height of about ten feet; it is then carried off; these stoves stand in one corner of the room, so that they can warm the whole house. The flues are built of hollow porous brick, which of course contains the heat. The external surface is of white glazed and ornamented tiles. The fuel is usually birch, and when the fire is started, a patch of green is thrown on the hearth, which by the heated air thus enclosed diffuses itself through the rooms. The stove requires to be heated at most for an hour in the morning, and another at night, to maintain a high temperature (100° Fahrenheit for instance) during the twenty-four hours.

For the external design of modern house architecture the English are principally indebted to the Italians. This style, which was invented by the great Italian architects and executed in many of the Italian cities, is mainly characterized by the judicious arrangement, proportion, and decoration of the openings in the elevations, the windows and the doors, and by the bold cornices which surmount the whole front. These masterpieces are deservedly studied by modern architects, and their principal features sometimes judiciously introduced into their designs. The cities of Rome, Genoa, Verona, Venice, and Bologna may be named in that connexion. The Roman and Tuscan order are forms of pilastrated architecture, a style which might be advantageously employed in this country to a greater extent than it has been.

Houses are generally ventilated by means of the openings, the windows, and doors, which are sometimes and by the aid of open fire-places. The system of ventilation adopted in some large covered markets, as at Liverpool, and some large hospitals, might be adopted with advantage in certain classes of dwellings, as in workshops and houses of extreme size and extent. This system consists in the adoption of fine air-holes on the line of the floors, which keep up a gradual fresh current of air, without a rapid draft.

The houses in all countries are, in some degree at least, adapted to the climate. The houses of hot climates are large, with lofty and well ventilated apartments; while those of cold climates are more particularly arranged with a view to protect the inhabitants from cold.
HOUSE OF CORRECTION. [PRISON.]

HOUSA. [SODAN.

HOVEDEN, ROGER DE, an English historian, who seems to have been the same person whom Robert of Gloucester calls "Hew of Housan," and who is supposed to have been the son of Hoven or Howden in Yorkshire, the place of his birth. Walter of Coventry says he was in the household of Henry II; probably as a chaplain, as that monastic state is stated to have employed him in the ecclesiastical see of Norwich, where his abbot or prior died, and when the revenues of the respective foundations fell into the king's hands. The exact time of Hoven's birth and death is unknown, but it was probably in the third quarter of the twelfth century. His History, which commences in 731, where Bede ends, and continues to 1202, the third year of King John. Hoven's History was published by Sir Henry Savile, in the 'Scriptores post Bedam,' Vol. VII, 1596, and again at Frankfort in 1601. Nicolson, upon the authority of Pits, says that in 1291 Edward I. caused diligent search to be made in all the libraries in England for Hoven's History, to adjust the dispute about the homage due from the crown of Scotland. Leiland, Selden, Sir Henry Savile, and Nicolson, all bear testimony to the fidelity of Hoven as an historian. (Tanner, Bibl. Brit. Hist., pp. 415, 416; Nicolson, Engl. Hist., Vol. II, p. 94.)

HOWARD, HENRY, EARL OF SURREY, son of Thomas Howard, third duke of Norfolk, by his second daughter Elizabeth Stafford, daughter of Edward duke of Buckingham, was born about the year 1515 or 1516, the exact time of his birth is uncertain. Nothing particular is known of his life until his marriage in 1532, at which time he could not have been more than sixteen. In that year he visited France in company with the duke of Richmond, and was present at the interview between Henry and the king of France. At Anne Boleyn's coronation (1533) he bore one of the swords in the procession, and soon after paid that visit to Windsor which was afterwards the subject of his odes; this at least is the opinion of the author of his life prefixed to Pickering's edition of his poems, while Dr. Nott, his more learned but less judicious biographer, supposes the visit to have been in 1576. His eldest son was born. We find him soon after assisting at Anne Boleyn's trial, and in the same year he lost by death his friend the duke of Richmond. In 1540 he served his first campaign in France, and two years afterwards was elected a knight of the garter. The short remainder of his life appears to have been clouded by misfortunes, the first of which was his quarrel with John & Leigh, and consequent imprisonment in the Tower. This charge was followed by summons from the Privy Council for eating flesh in Lent, and for walking about the streets at night in a 'lend and unseemly manner,' and breaking windows with a crossbow. He was found guilty of the first charge he excused himself, and was again confined. Dr. Nott, with singular obtuseness, appears utterly to misunderstand a poem in which Surrey defends himself in a half jocose manner, and assumes the whole proceeding to have been one of sober purpose, not a mere freak of youthful folly. In the next October he made another campaign in France, and after his return took Hadrian Junius into his family as physician. In 1547 he was again imprisoned for using bitter language against the earl of Hertford, after which nothing further is worth note until his last imprisonment, the real grounds of which are doubtful; the king's suspicious temper and Surrey's meretricious spirit would however supply sufficient means of a forced and unfounded charge that was of having quarreled the royal arms with his own, which it appears he had a right to do, although the point is not quite clear. This however was taken as a proof of treasonable intentions, and by the joint testimony of his sister the duchess of Richmond and of his father's mistress he was condemned and executed, January 21, 1547. His father, who was involved in the same charge, being absolved on other grounds, was liberated, and his death in the same week with Surrey's execution, was converted into a release.

Surrey seems to have been on bad terms with his mother, and this broach of a quarrel, at which he might have been fortunate in family matters. The controversy respecting the existence of Geraldine, his supposed mistress, has not terminated, and probably never will, until there are greater opportunities than exist at present for examining public records. It appears that there was an Irish lady to whom the famous sonnet might refer; and it also appears that Dr. Nott has understood some other of Surrey's poems to refer to Geraldine, when they do not; but the case is not clear on either point.

Surrey's works are principally remarkable as forming an important era in English literature. He was the first whose sonnet taught him to substitute the personal method of poem, at which we should admire the daring of Chaucer and his followers. He is also the earliest writer of English blank verse, of which the translation of some parts of 'The Aeneid' is a beautiful example. The 'Duke of Yorks' lament' is the earliest attempt at the second school of English poets who admired and followed the Italian models. As such, Spencer directly, and Milton indirectly, are indebted to Surrey, who, if for no other reason, for this at least deserves remembrance. He worked through four editions in two months, and through seven more in the thirty years after their appearance in 1527, besides appearing in garland, broad-sheets, and miscellanies. Many people who could not afford to buy printed copies multiplied them in manuscript, which sufficiently proves their popularity. It is a curious fact however that the literary tyranny of Pope was so absolute, and the national taste so much altered, at the beginning of the eighteenth century, that the book-sellers, who printed Surrey's poems about the year 1714, apologized for their audacity in thus restoring to notice a forgotten and anti- poetic poet by a reference to the authority of Mr. Pope. (Nott's Life of 2 vols., S. Surrey's Life, prefixed to Pickering's edition of his poems.)

HOWARD, CHARLES, LORD HOWARD OF EFINGHAM, second of that title, grandson of Thomas, second duke of Norfolk, was born in his father's house, and received much service by land and sea, he was appointed in 1553 lord-high-admiral of England, and in that capacity had the chief management of the preparations made in defence of England against the Spanish armada. He was a true son of the house of Howard, a natural enemy existed between the old soldier and the young favourite; nor did they quite agree as to the measures to be pursued. However the town was taken, and the ships in the harbour destroyed. (Essex, Earl of.) For this service Lord Howard was created earl of Nottingham, as declared in his patent, much to the annoyance of Essex, who would willingly have engrossed the glory himself, and sought to prejudice thequeen against his title. He anticipated one another Spanish invasion, coupled with suspicion of the earl of Essex's intentions in Ireland, the queen reproved in the earl of Nottingham the sole command of the army and fleet, with the sole consultation of English officers, which held during six weeks—an extraordinary mark of confidence. He commanded the troops which put down Essex's rash attempt at rebellion, and treated him in his downfall, as he had during his prosperity, with respect and kindness. Under the reign of James I. he retained his high consideration at court, and was employed in several distinguished capacities. He died at the advanced age of eighty-seven, December 14, 1624, some years before which he had resigned the office of lord-high-admiral in behalf of the favourite, Villiers, then earl of Buckingham, receiving in exchange a pension of 1000l. and the arrears of a debt of 1600l. due to the crown. His surviving half a century, and being followed by posterity was a mark of that part of that time the highest confidence, of his sovereigns, without earning or retaining it by unworthy compliances or selfish and interested intrigues. His temper appears to have been no less upright, honest, and excellent, than his services were distinguished. (Bibl. Brittann.)

HOWARD, JOHN, one of the most disinterested, laborious, and useful philanthropists that have done honour to man; born at the age of about 1740, in the parish of Southwark, was a London tradesman, who, dying early, left him in possession of a handsome fortune. Having always been fond of travel, he conceived a desire to visit Lisbon immediately after his death, which happened in 1748, but he died seemingly, but was captured by a French privateer. The sufferings which he endured and witnessed during his confinement struck deep into his mind. The impression Vol. XII.-2 U

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was renewed in 1733, when, as sheriff of Bedfordshire, he had charge of the prisons of the county. Shocked by the misery and abuses which prevailed, he set diligently to work to inquire into the nature and remedy of the evil. In that year he visited, in two journeys, most of the towns and country parts of England, and accumulated a large mass of information, which, in March, 1744, he laid before the House of Commons. This was the commencement of prison reform in England; for in the course of these two visits he proved the necessity of relieving accused prisoners from payment of fees, the other for preserving the health of prisoners. Once actively engaged, he became more and more devoted to this beneficent pursuit; insomuch that the Secretary of State, Walpole, called him "more than a traveller's diary of his journeys. He travelled repeatedly over the United Kingdom, and at different periods to almost every part of Europe, visiting the most noisome places, relieving personally the objects of distress, and noting all that seemed to him important either for warning or example. The first fruit of these labours was a 4to. volume, entitled 'The State of the Prisons in England and Wales, with some preliminary observations, and an account of some Foreign Prisons,' 1777. 'As soon as it appeared the world was astonished at the mass of valuable materials accumulated by a private unaided individual, through a continuous and arduous labour, and at its probable effect on the moral life, in consequence of the infectious diseases prevalent in the scenes of his inquiries. The cool good sense and moderation of his narrative, contrasted with that enthusiastic ardor which must be admiring, was undertaken without an admixture of enthusiasm, and he was immediately regarded as one of the extraordinary characters of the age, and as the leader in all plans of mitigating the condition of that wretched part of the community for whom he interested himself' (Alkin.)

The House of Commons having seconded his views by the introduction of a bill for the establishment of houses of correction, Mr. Howard, in 1776, undertook a fresh tour, primarily to visit and celebrate the opening of the House of Correction at Stolfold, in Norfolk, but he continued his route through Belgium and Germany into Italy, whence he returned through Switzerland and France in 1779. In the same year he made another survey of Great Britain and Ireland. In these tours he extended his views to the investigation of hospitals. The results were published in 1780, in an 'Appendix to the State of the Prisons in England and Wales,' etc. In 1781, having now travelled over all the south of Europe, except Spain and Portugal, through which he went in 1783, he visited Denmark, Sweden, Russia, and Poland; and continuing at intervals his home inquiries, published in 1784 a second appendix to his account of the state of prisons, in which the additional matter was comprised.

The importance, both in prisons and hospitals, of preventing the occurrence or spread of infectious diseases, produced in Mr. Howard a long-continued interest in the working of the Lazarettos in the Mediterranean, and especially as a safeguard against the plague. Danger or disgust never turned him from his path; but on this occasion he went without even a servant, not thinking it right, for convenience sake, to expose another person to such a risk. Quitting England in 1785, he travelled through the south of France and Italy to Malta, Zante, and Constantinople; whence he returned to Smyrna, while the plague was raging, for the purpose of sailing from an infected port to Venice, where he might undergo the utmost rigour of the quarantine system. He returned to England in 1787, resumed his home tours, and in 1789 published the result of his late travels in a new edition of his work, in which the original matter was comprised.

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ried Mary, daughter of Chiverton Hartop of Welby; and soon after, losing his brother Viscount Howe, he succeeded to his title and estate. In 1759 Lord Howe was re-appointed to the Magannarie, and on the 20th of June engaged with the squadron under M. de Conflans, in which Howe took the Thiébou and the Formidable. His reputation was now so high that George II. complimented him by saying that his fame had been one continued series of service to his country. After he had been again absent in the Princess Amelia, he returned home; and peace being proclaimed, Howe occupied a seat at the Board of Admiralty for two years, and was afterwards appointed Commander-in-Chief of the Navy, and was returned to parliament for Dartmouth. Except in questions that regarded naval administration, he took little part in the business of the house. In October, 1776, he was appointed to any command in the Mediterranean, and was placed in command-in-chief of the squadron then in that theatre of war. In 1777 he sailed on board the Eagle for North America. He was successful in a brilliant action with D'Eastraing's squadron off Rhode Island, which he quitted September, 1778, and on the 30th October landed at St. Helen's. On a change of ministers, his friends, who came into power, appointed him Admiral of the Blue, and to the command of the Victory; but failing in his attempts to intercept the fleet which was over the West Indian trade, he soon returned to Spithead. He was then sent to relieve Gibraltar, which he accomplished, and arrived in England on the 14th November. Lord Keppel having resigned his commission, he was appointed Admi-
ral of the British fleet. He quelled, in his own person, a mutiny on board the Janus. In three months he was obliged to resign, on another change of the ministry, which restored Lord Keppel. At this time he was created Earl Howe. He acknowledged the elevation of his house to the dignity of the barony of Langer to his eldest daughter. On the 22nd of June, 1790, he was appointed to the command of the Channel fleet, with the additional and peculiar distinction of being ordered by the king to hoist his flag at the main, on board the Queen Charlotte of 100 guns; but after cruising about in a fruitless search for the Spanish fleet, he anchored at Spithead, 14th September, and enjoyed repose on shore for a month. He was then appointed to the command of three convoys to the Lizard, and the same day discovered three frigates outside of Brest harbour. On the 25th May two French corvettes were taken; on the 28th May several French vessels were seen far to the south-east, and the Bellerophon engaged with the Révolutionnaire. The enemy's motions having been watched during the night, the two fleets continued in the same relative position on the horizon, and on the 30th the weather prevented an engagement, but on the 1st of June the action commenced at 9 A.M. The Marlborough, Defence, Queen Charlotte, &c. broke the enemy's line: ten of the enemy's ships were dismasted, seven were taken, three more were captured, 44 pounders, 24 and 20 guns, 54 inch and 42 inch, from the weight of the round shot and the diameters of the shells discharged from them. The lengths of the above natureresulting from—

Iron, 5 feet and 4 feet.

Brass, 4 feet 9 in., 3 feet 9 in., 2 feet 8 in., and 1 ft. 11 in.

The French officer above mentioned has proposed to his government the employment of iron howitzers on board of ships of war, for the purpose of firing loaded shells in naval actions; recommending at the same time to use such charges of powder as will suffice to give the shell only the momentum necessary to allow it to enter, without penetrating through, the sides of an enemy's ship. Its explosion in that situation would probably produce an effect equal to that which would result from the concentrated fire of a whole broadside of solid shot; and should the shell strike near the water's edge, the force of the wave of water produced by the exploding charge would prove a formidable means of obtaining victory on the ocean.

HOWTH. 

HOYAR. (H. NOVER.)

HUDDERSFIELD, a market-town, parish, and township in the upper division of the wapentake of Asgabere, and in the
the West Riding of Yorkshire. It was created a parliamentary borough by the Reform Act, with the right of sending one member to parliament. The borough extends over the entire township, and includes a population of 19,035, and 1,140 houses of 106. and upwards. The township of Huddersfield comprises about 3,700 acres of land, which are divided into five hamlets for the maintenance of the highways, viz. Huddersfield, Fartown, Bradley, Deighton with Sheepridge, and Marsh with Paddock. The parish of Huddersfield consists of seven townships and parts of others, which, with their population, are as follows:—Golcar 3143, Huddersfield 19,035, Lindley 2306, Longwood 2111, part of Marsden 642, Slaithwaite with Deanhead 915, and Slaithwaite 2982; total population 19,441.

The town of Huddersfield is in the north-west of Leeborough 7 miles south-east of Halifax, and 26 miles north-west of Sheffield.

Huddersfield is said to have derived its name from Oder, or Ed, the first Saxon lord to settle on the river Colne, which rises above Holmfirth, and falls into the Calder near Nunbrook. It is one of the chief seats of the woollen manufacturers. Its population has more than doubled since 1811. It is situated on a level plain, and the water-power of the Calder has been developing the many mills which dot the landscape. The town is noted for its woolen manufactures, and is considered one of the wealthiest towns in the country. The cotton industry is also well developed, with many factories and mills.

In 1898 Huddersfield was incorporated as a municipal borough with a population of about 80,000. The town is well provided with schools, hospitals, and other public institutions. The Huddersfield Royal Hospital, which was founded in 1851, is one of the largest in the country.

The parish church is St. James's, built in 1831, and is one of the finest examples of Gothic architecture in the country. The church is surrounded by beautiful parkland, and is a popular spot for picnics and walks. The town is also well known for its beautiful gardens and parks, which are a source of great pride to the inhabitants.

Huddersfield is famous for its woollen industry, and is considered one of the most important centres of the trade in the country. The town is also well known for its fine examples of Victorian architecture, including the Huddersfield Royal Infirmary, which was built in 1834, and the historic town hall, which was completed in 1840.

The town is also home to the Huddersfield Town Football Club, which was founded in 1886 and is one of the oldest clubs in the country. The club has had a long and successful history, and has won many titles and trophies over the years.

The town is well served by public transport, with a network of buses and trains connecting it to the rest of the country. The town is also home to a number of museums and galleries, including the Huddersfield Art Gallery and the Huddersfield Museum and Art Gallery, which are both located in the town centre.
the much coveted object was attained. But finding that great inland sea to be but a bay, he resolved to winter in the southern part of it, hoping to pursue his discoveries in the spring. He and his companions, with his expectant father, left the vessel and Straits on the voyage home, some of the boldest of the multitudes seized the captain and eight of his staunchest followers, and sent them adrift in an open boat; and they were never afterwards heard of. Two years in the laird of these old sailors, to know in that first voyage Hudson's crew consisted of ten men and a boy; his last and largest ship's complement was only twenty-three men. For an account of the adventures, see Purcell's "Pilgrime" and Harris's "Voyages." He has a full account in the "Biog. Britanni."

HUDSON, JOHN, D.D., was born at Weshope in Cumber- land, 1713; "Rosamund, née Bucastall," 1693; "Theophilus," 1698; "Geographiae Veteris Scriptores Graeci Minores," with notes and dissertations by Dodwell, 4 vols. 8vo., 1698-1712; "Dionysius of Halicarnasso," 2 vols. 8vo., 1714; "Longinus," 1716, 1719; "Morris Attye," 1712; "Theodorus Voss," 4 vols. 8vo., 1720; which was printed as far as the fourth index under the author's own superintendence; the last few pages edited by his friend Hall, who has prefixed to the work a short account of the life and writings of Hudson.

HUDSON, RIVER. [New York.]

HUDSON'S BAY is an extensive Mediterranean sea on the eastern side of North America, and connected with the northern shores of Labrador; its surface is greater than that of any of the inland seas of the Old Continent, the Mediterranean only excepted. Its southern part is called James's Bay. From the most southern corner of James's Bay to Quebec Harbour, which may be considered as the most northern point of Hudson's Bay, is upwards of 1000 miles (between 51° and 66° N. lat.). It is more than 500 miles across in its widest part. James's Bay itself extends nearly 240 milesouth and north, and at its mouth (near 55° N. lat.), between Cape Jones on the east and Cape Henrietta Maria on the west, it is 140 miles wide. The coasts are generally high, rocky, and rugged, and in many places precipitous; particularly along the south-western shores between Cape Henrietta Maria and Cape Churchill, where they are generally low and swampy, and frequently exhibit extensive swamps. The depth of water in the middle of the bay is, on the average, 15 fathoms, but it is probably greater. The northern part of Hudson's Bay is occupied by Southampton Island, which is formed of high rocky masses, and seems to consist of numerous smaller islands, separated from one another by straits, which however are always closed by ice. It does not appear to be inhabited. Between it and the East Main is Manifold Island, likewise a mass of rock, but not of great elevation. About 100 miles from the shores of East Main, and nearly in the meridian of Manifold Island, is a dangerous chain of rocks, extending so far as the innermost portion of James's Bay: to the northward they are called the Sleepers; and, near James's Bay, the Belcher; at other places they have other names. The coasts which enclose Hudson's Bay on all sides consist by far the greatest portion of the British dominions in North America; but they are not known under any one general denomination, and may therefore be described as the northern boundary of the country. We shall not include the islands lying east of Fox's Channel and north of Fury and Hecla Strait, which will be noticed under NORTH-WEST PASSAGE, but we shall include the land lying west of the Grand Slave Lake and the Great Bear Lake and other parts of the country. The area cannot be given, as considerable tracts of the coast are still unknown, but it certainly exceeds 2,000,000 square miles, and probably does not fall much short of 3,000,000 square miles.

This immense country may be divided into four natural regions. The most eastern is the sterile region, which lies along the shores of the sea, and extends far inland. Its southern and northern boundaries are marked by one line beginning on the south on the St. Lawrence River at Cape Torment, about 30 miles below Quebec, and running across the peninsula of Labrador to Cape Jones, at the mouth of James's Bay. The eastern boundary of the Great Slave Lake, from Cape Henrico to the mouth of the Mackenzie, and the Great Rockies, probably accounts for its being nearly destitute of fur-bearing animals, and hence the Hudson's Bay Company has no establishments within its limits. Only the reindeer and the muskox are abundant. The reindeer are found in the land-locked portions of the bay, and the muskox inhabits the northern boundary of the Bay. The muskox has a few familiar families of Indians. The winters are longer and more severe than in Greenland in the same latitude, a fact well established as to the coast of Labrador.

The second region occupies the country between the two portions of the sterile region, and extends on both shores of James's Bay, and along the southern shores of Hudson's Bay, as far westward as Cape Churchill. It also extends to the ridge which forms the northern boundary of the Canada, and to the lakes Superior, Winnipeg, Deer, and Wollaston. Along the shores and several miles inland it is mostly occupied by swampy tracts, which are separated from one another by comparatively low ridges. These tracts have little wood on them. Farther inland it is generally well wooded, and produces the fur-bearing animals in great abundance. Many parts of it could be cultivated, though it is much more severe than in Europe in the same latitude. This country may be called the wooded region. Its surface is generally undulating, and the hills not numerous.

To the west of the wooded region is the Savannah region, which extends to the foot of the Rocky Mountains, and northward to the Lake of Athabasca and the Peace river. Its surface stretches out in extensive plains, intersected only by the beds of several rivers, which are considerably below the plains, and are found to grow abundantly, and the soil seems adapted to agriculture. But the soil of the plains themselves is rather sandy and dry, and entirely destitute of wood; yet it supports a thick grassy sward, on which numerous herds of buffaloes and several kinds of deer find abundant pasture. In a few places the plains are intersected by ridges of low hills. North of the river Saskatchewan the country is more broken, and the Peace River, Grand Slave Lake, and other parts of the Peace river plains are of comparatively small extent, and separated from one another by richly wooded tracts.

The fourth region we shall call the Valley of the Mackenzie River. It comprehends the country between the sterile region and the Rocky Mountains north of Lake Athabasca. The river generally runs through a bottom, rarely more than a few miles wide, whose alluvial soil is found in many places covered with trees of moderate height. The high-
grounds which enclose the bottom are usually from 100 to 150 feet above it, and exhibit towards the Rocky Mountains in some places an undulating, but in others, especially towards the south, a broken surface. But towards the Barren Grounds their surface rises rapidly into high hills, which in many places attain from 600 to 1000 and even 1500 feet of elevation, and frequently run parallel to the course of the river. White spruce-trees grow at the base of these hills as far as 66½° N. lat., north of which they become very rare and 55° 10′ N. lat., and from 15 to 40 miles in width, is formed by the Yellow River, which divides into branches that run parallel to the river. Most of the islands are partly or entirely flooded in the spring, and have their centres depressed and marshy or occupied by a lake, whilst their borders are higher, and well clothed with white spruce-trees. The trees terminate 66° 40′ N. lat.

The Rocky Mountains, which separate the countries now under survey from the North-western Territory, seem to attain the greatest elevation where the sources of the Athabaska river approach the course of the Columbia river. Mount Hooker is stated to rise to 15,700 feet, and Mount Bowne even to 16,000 feet above the sea. Their elevation farther north seems to be considerable, as the range of the river by another route to the north of the Peace river is always covered with snow: farther north however they decrease in elevation; and where the Mackenzie river approaches them, they are less than 4000 feet high. They decrease in elevation towards the Arctic Ocean, where they are free from snow in summer. As far as our information goes, they seem to consist of a number of parallel ridges, with longitudinal valleys of moderate depth between them. The most eastern ranges seem to be the highest, but they do not constitute the watershed, as several rivers originate in the ridges farther west, and break through the elevated ridges which forms the boundary-line of the countries of which we are taking notice.

Numerous large rivers traverse this extensive country.

One of the most important, not on account of the country which it drains but of its situation, is the Moose river and its affluent the Abitibiwe. Both rise in lakes situated on the high ground which separates Canada from the territory of the Hudson’s Bay Company, and at no great distance from the upper branches of the Ottawa river; and they are among the few streams to which communication between both countries, and are the most frequented road from Hudson’s Bay to the great commercial town of Montreal. The Abitibiwe lake, which may be considered as the source of the river, is 160 miles long, and somewhat less than one-third of that amount in breadth, and is diversified by numerous islands. The river, which issues from it, runs west, but afterwards flows north, falling into a lake after a course of about 200 miles. The Moose river itself rises about 60 miles from the shores of Lake Superior, and falls into James’s Bay after a course of about 230 miles.

Between the mouth of the Moose river and Cape Churchill are the embouchures of the Albany, Severn, Hayes, and Nelson rivers. The first three rise in the hilly country which extends from the western extremity of Lake Superior, and after 300 miles of running, enter the latter lake. The Albany river has a course of perhaps not less than 500 miles, if its windings are taken into account, its course being about 320 miles from its mouth in a straight line. The Severn runs 250 miles from its mouth, and after about 220 miles from its mouth, on its west bank, stands York Factory, the principal settlement of the Hudson’s Bay Company in this country.

The Nelson river is only inferior to the Mackenzie; its remotest branches rise in the Rocky Mountains; all the waters which descend from the eastern declivity of that range, form the Nelson, which is now commonly called, the Seine, or the latter lake. The Albany river has a course of perhaps not less than 500 miles, if its windings are taken into account, its course being about 320 miles from its mouth in a straight line. The Severn runs 250 miles from its mouth, and after about 220 miles from its mouth, on its west bank, stands York Factory, the principal settlement of the Hudson’s Bay Company in this country.

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whole course does not fall short of 2000 miles, which is more than that of the St. Lawrence.

East of the mouth of the Mackenzie and close to the shores of the Arctic Ocean is a great lake, called Esquimaux Lake, which communicates with the sea, and whose waters are known to be brackish. It has not been visited by Europeans.

Besides the Mackenzie, the Coppermine River traverses the northern part of the country, and falls into the Arctic Ocean. The copper mine at which the Hudson's Bay Company has its only claim to this region is on the Coppermine River. In 1834 the HBC established a post on the north-west coast of this lake, and from this point the river flows north into the Arctic Ocean, and forms several lakes. In the present state of our knowledge of these countries it is impossible to say what the route is which it falls to Hudson's Bay as a part of the Atlantic or of the Arctic sea. Its mouth is in 67° 15' N. lat. and between 94° and 95° W. long.

We observed above, that the climate of the sterile region in the interior of the island under the same latitude. At Winter Island (66° 11' N. lat. and 82° 30' W. long.) the mean annual temperature does not exceed 6° 84' of Fahrenheit; the maximum of heat observed is 54°, and the minimum -42°. At Fort Franklin, which is about 230 feet above the sea, the range of temperature is 79° 39' (71° 13' W. long.), but situated in the Vale of the Mackenzie, the mean annual temperature is 77° 50', the maximum of heat 80°, and the minimum -58°. But though the other stations of the eastern end of the Coppermine Country even at Fort Chipewyan on the banks of Lake Athabasca (58° 43' N. lat.) does not rise above the freezing-point, being 39°, whilst the maximum of heat is 77°, and the minimum -31°. At Cumberland House on the Saskatchewan (53° 57' N. lat.) the mean annual temperature in only 32° 17'; the maximum heat 87°, and the minimum -44°. But at the last-mentioned place grain may be cultivated, as is proved by a single mass of wheat growing from the slight difference of temperature between Cumberland House and Fort Chipewyan we should conjecture that agriculture might be extended to the southern banks of Lake Athabasca, when the variations of the seasons with respect to agriculture are understood. In winter the country is, of course, covered with snow, but it is stated to be rarely more than 18 inches deep, which is considerably less than falls in the northern countries of Europe. The aurora borealis is a very common phenomenon in the northern parts of these countries, but it does not occur frequently about Lake Winnipeg.

Though a good portion of the country is covered with woods, and at several places iron, copper, lead, and coal, as well as gold and silver, are discovered, yet the principal wealth of the country consists in its animals, especially reindeer, musk-ox, moose-deer or elk, different kinds of deer, bears, wolves, wolverines, foxes, beavers, otters, raccoons, and other interesting species, which have on the western coast of the island, and are a great source of profit, by which vessels are frequently beset for many days. It can only be attempted during the months of July and August. There are several islands in the Strait, which are mostly inhabited by Esquimaux.

HUDSON'S BAY COMPANY.

HUDSON'S BAY COMPANY. [FURS AND FUR TRADE.]

HUE AND CRY was the old common-law process of pursuing with horn and voice all felons and such as had dangerously wounded a man. Though the term has in a great measure fallen into disuse, the process is still recognised by the law of England as a means of arresting felons without the warrant of a justice of the peace. (See ARREST.) The person arrested was the accused person, or the person by the precept of a justice of the peace, or by a private person who knows of the felony; who should acquaint the constable of the vicinage with the circumstances and the person by whom the charge of the felon; and the said constable or other person may make the arrest, whereupon the said constable or other person may make the arrest, or, if he is not able to do so, give notice of the same to the constable of the vicinage, who is to make the arrest.

HUERTA, VICENTE GARCIA. DE LA, was born in 1729, at Zafrilla in Extremadura. Actuated both by national and academic pride, he became, through a number of political and social events, the father of a new order in Spain. His entry into politics was sudden and unexpected, and he was quickly thrust into the center of national affairs. His influence was felt in both the political and cultural spheres, and he was a leading figure in the development of the Spanish Enlightenment. His works were widely read and studied, and his ideas continue to influence modern thought. (Bl. Com.; Stephen's Criminal Law.)
highly commend the author. Huerta died at Madrid in 1797. Besides another inferior tragedy, partly taken from the "Elektra" of Sophocles, "Agamemnon nigri volve," he left orders like "Noche de los Españo" and "La Españo," which portray the great Spanish captains; "Obras Poéticas," 2 vols. 8vo., and a classical selection out of the amazing store of Spanish drama, which he entitled "Teatro Hispánico," 16 vols. 8vo. This work was improved by his brother Pedro, the laborious author of the "Comentarios de la Pintura Eneística del Pinc" and of "De las Líneas de Apelles y Protogenes," nor with another academican, Francisco Medina, in the "De los Líneas de Apelles y Protogenes," 2 vols. 8vo. of the "De los Literas de España," nor with Lopez de la Huerta, who wrote the "Examen de la Posibilidad de Fijar los Sininos de la Lengua Castellana."—H.H.

HURT, PETER DANIEL, bishop of Avranches, was born at Caen on the 8th of February, 1630. He was originally intended for the profession of the law; but he is said to have been induced to devote his attention to subjects of general literature by the perusal of the "Principes" of Des Cartes, and Bochart's "Sacred Geography." In 1652 he accompanied Bochart to Sweden, and was solicited by the queen to settle in her kingdom. This offer however he refused, and returned to France, where he acquired so great a reputation that he was appointed in 1679 subprior to the Dauphin. During the next 20 years he was principally engaged in superintending the publication of the three volumes of the "Bibliothèque Classique," known by the name of "In usum Delphini." The first idea of this edition was started by the duke of Montausier; but we are indebted to Hurt for the plan and arrangement of the work. In 1674 he was elected a member of the French Academy; and having entered the Catholic church in 1676, at the age of 46 years, he was appointed to the abbey of Annay near Caen, where he composed the greater part of his works. In 1685 he was made bishop of Avranches, but was not consecrated till 1692, in consequence of some disputes between the pope and the French government. He resigned his bishopric in 1699, in order to enjoy more time for study; and he obtained in 1707 the title of Prieur of the Friars of Caen. During the latter years of his life he lived principally at Paris in the Maison Professe de la Jesuite. He died on the 25th of January, 1721, at the age of 91.

The best known of Hurt's works is his "Demonstratio Evangelica," which was published originally at Paris in 1679, and has since been frequently reprinted. This book, like most of Hurt's other works, is written with more learning than judgment. The most important of Hurt's other works are: "De Interpretatione libri duo," Paris, 1661; "Origines Commentarii in Sacram Scripturam," Rouen, 1668, 2 vols. fol., reprinted at Cologne, 1685, 3 vols. fol.; "Commentarium de Seminario," Paris, 1694, 12mo.; "Questiones Alumnam de Concordatia Rationis et Fidei," Caen, 1690, 12mo.; "De la Situation du Paradis Terrestre," Paris, 1691, 12mo.; "Husti Commentarius de Rebus ad eum pertinentibus," Amsterdam, 1698, 12mo., of which a French translation, "Pensées d'un Naturaliste," appeared in 1714.

For municipal purposes Hull is divided into seven wards, with fourteen aldermen and forty-two councillors.

History.—This place took its name from the parish church of St. John the Baptist, hence Hull, from the Danish word "Hull," which signifies a fortified town and port. The researches however of a recent historian of Hull satisfactorily establish the fact that it was a place of considerable mercantile importance for more than a century prior to 1286, the date to which its foundation is usually referred. (See notices relative to the 'Early History of the Town and Port of Hull,' by Charles Frost, Esq., F.S.A.) The following circumstances indicate its early importance:—On the 1st of January, 1280, the Bishop of Lincoln, after the expulsion of Edward I. the duties on exports received at Hull amounted to nearly one-seventh of the aggregate sum received throughout the whole kingdom; and in the twenty-eighth of Edward I. it was appointed, by a royal ordinance, for establishing mints, one of the places for the erection of furnaces. Other proofs of its early mercantile importance might easily be offered. Several visitations of the plague, at intervals during the fifteenth, sixteenth, and seventeenth centuries, caused much suffering to the inhabitants. The visitation of 1533 was accompanied by famine, as the country people were afraid of bringing in supplies of provisions. At the breaking out of the disempowerments of Charles and the parliament Hull was a great depot of arms. The authorities of the town refused to receive the earl of Northumberland, whom the king sent to take possession of the town in his name, and after some hesitation they admitted Sir John Hotham as governor, who was sent by the parliament. At this time the magazines of Hull contained more warlike stores than the Tower of London, and it was the policy of the parliament to have them conveyed to London.

On the 23rd of April, 1642, Charles I., accompanied by his son, afterwards Charles II., with a train of two to three hundred servants, and attended by many gentle- men of the county, set out from York to Hull, and when within a few miles of the town sent an officer to inform the governor that he intended to dine with him that day. Sir John Hotham was not disposed to accept this honour, and he sent a message to the king humbly beseeching him to conclude the business of the church and to forego his visit. After a short discourse the king would not betray the trust committed to him open the gates to so great a train as his majesty was attended by. The king then demanded entrance for himself and twenty of his fol lowers. The governor refused the trust committed to him, at the same time declaring himself to be a faithful and loyal subject of his majesty. The king, finding that threats and entreaties were alike unavailing, retired to Beverley, where he determined upon a religious reform. He sent a herald to Sir John, summoning him once more to open the gates on pain of being proclaimed a traitor, and with a promise of forgiveness for the past if he complied. The herald proved unsuccessful, and the king returned to York greatly disappointed. This was the first act of hostility be
between the king and the parliament. A short time after this the king laid siege to the town, which was defended by Sir John Hotham and Sir John Meldrum, who was sent by the parliament to his assistance. Sir John Hotham received overtures by means of Lord Digby for delivering up Hull to the king. His treachery was suspected by the parliament, and they were induced to watch his movements. This treachery of Fairfax to the office of general of the parliamentary army in the north gave great umbrage to Sir John Hotham, and he was induced to seek opportunities to deliver up Hull to the Royalists. He had a large one when he was taken by the parliament and was executed on Tower Hill. After these events Hull was again laid under siege by the marquis of Newcastle, and was successfully defended by Lord Fairfax and Sir John Meldrum. During the short period of excitement which terminated the Stuart dynasty and placed William III. on the throne of England, Hull was again a scene of warlike activity. The town, fort, and citadel were in the hands of the Catholic party. But measures were concerted and an act of forbearance towards them was demanded, and the promptitude that the governor was taken in his quarters before he had even heard of such a design. The anniversary of this event is still celebrated by the name of the town day, or the barrow day, and consists of a service in the Church of St. Mary.

Commerce. — The exports of Hull formerly were chiefly wool, woollens, and leather; it imports wine and timber. At present the coasting-trade, of which Hull has a greater share than any other town in England, is one of its chief branches of trade. It has also an extensive commerce with the Baltic, with the north of Germany, Holland, and Denmark. The Greenland fishery owed its revival, about 1766, and its subsequent importance, to the mercantile enterprise of Hull. The connection between Hull and the interior of the kingdom are numerous; the Ouse, Trent, Aire, and Calder, all communicate with the Humber, and these means of internal commerce have been greatly improved by the Yeadon and Sowerby navigation, and will be again augmented by the continuance of the line from Selby to Hull, a work which is at present in progress. It is computed that the manufactured goods, coal, stone, and all kinds of merchandise, which are sold in Hull, to the value of about one million per annum, are the produce of Yorkshire alone, amount in value to at least five million sterling. In some years within the present century more than sixty ships left Hull for the whale fisheries of the north and west. The quantity of whalebone has been gradually diminishing; in 1834 twenty-seven ships were sent out, and the number has continued to decrease since that time, though Hull may still be regarded as the principal whalebone port of Great Britain. The establishment of Goole as a port, about twenty miles up the Humber, has caused the general commerce of Hull to decline in a slight degree since the year 1828. Within the last few years Hull has become a principal steam-packet station. These packets may be classed as sea-packets and river-packet. Of the former eight are constantly employed between Hull and London; seven between Hull and Hamburg; three between Hull and Rotterdam; and four between Hull and New York. Ocean steamers to Berwick, Aberdeen, and Yarmouth also pass between these places and Hull at regular intervals. The river-packets and steam-tugs are more than twenty in number. They go to the several ports, and have a great deal of business that formerly called the Old Harbour. The Humber Dock, at the west part of the town, was commenced in 1807; its length is 914 feet, breadth 342 feet, and depth 31 feet: the wharfs cover an area of 13 acres; the entrance to the dock is 487 feet wide, and has a fall of water of 5 feet; it is called the Old Harbour. The Humber Dock, at the west part of the town, was commenced in 1807; its length is 914 feet, breadth 342 feet, and depth 31 feet: the wharfs cover a space of about 28 acres; the dock was opened in 1826, and completed in 1829; as its name imports, it connects the Old Dock and the Humber Dock. Its dimensions are as follows: length 645 feet, breadth 407 feet, area 29,191 square yards; it will contain 60 square-rigged vessels. The area of the quays is 15,643 square yards; the locks are 120 feet long, 36 feet broad, and 25 feet deep; the two bridges are each 24 feet wide. It may here be remarked, that the Humber docks occupy the site of the ancient fortifications, and encircle the part which was the old town with water in place of its former walls. Attached to the Humber Dock is a capacious basin, with its buildings, travelled by steamboats, and is officially performed by the steam-boat trade. Hundreds of passengers land here daily, for whose accommodation the extension of the piers to low-water mark would be an improvement so obvious, that no accomplishment may be looked for at no very distant time.

Manufactures. — The manufactures of Hull are neither numerous nor extensive. Theexpressing and refining of linseed is effected by wind-mills and steam-mills; the residue of the oil is also refined by similar means. There is a large sugar-house, a soap factory, several white-led works, shipbuilders' yards, Turkentine and sail-cloth manufactories, and the manufacture of a flax and cotton mill, which has been erected on a large scale, which at present employs 500 persons; when completed it is expected to employ 500. New lines of houses for the workpeople have risen up in the outskirts of the town.

Public Buildings. — The public buildings connected with the trade and commerce of Hull are the custom-house, the dock-office, the pilot-office, the excise-office, the exchange, the post-office, the town-hall, the Chamber of Commerce, and several banks. The establishment connected with the internal economy of the town are the waterworks, the gasworks, the public baths, the shambles, the savings bank, and the fire-engine. Hull is a plain brick edifice, at the rear of which is a court-house, and a building for the court of requests: the other law courts are the county court, and the court of venue for determining civil causes, which has a jurisdiction extending to the town and county of Hull. The quarterly sessions are held in the Guildhall. The new goal and house of correction is in Kingdon Street on the Humber bank; it cost £2,000.

The prisoners are classified according to their age, sex, and the degree of depredation and violence they are charged with. Crime and mendicity have been much checked by the establishment of a new police on the system of the metropolis. The magistrates, who is on the seat bank of the river Hull, at its junction with the Humber, is supported by the local authority, and is occupied by a regular garrison.

The magazines are capable of containing 20,000 stand of arms, and ordnance stores for twelve or fifteen sail of the line. There are also 100 houses, in the form of a column, in a small pocket of William III. in the Market-place, which is covered with lead and glass. The Wilberforce Memorial is a fine fluted Greek Doric column, which stands on a square pedestal, on each side of which is a group of ten columns; the entablature of this memorial was on the 1st of August, 1834, the day on which negro slavery was abolished, and that it was erected by voluntary subscription. Above the capital of the column is a small tablet, which reads, "A monument which stands a statue of Wilberforce in his senatorial robes."

Education. — The educational charities are under the administration of a Trinity House school for 36 boys, who receive a nautical education; the Vicar's school for 20 boys; Cogan's charity-school for 40 girls; the national school, which is open to children of all denominations, and which has about 900 children of both sexes; the two schools for the deaf and dumb; the Adelphi and Drypool national schools, each of which contains upwards of 300 children; the Catholic free-school, which is attended by nearly 100 children; the British and Foreign school, which will accommodate nearly 100 children; and the East and West Schools, which is supported by the managers of that institution, and which contains about 250 children; and the Sunday-schools, which are attached to the various denominations of Christians. There is a free grammar-school which has been recently established. The free grammar-school was founded by Bishop Alcock, a native of Beverley, in 1486. Originally the sons of freemen received a classical education at this school on condition that they were present there are no classical scholars, and the more common branches of learning are taught. Many men who have risen to eminence have received some part of their education here, among whom may be named Lord Cranstoun.

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Watson, bishop of Landaff, and William Wibertforce. The educational wants of the town had been long felt, and two new proprietary institutions, one of which is denominated the Hull College, and the other the Kingston College. The latter is exclusively for education on the principles of the Established Church; the other is open to all. Both are under the care of the Rev. Dr. Estlin, a native of Hull. Hull College has 120 shilling, and Kingston College 129. Both have preparatory schools attached to them, where it is intended that the better parts of the infant system shall be carried out. The other educational institution in the town is a Mechanics' Institution, which has a good library of nearly 5000 volumes; the Hull Subscription Library of 15,000 volumes, and of which the first being chiefly classical, was published in 1773; the Lyceum Library, containing 5000 volumes. The Hull Philosophical Society occupies a part of a splendid pile of buildings in Kingston Square. These rooms were erected for public meetings, concerts, and lectures. Hull has several musical societies, and a convenient theatre.

Medical Institutions.—The General Infirmary of Hull was commenced in 1782. The present building is of brick with stone dressings; it has accommodations for 70 in-patients. The first floor of the building is occupied by the wards, of which there are four, each accommodating 10 patients. The wards are well ventilated, and lighted by large windows. The medical staff consists of several well-qualified practitioners, and the nursing staff is carefully selected and well trained. The hospital has a good supply of fresh water, and the medical officers are well equipped with the latest instruments and appliances. The infirmary is the largest and most modern in the county, and is widely respected for its efficiency and excellence.

Places of Worship.—The Holy Trinity church is the most ancient in Hull, and is said to be one of the largest parochial edifices in the kingdom. It is 272 feet long from east to west, and the nave is 144 feet wide; the breadth of the nave of the transept is 100 feet; the breadth of the chancel is 100 feet; the length of the chancel is 360 feet; and the length of the church is 380 feet. The church is constructed of brick and stone, and is a noble edifice. The eastern end of the church is decorated with a fine tower, and on the south transept is a handsome clock-tower. The church is well adapted for the accommodation of the large population of the town, and is well supplied with refreshments and accommodation. The church has a good supply of fresh water, and the medical officers are well equipped with the latest instruments and appliances. The infirmary is the largest and most modern in the county, and is widely respected for its efficiency and excellence.

HUMAIUN, NESIR-EDDIN MOHAMMED, the son of Babar, and the second emperor of the Tartars, or as it is more usually called, the Mogul dynasty in Hindustan, was born in Cabul, A.H. 913 (A.D. 1502). He accompanied his father Babar on the conquest of Hindustan (1526), and commanded the right wing of the army in the decisive battle of Panipat, in which the Afghan Sultan Ibrahim Lodi was entirely defeated. After this battle, Humain was appointed governor of the two Afghan towns of Ganges and Jumna, and he commanded an army of forty or fifty thousand men east of the Ganges; and after having defeated them he rejoined the army of Babar, and was present at the battle fought with the native Hindu princes at Bina near Agra, in which he greatly distinguished himself.

Humain ascended the throne on the death of Babar, A.H. 937 (A.D. 1530). Humain does not appear to have possessed that energy and decision which characterized his father; in consequence of which the native princes of Hindustan quickly renounced their allegiance to the Mogul dynasty. Humain was however at first successful in reducing them to subjection; Bahadur, the powerful monarch of Gujarat, was severely punished; and the successors of the robber chief, who had defeated Babar, were defeated in Bengal. But while he was employed in reducing these provinces, Shir Khan, the Afghan governor of Bahar, revolted against him. A battle was fought between them on the banks of the Ganges, in which Humain was entirely defeated, and obliged to retreat to Lahore. Soon after this he was deserted by his brothers Kamran and Hindal; and after wandering for a year in the neighbourhood of the Indus, exposed to many hardships and dangers, he at length took refuge in the territories of Tahmasb Mirza, king of Persia; who received him most hospitably, and assisted him with troops to enable him to recover his dominions. In A.H. 943 (A.D. 1536) Humain entered Cabul; and was engaged for several years in a contest with Kamran, who, though repeatedly conquered and as often pardoned by Humain, did not cease making war against his brother till he was deprived of his eyes. In A.H. 963 (A.D. 1558) Humain marched against Seckunder, the Afghan governor of Delhi; and after defeating his forces near the river Sulutie, and at Sirhind (28th of June, 1555), he again obtained possession of that part of Hindustan, which had been conquered by Babar. Humain died on the 11th of the month Rubeify al Avul, A.H. 963 (21st of January, 1563), in his 48th year, in consequence of a fall from the terrace of his palace. He was succeeded by his son Akbar.

Humain was distinguished by a greater love of justice and humanity than we usually meet with in Oriental sovereigns. He frequently pardoned his brothers who rebelled against him, and was with great difficulty prevailed upon to consent to the death of Kamran. We are informed by Ferishta, that 'he devoted himself to the sciences of astronomy and geography, and not only wrote dissertations on the nature of the elements, but had terrestrial and celestial globes constructed for his use.' He also wrote several poems, which were extant in the time of Ferishta.

An interesting account of the life of Humain is given in the 'Travels of Vakif', or Private Memoirs of the Mogul Emperors of Hindostan, written in the Persian language, by Joubier, a confidential domestic of His Majesty; of which an English translation has been published by Major C. Stewart, London, 1832. See also Ferishta's 'History', translated by Lord Bruges, vol. ii., pp. 70-97; 154-186.

HUMBER. [YORKSHIRE]

HUMBLE-BEE. The technical characters of the insects called humble-bees are given under the head BEE; in the present article the habits and economy of the species are all that is to be noticed.

In the autumnal months, when the cold weather begins to be felt, and the various honey-yielding flowers disappear, the male and neuter humble-bees die, having performed their allotted task, which, as far as we know, is to be that of fertilizing certain plants, by conveying the pollen from the male to the female flowers; a task which is unavoidably accomplished by their visiting different flowers for the purpose of collecting honey and pollen to rear their young. Some female humble-bees also die, whereas others
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(probably those only which had been reared in the previous summer) seek a convenient spot in which they may pass the winter as little exposed to the cold as possible; sometimes in rotten wood of old pollard trees, and sometimes in moss, or among dead leaves, or in fact in almost any situation which will afford the desired protection. Have they not a term in a topid state and without food. The warmth of the spring causes these females again to make their appearance, and have been impregnated the previous autumn, then seek a secret place for the confinement of their nests. Grassy banks are the localities most frequently chosen for this purpose, but various situations, and even a difference of soil apparently, are selected by the different species of Homboldtine, of one species disporting more in one situation than another, and that in places distant from each other but similar in character. The nests are sometimes built upon the ground, but most generally they are in a hole excavated by the bee. These excavations vary in depth and form, even though made by the same species of bee. In their construction the animal uses its jaws to dislodge the particles of earth, which are then, by means of the anterior pair of legs, passed backwards to the hinder pair, and from the same office: as the burrow becomes deeper, the whole body of the bee is used to eject the grains of soil. In saying that theumble-bees form the burrows in the ground in which we find them, I should perhaps have said for a bee we have frequently observed the female bee commence removing particles of earth, apparently with intent to make such an excavation, upon returning to the same spots after a certain interval of time, which was always abandoned. Huber, who paid much attention to these insects, says, 'I have not discovered in what manner they excavate the holes which lead to their nests, nor do I know how they form the vaults in which they are placed, neither am I aware whether they always construct these vaults themselves, or whether they do not sometimes avail themselves of the holes made by moles or other animals.' Upon consulting some other authors, these points appear to be treated in the same light as that of the spring and autumn floods. Yet, as long as a burrow is formed, it is terminated by an arched chamber of considerable extent, and it is in this chamber that the nest is constructed. These species which do not burrow in the ground have a situation in which the herbage is sufficiently thick to afford shelter, and there form on the surface of the ground an arched chamber of moss thickly matted together. In what manner the female first commences the superior arrangement of her nest, and how she brings up her young whilst in her solitary state, Huber and some of the earlier authors did not ascertain; we are indebted to M. le Comte Saint-Fargeau, for the formation of the nids. The first information that apprised us that honey-collected a quantity of pollen and honey, these substances are formed by the female humble-bee into a ball, in which the eggs are deposited, so that when the eggs are hatched, the larvae are surrounded by the substance, which serves them both for food and protection. They are generally contain several eggs, and consequently, when these are hatched, numerous larvae. Réaumur found them to vary from three to thirty. Each larva feeding upon the food nearest to it, the original crust of their enclosure becomes thin, and the parent insect then takes care to add fresh alimentary paste to the weakest parts. When the larvae are full grown each one encloses itself in a silken cocoon of an oval form, and is provided with a tempering of wax. There is a certain number of nesters, or workers, having undergone their final transformation, the nest is enlarged, and an inner coating of wax is attached to it, and in those nests which are inhabited by ants the work of the worker and the ants are so amalgamated with it, that a portion of the nest cannot be removed without injuring the interior more or less. Wax is also used by the workers in the construction of little cells for themselves, provided with a tempering of wax. H. humilis, makes these cells, as Huber informs us, in a different manner; some construct them on the top of the cocoons and of a half oval form, others build them of an egg shape with the apex truncate, and some of a hexagonal prism. But they all, however, have a ring of wax within the top. The next variety is almost a perfect oval, having but a small opening at the apex. Lastly these humble-bees show, says Huber, 'that they are not inferior in size to the honey-bees, and that they are not found in hony-pots there would necessarily be a vacant space; but

HUMBOLDTINE, minute state of iron. This substance occurs crystalline and massive; the crystalline form is undetermined. Fracture uneven, earthy; colour brightish yellow; devoid of lustre; opaque. Specific gravity varies from 1.4 to 1.6. Hardness sufficient to scratch gypsum, but is scratched by mica. It is insoluble in water, but dissolves in nitric acid without effervescence, and imparts a yellow colour to it.

The mass is entirely composed of small, flatish, rhombohedral pieces, of a fine earthy structure; colour greenish yellow.

Analysis by Rivero:

| Oxalic acid | 46:14 |
| Proxide of iron | 53:56 |

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HUMBOLDTITE. This mineral is a boro-silicate of lime, and is therefore a variety of datholite, unless indeed it shall be found to be identical with it, which, as been supposed to be the case. It occurs crystalline or massive. Primary form an oblique rhombohedron; cleavage parallel to the oblique diagonal of the prism; fracture conchoidal; hardness 4:5—5:0; colour white and yellowish white; streak white; lustre vitreous, transparent, translucent; specific gravity 2:98. Found in the Tyrol, in the Hartz, in North America, and near Edinburgh.

HUME, DAVID, was born at Edinburgh on the 5th of April, 1711. His father's family was a branch of that of the earl of Home, or Hume; but it was not a wealthy family, and Hume, being besides a younger brother, inbred but a slender patrimony. He was destined by his father (his father had been very poor) for the profession of the law; but for this he showed no inclination, and it was eventually given up. The following is his own account of the matter. 'I passed through the ordinary course of studies with much ease and very early with a passion for literature, which has been the ruling passion of my life, and the great source of my enjoyments. My studious disposition, my sobriety, and my industry, gave my family a notion that the law was a proper profession for me.' I found an Aunt in my family, and this army of relatives was very small, with the pursuits of philosophy and general learning; and while they fancied I was poring upon Voss and Vico, Cicero and Virgil were the authors which I was secretly devouring.'

We proceed with quotations from his autobiography.

'Very slender fortune however was unsuitable to this plan of life, and my health being a little broken by my ardently applied to, or rather forced, to make a very feeble trial for entering into a more active scene of life. In 1734 I went to Bristol, with some recommendations.'

*The above is the meaning of the paragraph of the author quoted, but is not a close translation of the Latin sentence, of the London Society's 'Transactions,' page 97. The paragraph is of importance, since it shows that when one cell is placed in contact with others, the space is not filled, it assumes a angular form, the number of sides depending on the number of cells with which it is in contact, and adds that the new theory of the construction of the honeycomb detailed in the article. Since then it has been discovered that the hexagonal form was not such as the bee, and that the space is surrounded by the figure which results from the circumvention of the cell walls of a straight or circular, the angle of intersection being the same, is a straight line of the space. In the true construction there is not a single cell constructed separately, they would resemble those of the quass-bee. This idea is not supported by the above article, but is given somewhat upon examining the mechanism of both the honeycomb is a combination or more less in an oval form; but if the cell be extended (as in the supposed case of bees excavating their cells in a solid mass of wax), it is a cylindrical form; the body of the animal being the movements.

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lations to eminent merchants, but in a few months found that scene totally unsuitable to me. I went over to France with a view of prosecuting my studies in a country retreat, and I then laid that plan of life which I have steadily and successfully pursued. I resolved to pick up courage and perseverance from the example of my French countrymen, and to make a very rigid frugality supply my deficiency of fortune, to maintain unimpaired my independence, and to regard every object as contemptible except the improvement of my talents in literature. He first returned to Paris in 1761, and then to La Fèche in the same year, and at those two places, but chiefly at the latter, he composed his "Treatise of Human Nature." He returned to London in 1737, and published his treatise the year after. Never, he says, "was I more conscious of the utility and importance of my "Treatise of Human Nature." It fell dead-born from the press, without reaching such distinction as even to excite a murmur among the sciolists. But the disappointment did not affect him much or long; and as he henceforward aimed at nothing more than to perfect his literary fame, he prosecuted his studies with vigour. In 1742 he published at Edinburgh the first part of his Essays, which was on the whole favourably received, and the success of which consoled him in some measure for the failure of his first literary attempt. In 1745 Hume went to live with the marquis of Annandale, whose state of mind and health was such as to require a change of air, and we became acquainted, and when I received, it appears, a handsome salary. He had immediately after an invitation from General St. Clair to attend him as secretary to his expedition, which was at first intended only to last a month but ended on his assignment in the coast of France. Hume took the appointment, and the next year, 1747, went as secretary to the same general in his military embassy to the courts of Vienna and Turin. These two years were spent in the chase of which I received during the course of my life; I passed them agreeably and in good company, and my appointments, with my frugality, had made me reach a fortune, which I called independent, though most of my friends were indebted to it; in short, I was now master of near a thousand pounds.

On his return to England he went again to his brother's house, and living there two years, composed his "Political Discourses," and his "Enquiry concerning the Principles of Morals." These two works were published in 1752, the first in Edinburgh, and the second in London. Of the first he tells us that it was well received abroad and at home; but the other "came unnoticed and unobserved into the world." In the same year he was appointed librarian to the Faculty of Advocates, an office which was unattended with emolument, and which he gives as a reason of his not having a large library. He now formed the plan of writing the History of England. "Being frightened," he says, "with the notion of continuing a narrative through a period of 1700 years, I was afraid of the manner of the History of Stuart, an epoch when, I thought, the misrepresentations of faction began chief to take place." Priding himself much on his own impartiality, he was bitterly disappointed when, on the appearance of the first volume, he was accused on all hands of onedness. "I was assailed by one cry of reproach, disapprobation, and even detestation; English, Scotch, and Irish, whig and tory, churchman and sectary, freethinker and religious man, patriot and courtier, united in their rage against the man who had presumed to shed a generous tear for the fate of Charles I. and the earl of Strafford; and after the first ebullitions of their fury were over, what was still more mortifying, the book seemed to sink into total oblivion. Butter told me that in a month he sold only forty-five copies of it." * * * I was, I confess, discouraged; and had not the war been at that time breaking out between France and England, I had certainly returned to Paris. I resolved to try this method of calling them: and the firmness of his mind or the steadfastness of his resolutions. His constant pleasantry was the genuine effusion of good-nature and good-humour, tempered with delicacy and modesty, and without even the slightest tincture of vanity, so frequently the disagreeable source of what is called wit in other men. It was never the meaning of his raillery to mortify. . . . And that gaiety of temper, so agreeable in society, but which is so easily confounded with the formal and superficial qualities, was in him certainly attended with the most severe application, the most extensive learning, the greatest depth of thought, and a capacity in every respect the most comprehensive. Upon the whole, I have always considered him, to a greater degree than most men, as dead, as approaching nearly to the idea of a perfectly wise and virtuous man, as perhaps the nature of human frailty will permit. As an historian, Hume is to be viewed principally in two ways, as an historian and as a philosopher. The merits and the demerits of his history are generally very well known. It is written in a very easy and animated as well as thoughtful and philosophic style; but on the other hand it is disfigured by partiality, misrepresentation, and want of accuracy. He could not tolerate the labour of research into original documents, and he had not sufficient knowledge of the subject to it. But the second volume, which attained its present form, and the effect which successive enactments have had on the fundamental laws of property. As a philosopher, it has been observed that Hume is
acute and ingenious, but not profound; and the remark is just, if applied to what he has done, rather than to what he perhaps might have accomplished. His treatises contain no complete system of any branch of philosophy; and the separate essays are chiefly valuable for acute observations and inductive reasoning. He never engaged in the idle metaphysical speculation of other writers. His articles in the "Cassian," "Philosophical Transactions," and "Annales des sciences mathématiques et physiques" are genuine, and the value of his remarks on evidence are generally admitted, even by those who do not follow him in all the consequences which he has derived from them. He also exhibited the state of the affair of the essay to have been a certain extent misunderstood, even by those who would not have quarreled with the author simply for the consequences which flow from his principles of evidence. As a political writer, Hume cannot be ranked in the first class. The justness of any of his strictures on the absurd fiction of the 'Original Contract,' as applied to any existing government, stands in striking contrast with his admission of an original contract, as expressed in the following terms: 'The people, if we trace government to its first origin in the woods and deserts, are the source of all power and jurisdiction, and voluntarily, for their safety and happiness, entrust to a public mind, for the time being, the administration of that power and the superintendence of that business which receive their laws and receipts from their equals and companions.' An assertion so monstrous, so unsupported by any evidence, and expressed in words so many inquisitions and contradictions, that he never seems to have written the remainder of this essay. To many of the literary essays of Hume we should assign a higher degree of merit than perhaps, at the present day, most people are disposed to give them. They appear to us to contain many more important truths expressed with great celerity; and if they never exhaust the subject, they perhaps always dispose the reader to further investigation. In his 'Enquiry concerning the Principles of Morals' he has made many ingenious elucidations, and given the 'Harmonics' a new and independent principle of morals, but he has at the same time admitted a principle of conscience, independent of that principle of utility.

The editions of Hume's History are innumerable; and, as is well known, it now always goes along with that of Smollett. In the last edition which has been published, the narrative is carried on to the present time, from where Smollett left it. Mr. Smart's "History of Emanuel College," Cambridge. The best edition of Hume's philosophical works is one published in Edinburgh, in 1829, in 4 vols. 8vo.

**HUMITE.** This mineral occurs in attached crystals, that frequently render it useless. "Cléon" renders it useless, and cleaves readily parallel to the base of the primary form. Fracture uneven. Hardness 6 to 7. Scratches glass readily. Colour, various shades of yellow and brown, sometimes nearly colourless. Translucent and vitreous. A solution by the blow-pipe, it becomes opaque, but not fusible; with borax it gives a transparent glass.

**HUMMEL, JOHANN-NPOMUK,** a composer and performer highly distinguished during the present century, was born at Salzburg, 1776. At a very early age he received instructions in music from his father, a master at the military institution of Warberg, and evinced so decided a talent, that, when he had scarcely completed his seventh year, he was sent to Vienna, and placed under Albinoni, who, though he had a natural repugnance to teaching, took so promising a genius into his house as a pupil, where he remained two years, and imbued much of the knowledge and love of music with that fervent and deep regard of life which were developed in so striking and profitable a manner. In his tenth year he set out on a visit to the principal cities of Germany, Denmark, and Holland, and reached London in 1791, where he was much received, and had the honour to perform at Buckingham House before the royal family.

At the expiration of six years, Hummel returned to Vienna, pursued his studies under Albrechtsberger, and further improved himself by friendly intercourse with Salieri. In 1803 he engaged in the service of Prince Esterhazy; and a few years after, when the Imperial Theatre at Vienna was in rebuilding, he was put in charge of the work of reconstruction by the Duke of Weimar, who appointed him to the close of his life. But his duties at the Court of Weimar were not of a nature to prevent his frequent journeys to other countries, and he made at least six to Russia in his time. He was made Steel and Silver to Petersburg and Moscow, and two years after to Amsterdam. In April, 1836, M. Hummel arrived in London, and immediately gave a concert at the Hanover-Square Room, which was so successful that after the concert the compositions made so great a sensation, it was followed by two other concerts in May and June, which were as fully attended as the first. This success induced him to return to the composition of the whole. As a performer he was a master of concerts; but trusting too much to his individual exertions, they proved rather less attractive than those of the preceding season. In 1837 he repeated his visit to London, and a single concert convinced him of the great popularity which had deserted him; he was no longer new, and had no connection to supply the want of that novelty for which in our fashionable circles there is so insatiable a thirst. M. Hummel was still a master of the pianoforte, and had received the reputation of being the greatest performer of the organ, which was conferred on him. He died, of water on the chest, in October, 1837, leaving a widow and two sons amply provided for by a good fortune acquired by his talents and accumulated by his prudence.

M. Hummel's compositions are very numerous. Of his operas, *Mathilde von Guise* is the best; and in his two masses,—in *D* minor and *A* flat—are clever and charming movements. But his reputation will rest on his pianoforte works. Some of these will not soon be forgotten, particularly his beautiful and masterly concerto in *D* minor. He certainly was an imitator of his master, Mozart, and not over scrupulous in adopting the ideas of others; but, in general, those which prove the meanest, and this article is quoted, changing the present into the past tense, 'Like a man of taste, he interwove them so skillfully with his own, that there is nothing heterogeneous in the composition of the whole.' As a performer he was a master of all styles, but excelled more in the brilliant than the pathetic, though he never carried the former to excess.

The strength, and still more the equality, of his fingers, were among the distinguishing features of his playing; and the pendulum-like accuracy of his time was too remarkable not to be noticed by all who heard him. . . . His execution was perfect, but his good sense taught him that great velocity is not so necessary to affect the listener's sentiments as an air or the beauty of a modulation—that racing and leaping on the piano-forte are generally resorted to by those who are conscious of possessing none of the higher powers, and seem to feel obliged to make up for the want of pure taste and deep feeling by mechanical dexterity.'

**HUMMING BIRDS,** the name of a brilliant family which includes the smallest of birds. [TROCHILIDÆ.]

**HUMULUS LUPULUS,** a perennial plant belonging to the natural order Urticaceæ (the female inflorescences of which form the substance called hops, the use of which in brewing is so well known), is a coarse twiner inhabiting hedges in many parts of Europe, and also found apparently wild in the United States of America. It has rough, opposite, cordate, lobed leaves, and numerous greenish-white flowers, of which the sexes are distinct. In the male hop the flowers form loose drooping panicles, and each consist of 5 sepals, 5 stamens, and a centre of brown, or reddish orange, hairy ovary. In the female the flowers are arranged in little axillary, stalked, sessile tufts; each consists of a naked ovary, with two spreading downy stigmas, and is enclosed by a concave bract. These bracts increase in size after the flower is past, and are collected into a loose head of imbricated scales, within which are placed the small seed-vessels, or seeds, as they are usually called.

**HUMULUS LUPULUS,** the female flowers, termed cones, stroboli, or catkins, of this plant, when ripe, constitute the hops, which, independent of their employment in brewing, are of considerable utility in medicine. The mature cones consist of imbricated scales, each imbricated scale enclosing the fruit at the base: the surface both of the scales and of the fruit is studded with aromatic glands, which
HUNGARY. This name has been used sometimes in a more general, sometimes in a more limited sense. Under the denomination of Hungarian Hereditary Dominions are comprehended Hungary Proper, Transylvania, Dalmatia, and the Military Frontier. The kingdom of Hungary united under the same civil government, as determined after the peace in 1815, comprehends Hungary, Slavonia, and Croatia, and is divided into the counties of the 40 Carlsbad which (previously made part of Illyria), and the Hungarian Littoral, or sea-coast, were annexed in 1822. The Military Frontier, though geographically a part of Hungary, is, as a military and entirely distinct government. The kingdom, within the above limits, is bounded on the north by Moravia, Silesia, and Galicia; on the east by Transylvania; on the south by the Military Frontier (which separates it from Turkey), and by the Gulf of Quarnor; and on the west by Illyria, Styria, Lower Austria, and Moravia. It extends from 14° 56' 22" (the most westerly point at Piemont on the sea-coast), to 25° 5' 24" (the most easterly point of the county of Muranov on the Bistrica). Hungary includes, from 4° 43' 20" (the most easterly point of the Banat, near Neus-Moldava) to 45° 24' 40" N. lat. (the most northerly part of the Arva on the mountain of Zaylee). The area of the kingdom, according to the Survey of 1825, is 11,600 town or city square miles: namely, the Hungarian counties, 78,735; the Hungarian districts (not included in the counties), 2301; Slavonia, 3616; and Croatia 3620 square miles. The population of Hungary, considering the estimated area and the present state of the countries of Europe; but the most recent authorities agree, that in 1834 it might be taken in round numbers at 10,195,000 souls, and it was rapidly on the increase, having been, in 1825, 9,407,499 souls. In the 1836 census the population of the kingdom of Hungary at 11,404,356. The most remarkable increase in the population has been that of the Jews, who in 1783 were 25,377; in 1804, 63,908; and in 1827, 191,570. From the differences in the accuracy of the returns, and the different dates at which they were made, the several items will not strictly agree with the sum total.

Division.—The kingdom of Hungary is divided into Hungary proper, Slavonia, Croatia, and certain privileged districts, viz. 1. in Hungary, Jazyra (Jazag), Great Kumania (Nagy-Kunsg), Little Kumania (Kis-Kunsg), the Heydue towns (Hajdu-Varosok), and sixteen towns of the county of Zips; 2. in Croatia, the Hungarian Littoral or sea-coast.

I. HUNGARY Proper is divided into four circles.

The Circle on this side of the Danube has an area of 22,326 square miles, 2,659,653 inhabitants, 26 cities, of which three are bishopsee, 176 towns, 2507 villages, and 93 hamlets, called praelis. It includes 13 counties, and 3 small districts, P✷burg (area of hops), and even 4,917,974 in. (chief town, Trencin, 3360 in.); Rajecz, 4360 in. 4. Trencin (area 447 square miles, 33,462 in.): chief town, St. Martin, 1900 in.; Arva (area 785 square miles, 101,734 in.): chief towns, Alba-Kunin, 1100 in.; Trencin, 2650 in. 6. Liptau and Nemba (area 784 square miles, chief towns, 74,575 in.): chief towns, Trencin, 3360 in.; Kuns, 3500 in.; Nezihols, 4160 in.; Deutsch-Liptak, 3600 in.; Rosenberg, 2532 in. 7. Soh (area 7010 square miles, 91,043 in.): chief towns, Neusohl, 1990 in.; Bries, 3350 in.; Harpfn, 9360 in.; Burs (area 1000 square miles, 137,210 in.): Kron, 5500 in.; Kuns, 3500 in.; Honth (area 960 square miles, 125,427 in.): chief towns, Schemnitz, 2300 in.; Pukanz, 2312 in. 8. Gran (area 999 square miles, 54,636 in.): chief town Gran, an archbishop's see, had 1198 houses, and 11,600,000 souls; but the town was destroyed by the late inundation of the Danube in the spring of 1835. 11. Neograv (area 1632 square miles, 193,740 in.): chief towns, Balaszar-Gyarmath, 4300 in.; Gatsch, 4000 in.; 12. Pest (area 4011 square miles, 433,419 in.): chief towns, Pesth, which before the late inundation
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had 3860 houses, and 65,000 inhabitants, besides the garrison of 10,000 men; but above 1000 houses having been destroyed, the actual population cannot be stated. Many of the inhabitants have escaped to the seat of Oéen (Buda) on the other side of the Danube, the capital of the kingdom, which has 30,000 inhabitants; Wesseleny, 11,271 in.; Kestemel, 36,876 in.; Great Koros, 13,697 in.; Little Koros, 6000 in.; Cecsegzug, 8000 in.; Buda, 11,268 in.; 13. Bace, or Batzech: chief towns, Zombor, 21,086 in.; Maria Theresiastadt (or Theresiopol), 34,924 in.; Neusatz, 20,231 in.; Saja, 14,534 in.; Szenta, 13,537 in.; Borsod, 13,537 in.; Major, 12,912 in.; Nagy, 12,612 in.; The county is the privileged district of the Austrians, an inalienable domain of the crown, containing sixteen large villages. The Circle beyond the Danube has an area of 66.33 square miles, 2,250,530 inhabitants, 6 cities, 2 towns, 500,000 of the bishops' sees, 1792 villages, 478 prædica. It includes 11 counties, and 1 district. 1. Szabolcs has an area of 2431 square miles, 153,840 inhabitants, 16 towns, 131 villages, 500,000 prædica: chief towns: Szigetvar, 14,371 in.; Nyir-Kiseg, 15,640 inhabitants. The Heydude town is in this county.

2. Szechenyi has an area of 2230 square miles, 212,675 inhabitants, 10 cities, 17 towns, 245 villages, and 19,000,000 prædica. Chief towns: Szechenyi, 15,000 inhabitants; Great Karoly, 7213 in.; Ungreisch-Neusatz, or Feleso Banya, 4700 inhabitants; Szentimir-Nemeti, 14,279 inhabitants. 3. Morarac has an area of 3270 square miles, 136,705 inhabitants, 5 towns, 136 villages, 1 prædica: chief towns: Szeged, 6500 inhabitants; Húsul, 2712 inhabitants; Visk, 2036 inhabitants; Komarom, the largest village in the county, has 3836 in. inhabitants. 4. Sijlar has an area of 4500 square miles, 127,329 inhabitants, 17 cities, 131 inhabitants; Csatyo, 5600 inhabitants; Turja, 13,219 inhabitants; chief towns: Szentys, 10,289 in.; Coward, 14,000 inhabitants. 5. Gócs has an area of 474 square miles, 41,034 inhabitants, chief towns: Nagy-f. 8,000 inhabitants; Chief of Gócs, 15,000 inhabitants. 6. Békes has an area of 1875 square miles, 117,830 inhabitants, 5 towns, 18 villages, 71 prædica: chief towns: Gyula, 13,751 inhabitants; Békes, 14,682 inhabitants; Szavas, 7850 inhabitants; Csatyo, 14,131 inhabitants; chief towns: Gross-Haridein, 16,000 inhabitants; a bishop's see; Debreczyn, 45,375 inhabitants. 7. Ugocza has an area of 474 square miles, 41,034 inhabitants, chief towns: Nagy-f. 8,000 inhabitants; Chief of Gócs, 15,000 inhabitants. 8. Szabad has an area of 1392 square miles, 198,335 inhabitants, 1 city, 3 towns, 10 villages, 26 prædica: chief towns: Szeged, 40,209 inhabitants; Gross-Harkelby, 15,000 inhabitants; Szentes, 15,000 inhabitants; Csatyo, 14,131 inhabitants. 9. Csirad has an area of 611 square miles, 41,945 inhabitants, 2 towns, 91 villages, 30 prædica: chief towns: Makó, 15,146 inhabitants; Csanad, 8730 inhabitants. 10.tdown has an area of 2476 square miles, 22,114 inhabitants, 1 city, 23 towns, 160 villages, 27 prædica: chief towns, Al- Arad, 13,824 inhabitants; Peczea, 13,440 inhabitants. The following three counties form the district called the Banat.

10. Torontai has an area of 2772 square miles, 249,500 inhabitants, 2 cities, 9 towns, 186 villages, 9 prædica: chief towns: Nagy Begekerek, 12,523 in.; Nagy St. Miklos, 24,972 inhabitants; Kis-Kika (a 460 village, and 170 inhabitants). 11. Temes has an area of 2486 square miles, 285,776 inhabitants, 2 cities, 9 towns, 186 villages, 3 prædica: the chief towns are Temesvar, 12,666 inhabitants; Versece, 12,535 inhabitants; chief towns: Temes, 17,000 inhabitants; Banat, 5000 inhabitants; chief towns: Temesvar, 12,666 inhabitants; Versece, 12,535 inhabitants; chief towns: Temes, 17,000 inhabitants; Banat, 5000 inhabitants. 12. Seven Heydude towns, within the county of Szabolcs, has an area of 350 square miles, and about 40,000 inhabitants: chief town Bosormeny, 14,560 inhabitants. The following counties, and the circumstances of certain parts. 1. Jassy (Jazag), in the county of Petfi, has an area of 370 square miles, 49,926 inhabitants: chief town Jassy (Jazag), 15,000 inhabitants. 2. Great Kumania (Kiai-Kuson), situated north-east and south-east of Jassy, has an area of 430 square miles, and 42,000 inhabitants: chief town Kumania (Jaja), 15,000 inhabitants. 3. Little Kumania (Kiai-Kuson) consisting of five portions, is larger than Great Kumania, having an area of 1920 square miles, 52,290 inhabitants: chief town Veleghaza, 15,000 inhabitants. 4. The district of the seven Heydude towns, within the county of Szabolcs, has an area of 350 square miles, and about 40,000 inhabitants: chief town Bosormeny, 14,560 inhabitants. 11. Slaveyovia has an area of 390 square miles, 81,067 inhabitants, 1 city, 8 towns, and 251 villages: chief town Pojega, 4100 inhabitants. 12. Persowiez has an area of 1734 square miles, 138,450 inhabitants, 1 city, 17 towns, 180 villages, 177 prædica: chief town Karm (), 15,000 inhabitants. 13. Pojega has an area of 906 square miles, 108,583 inhabitants, 13 towns, 96 villages, and 12 prædica. One-third of the county (the lordship of Illyk, or Ulyak, with the town of the same name) belongs to the Grecian bishopric, and is called the third (the bishopric of Bukovar, with the town of the same name, 5760 inhabitants) to the family of Count Ely, in...
Germany; chief towns, Iliok, the capital, and Ruma, 6170 inhabitants.

III. CROATIA. [See article Croatia.]

The entire Military Frontier is a tract of land extending from the Adriatic Sea along the Turkish frontier to the Bukowina. It has an area of 1,813,24 miles square. At the close of the 17th century the population was 925,589; in 1813, 940,598; in 1822 it was estimated at 1,010,878; in 1827 at 1,083,435.

Frontiers.—Hungary is on all sides separated from its neighbours by natural boundaries. From Presburg to Slastik, by the Carpathian Mountains, which run in a north-east direction to Mount Trojatska, thence eastward, near the frontier of Galicia, and afterwards to the south-east to the vicinity of the Bukowina. From the border of Transylvania to the Carpathian frontier runs, with many great bends. first to the west, and then to the south, to Orsowa and Mount Allison, on the Danube. On the south, from Orsowa to Essek, the Danube separates the kingdom from Servia and Slavonia; and from Essek to the Styrian frontier the Drave separates it from Slavonia and Croatia. On the west various small rivers divide Hungary from Styria and Austria.

Neither the natural rampart of the Carpathians could protect the Hungarian against the incursions and cruelties of the Tartars, nor the Danube against the Turks. The kingdom now derives greater security from being surrounded, on the north, west, and south, by countries which, as it itself, are subject to the Austrian sceptre: to the south it is defended against the Turks by a living rampart of 789,746 men. From these ancient enemies, weakened as they now are, the Hungarian can scarcely have anything to fear; but the powerful and ambitious Russian approaches his frontier.

Face of the Country, Soil, Climate.—The northern and western parts of the kingdom are very mountainous. The Carpathians are on the north and south, and that of the south of the Danube, surrounding almost the whole kingdom like a girdle, and send out numerous branches which cover nearly thirty-three counties, with elevations varying in magnitude and character. These branches enclose many beautiful valleys drained by large and small rivers, verdant meadows, rich corn-fields, and gardens yielding a variety of excellent fruit, vineyards many leagues in extent, and vast forests. The Carpathians, which begin at Presburg and sweep round the north and east frontier of Hungary and Transylvania, cover all the country between the 44th and 49th degrees of latitude, and are divided into several groups, distinguished by different names. The most elevated portion is that called Tatra, in the counties of Zips and Liptau. The loftiest summits are the Eithal (8100 Vienna feet), the Lomnitz (8135 feet), the Hundersdorff, Carsi, Wysoka, Mundl, etc. (each 8000 to 9000 feet), (according to Wahlenburg, 7538, and to Townson, 7818 feet high). The mountains on the south side of the Danube are branches of the Styrian and Julian Alps, among which the Rissiak, north-east of Fiume, attains an elevation of 4620 feet, and the Schmenschel, near Kamenci, 4760 feet. [Carpthians.]

Of the numerous valleys enclosed in the Carpathian mountains, the Waagthal (Valley of the Waag) is generally considered the most beautiful, but there are numerous others perhaps equally picturesque; for instance, the Mengsderfohrthal, which is distinguished by the grandeur of its forms, its magnificent views, and noble waterfalls. But while one part of the kingdom is covered with mountains and precipices cut into some resembling the Pampas of South America, and others being oceans of sand, like the Sahara. In the Carpathians and in other mountains there are innumerable caverns, caverns which are, and hold for talismans of extraordinary nautical beauty, and in others there are found the fossil remains of enormous animals, the gigantic inhabitants of the primitive world.

The nearly whole of Hungary lies within the basin of the Danube, which is shown by all the numerous rivers flowing into the Danube, with the single exception of the Poprad, which flows in a northern direction. The Theiss, itself a branch of the Danube, is one of the chief rivers, and its basin may be the most remarkable place in the world, resembling some of the Pampas of South America, and others being oceans of sand, like the Sahara. In the Carpathians and in other mountains there are innumerable caverns, caverns which are, and hold for talismans of extraordinary nautical beauty, and in others there are found the fossil remains of enormous animals, the gigantic inhabitants of the primitive world.

Of the lakes the most considerable, i.e., the Platanese [Balaton], occupies 46 square miles long, and from 2 to 3 miles broad; 2. Neusiedl, about 24 miles long, and from 3 to 7 miles broad; both of which are in the west part of the country. Lake Politzich in the county of Bars is 14 miles in circumference. There are numerous lakes in the counties of Banon and Transylvania, which are situated from 60 to 3600 feet above the level of the sea. On the banks of the Danube, Theiss, Drave, and other rivers there are extensive marshes which cover 2000 square miles. The Hamag, in the county of Bars, is about 24 miles long, and 18 miles in length and 9 in breadth, and contains some small lakes, or meres. It is overgrown with reeds, rushes, and in many parts with low bushes, and has some little colonies of wild fowls and bees. From the year 1813 a canal several miles in length was dug through the Hamag; but it was nearly destroyed by inundations in the same year. Many canals have been made in different tracts of Hungary, partly to drain the marshes, and partly for the purposes of commerce.

The soil of Hungary is for the most part clayey and sandy. The best and richest mould is in the southern part, on the rivers Koros, Theiss, and Danube; the northern part is in general clayey and often stony. The counties next the Carpathians are the most barren. The climate varies considerably. In the counties nearest the snow-covered mountains it is so cold, and the winter so long, that the snow remains throughout the year till May or even June. In the southern counties the air is so warm, and the winter so short, that the snow seldom lies on the ground more than two or three weeks. When snow is the best the mountains that are intersected by the Drave and the Maros are still covered with snow, and fires are necessary in the middle of summer. Foreigners in general have a very unfavourable opinion of the climate of Hungary, which they decry as extremely unhealthy; but M. Beudant, an eminent French traveler, says the climate of Hungary is in general very healthy, and that disorders are neither so frequent nor so fatal as in the neighbouring countries.

In the abundance, variety, and value of its natural productions Hungary excels almost any country in Europe. Corn is the main product of Hungarian agriculture, but in the north there is not sufficient for home consumption, while the south not only supplies the deficiency of the north, but exports to Germany and Italy. Barley and rye are grown in the north; oats everywhere in great abundance; wheat, millet and maize, in the south. Maize is more extensively cultivated than in any other part of Europe, and in the Banat province alone, each of the Poles of the Carpathians. There are whole forests of cherry, plum, and chestnut trees. In the south, lemon and orange trees blossom the whole summer in the open air, and the fruit ripens perfectly well. No country in the world, France perhaps excepted, produces such an abundance and variety of wines as Hungary; and with respect to quality, aroma, sweetness, strength, and fire, no wine in the world perhaps, says a Hungarian writer, is equal to that of Hungary; at least the wine of the Hegyalia district is renowned throughout the world by the name of Tokay.

The land employed as vineyards is estimated at a million of acres; and the annual produce, even of middling years, at 24,000,000 gallons, and the value of the wine at 110,000,000 florins. Timber is most abundant, there being 5,000,000 acres of forests of oak, beech, lime, birch, maple, and pines. In some counties however so much timber has been consumed in the manufacture of charcoal and fuel, that the smoking-houses, that fuel and timber are six times as dear as they were 60 years ago. Tobacco grows everywhere, except in a few of the colder counties, and is nearly as abundant as the corn. The produce of tobacco is estimated at 300,000 cwt., of which 200,000 cwt. are exported. Of domestic quadrupeds the horned cattle bred on the luxuriant pastures of Hungary are some of the finest in Europe; a race peculiar to the country, of a greyish white, with black stripes, on the forehead, legs, and tail; the horns long, straight, and curling upwards. Cattle are small and weak, but swift and hardy. Of sheep it was stated in 1811 that there were 8,000,000, though others affirm there were not above
6,000,000. Of late vast improvements have been made in the breed by the importation of the best from Spain. Hundreds of thousands of swine are bred in the forests. Besides four-footed game of all kinds, the forests are the retreat of bears and of hordes of wolves. Domestic poultry of every kind is extremely abundant. In the greatest bazaars of Debrecen, there are millions of geese; turkeys are seen in large flocks, and vast numbers of pigeons, wild and tame, do no little injury to the corn-fields. The standing waters, marshes, and lakes are full of fish, especially countless flocks of wild geese and ducks. Flowers of every kind and of many species, as number of 40 or 50, are seen in the extensive plains. There are various species of birds of prey, the eagle, the vulture, falcon, &c. The mineral treasures of Hungary entitle it to the title of a mining country. Into the debate on the iron ore of Hungary, Humboldt, and other scientific travellers have noticed the striking analogy between the two countries. It has metals of every kind except tin. The annual produce is stated as follows:—gold, 10 cwt.; silver, 40 cwt.; copper, 40,000 cwt.; lead, 25,000 cwt.; antimony, 5000 cwt.; quicksilver, 130 cwt.; iron, (not certain, but supposed to be) 190,000 cwt.

Hungary produces likewise a great variety of precious stones, such as amethyst, agate, jasper, black, brown, and transparent Hungarian diamonds, and soets, &c. The more useful mineral products are coal, 400,000 cwt.; salt (especially in the counties of Saros and Marmarosh), 1,000,000 cwt. The country abounds in mineral springs, and, indeed, in vellages, as the term is said to be about 300, many of which are highly celebrated, and much frequented for their medicinal virtues.

Manufactures and Trade. Though considerable improvements have been made in the manufacture of textiles, much of the cloth is still consumed in the country. The exports consist of the natural produce of the kingdom; the imports chiefly, though not entirely, of manufactures of which woollens, cottons, silks, and linen make one-half of the whole imports. The value of the exports exceeds that of the imports by a third, so that the balance, as Hungarian writers say, is from 6,000,000 to 8,000,000 of florins in their favour.

Forest and Manufactures.—There is, perhaps, no country of the same extent which contains so much variety of wood as Hungary. The Magyars, or proper Hungarians, are originally an Asiatic people; there are also Wallachs, Romans, Armenians, Goths, Jews, Greeks, Serbs, and a medley of tribes distinguished by names not easily accommodated to English orthography or English pronunciation; Rusians, Slovacs, Coats, Wendians, improperly called Wends, all of Slavonic origin. The Slovacs, who inhabit exclusively a large portion of the north-east of the kingdom, and some districts in other parts, are above 2,000,000 in number. The inhabitants, except the Jews, are all Christians. The Greek and Roman Catholic religion is predominant; but Joseph II. established complete toleration, and his successors went much farther, and placed the other Christians on an equal footing with the Roman Catholics, so that all enjoy by law equal religious liberty, though not perhaps with equal security. The members of the Greek church are divided into United (that is, such as have joined the Roman Catholics, and are often blended with them) and the Not-united. According to an authentic account, drawn up twelve years since, there were—

Roman Catholics 5,140,443
United Greeks 655,000
Not-united Greeks 1,116,776
Calvinists 1,338,623
Lutherans 837,000
Jews 191,976

9,247,018

Though the population has increased, the proportions have probably remained nearly the same. The Roman Catholic church is the most important denomination in Hungary.

The united Greeks have four bishops. The Not-united Greeks have an archbishop and six bishops. Since 1792 their bishops have had seats in the diet of the kingdom. The Protestant church is divided into five sees, the oldest being in time of war, 1792, but subject to the archbishop and synods and synods. The Roman superior clergy are well provided for, but the inferior clergy have inadequate in-
were three general insurrections: that in 1797 amounted to 2,500 men, that in 1800 to 38,000; and that in 1809 to 40,000, in which the free cities and privileged districts furnished in addition 45,000 infantry and cavalry, making a total of 85,000. The singular institution of the Military Frontier will be found under MILITARY FRONTIER.

History.—The oldest known inhabitants of the country were the Pannonians. In the year 377 the Huns established a power here, which was vastly increased under Attila, who was born in 400 and died in 434. These yielded in 526 to the Lombards; and when the latter removed to Italy, in 568, the Avari entered, who extended their dominion to Bavaria, but were conquered and compelled to embrace Christianity by Charlemagne. In the middle ages, the Poles from the east, the Hungarians from the south, and a people from central Asia, penetrated into the country, and conquered it in ten years. Their chiefs divided the country among them: Arpad, their leader, took half for his own share, the remainder was divided among the inferior chiefs and their followers, and the antient inhabitants became slaves.

Arpad's grandson Geza embraced the Christian religion, and his son Stephen, the last duke, assumed in the year 1000 the title of king, and united Transylvania to the Hungarian domain. Ladislaus I. and Coloman subdued Slavonia and Croatia, and, after many wars, Dalmatia; Bela II. obtained Bosnia; Emeric, Servia; and Andrew II. and his son Coloman, the family of Arpad, again extending itself, the male line in 1301. In 1310 Charles, brother to Louis IX. of France, was crowned king of Hungary, which he raised to a high degree of splendour. Charles having married a daughter of the English king, his son succeeded to that kingdom in 1370. This prince, who is called Louis the Great, reigned from 1342 to 1382, and his united kingdoms extended from the Baltic to the Adriatic. On his death Poland and Hungary were again separated, and internal troubles broke out. Sigismund, who reigned from 1386 to 1437, lost almost all the annexed dominions, the Turks approached the frontiers, and took part in all the intestine broils. Albert, archduke of Austria, heir to the unhappy daughter of Louis the Great, ascended the crown in 1437, but died in the campaign against the Turks in 1439. Under Ladislaus V. and VI. these powerful enemies were successfully resisted by the brave John Hunyad, whose son Matthias I., was made king in 1458. He proved a very able and fortunate king: he brought under his dominion Moldavia, Wallachia, Moravia, Silesia, Livonia, and great part of Austria, forming an empire of 264,000 square miles of country, and including the present South German and Bohemian dominions. In 1490 John Hunyad fell in battle near Varna, and the authority of the empire was reduced to Hungary. Stefan the second, who reigned from 1490 to 1526, was so envious of the liberties of his people that he was overthrown by the Turks, who were received into the empire in 1526. This was partly owing to the unpopularity of the house of Austria, whose despotic habits and religious intolerance were most distasteful to the Hungarian nobles. Hence arose continued disputes, and frequent insurrections, in which the insurgents even went so far on some occasions as to call the Turks to their aid. This was done in 1741, when Tekely, who with his Infield allies had nearly got possession of Vienna in 1683, which was chiefly indebted for its preservation to the Poles under John Sobieski. The treaty of Capitulation at Buda, in 1744, at the instance of the Hungarian princes, that of Passarowitz, in 1718, the Basait, from the Turkish vovó. The fatal civil wars and insurrections ceased in 1711, and the house of Austria has ever since reigned in peace over the dominions of the Hapsburgs, who have on various trying occasions stood at the head of all these aspiring and the most loyal and devoted subjects of their sovereigns, from the days of Maria Theresa to the present time. The nation has in fact had great reason to be attached to its sovereignty, and many important measures taken to improve the condition of the great mass of the people, than the nobles have been willing to concede.

(Historische Statistische-Geographische Beschreibung des Königreich Ungarn, Croaten, Slavonien, &c., 1834; Historisch-Statistischer Umriss von der Oesterreichischen

Monarchia, 1834; Neuere Gemäldte der Oesterreichischen Monarchie, von W. C. W. Blumenbach; Das Oesterreichische Kaisertum, von D. G. Hassel.)

HUNGERFORD. (BERKSHIRE.)

HUNS, HUNNI, the name given by historians to several nomadic Scythian tribes which devastated the Roman empire in the fifth century. It appears that these people inhabited the plains of Tartary near the borders of the Chinese empire for several centuries before our era, and that they were the ancestors of the Huns of the 5th century, who invaded China about A.D. 93, emigrated westward as far as the Volga, where they met the Alani, or Alani, another powerful Scythian tribe, which they routed and drove beyond the Tanais, or Don. The Huns then encamped in the plains between the Volga and the Tanais, and as far south as the ridge of the Caucasus, where they remained for more than two centuries. Under the emperor Valens they first crossed the Cammerian Bosporus, drove them to the Illyria, and Vagiaoth, and obliged the latter to cross the Danube, when the emperor granted them lands in Thrace. The Huns were joined by numerous other Scythian tribes, and the united Scythians began to subjugate the Sarmatians, the Goths and the Avars of the Gothic and Teutonic nations and by the Romans. Their features and general appearance are described by the Roman historians as hideous and repulsive, and their manners as those of the Thracians. (See Hun, No. 21.) The description of their features seems to correspond in some degree with that of the Cernucks of the present day. The Huns being now on the frontiers of the empire, had frequent wars with the Romans, and their invasions were only checked by the statesmanship of Constantine. (See Hun, No. 21.)

HUNTER, WILLIAM, was born in 1718 at Long Calderwood, near Glasgow. He was entered at the university of Glasgow in 1732, and remained there for five years studying for the church, but had no definite idea whether he should pursue the profession he met with Cullen at that time practising as a surgeon and apothecary at Hamilton. An intimate friendship was soon formed between them, the result of which was that Hunter determined to study medicine, and to prepare himself for the practice of his profession by acquiring a thorough knowledge of the science. Part of the agreement into which they mutually entered was, that each of them should alternate a winter at some large medical school, while the other remained in charge of the business in the country. The success of Cullen, and his exaltation to the highest celebrity in Scotland, has been already mentioned (Cullen, William), and Hunter was destined to attain a reputation scarcely inferior in England.

He was admitted to the university of Edinburgh in 1741, and on his graduation accompanied with Bell with the celebrated accoucheur, and studied anatomy under Dr. Nicholls, and surgery at St. George's Hospital. Dr. Douglas, to whom he brought a letter of introduction, engaged him soon after as his assistant. Hunter was in that year 27 years of age. He commenced lecturing on anatomy, and in 1747 became a member of the Corporation of Surgeons. But he had always preferred the practice of midwifery to that of surgery; and, during the course of several unsuccessful attempts at the accomplishment of this bold and ingenious design, he determined in 1749 to confine himself exclusively to the former subject. In 1750 he took a Doctor's degree at Glasgow; in 1764 was appointed physician extraordinary to the queen; in 1767 he became a Fellow of the Royal Society. His time was now so com-
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pletely occupied in the practice of his profession, that he was obliged to give up a part of his lectures, and his brother John, Hewson, and Cruckshank, were successively his partners. He amassed a large fortune, and died in 1783, with a reputation inferior only to that of his brother, of whom it was not his least honour that he had been the preceptor of that patron of anatomy and medicine, Sir John Pringle, for many years before Dr. Hunter’s death, in consequence of a dispute relative to their mutual claims to the discovery of the structure of the placenta; which was most in fault is still a matter of dispute in the medical world. Having died in the warm, did not cease till William was on his death-bed. Even then the reconciliation was only partial, for he left nearly the whole of his large property to those who were distinguished against him, although his brother was at the time in embarrassed circumstances.

William Hunter’s principal work was the ‘Anatomy of the Gravid Uterus,’ on which he was engaged for nearly thirty years. It consists of thirty-four folio plates, made accurately and beautifully engraved from dissections by himself and his brother, illustrative of the most important subjects in obstetrics. A work descriptive of these plates, and containing several other points of great interest collected from the original Miss., was published after Dr. Hunter’s death by his nephew Dr. Baille. He was also the author of numerous essays in the ‘Philosophical Transactions,’ and the ‘Medical Observations,’ of which the most important are those on the ovariis of the females, on the metamorphosis of the origin and use of the lymphatics, the retroversion of the uterus, and the membranes decidua reflexa. William Hunter long wished to found an anatomical school in London, and is known to have spent 30,000l. on building fit for that purpose, to endow a professorship, and to give his museum and library, if the government would grant him a piece of ground to build upon. This munificent project was never realized, but he did found a building on Windmill-street, where he built a private house, with a museum and dissecting-rooms adjacent to it. He at the same time added to his museum, which already contained a large number of very valuable anatomical and pathological objects. His life was one of great literary industry, and of particular value is the Latin work, a cabinet of the rarest ancient medals, which cost him 20,000l., and numerous objects of natural history. He bequeathed all these to Dr. Baille, who was to hold them during his life; and on his death they were conveyed by the will of 1773 to the University of Glasgow, to the use of which they were in 1783 allowed 8000l. for their maintenance and increase.

If William Hunter was inferior in intellect to his brother John, he was excelled by him in moral and personal qualities. He was a good scholar, a clear and elegant writer, and an accomplished gentleman. He was the most scientific man that ever practised as an accoucheur; and midwifery is as much indebted to him for its improvement as any other branch of the medical science. He not only improved the practice of his profession, but conferred a far greater benefit by introducing the scientific principles of physiology into what had, before their time, been little more than a matter of chance. Hunter, JOHN, was born in 1728, at Long Calderwood, in Kilbirnie, near Glasgow, where his father possessed a small farm. Being the youngest of ten children, and his father dying when he was very young, his education was almost entirely neglected. His whole time was devoted to the amusements of the country till he was 17 years old, when he went to stay with his brother-in-law Mr. Buchan, who was a cabinet-maker at Glasgow, and who made a fortune by the business. As early as his 13th year he was sent to school in London, and was in due time placed in 1740 as an anatomical and surgical lecturer. He wrote to offer his services as assistant in the dissecting-rooms. His offer was accepted, and in 1748 he commenced his practice in the Strand. He had not long resided in London as a medical man-commoner at St. Mary’s Hall, Oxford, intending to practice as a Physician; but he seems soon after to have given this up, for in 1754 he entered as a surgeon’s pupil at St. George’s Hospital, in the hope of becoming at some future time a surgeon to that institution. In the same year his brother made him his partner in the school, and he delivered a part of each annual course of lectures till 1759, when his constant and severe labours in anatomy, to which he had lately added comparative anatomy and physiology, began to affect his health so seriously that it became necessary to retire from public practice. With this view he obtained an appointment as staff-surgeon, and early in 1771 proceeded to Heleise, where he remained until 1773, when a peace was negotiated, and his health being completely restored, he returned to London, and commenced practice.

At first Hunter met with little success in his profession; the roughness of his manners, the consequence in part of his haughty disposition, but more of his deficient education, prevented him from rising in public estimation. Besides, he paid but little attention to his practice, regarding it, as he always did, only as a source from which he might obtain the means of carrying on the scientific investigations to which he was far more attached, and which he had already pursued while in the army. To defray the expenses which these entailed, he again commenced lecturing on anatomy and surgery; but notwithstanding the talent and extensive knowledge which his lectures evince, they were little appreciated, and he never had a class of more than twenty pupils, so that it was necessary to add a professorship for the purchase of animals and other similar purposes, after he had spent on them all that he did not require for the actual necessities of life. Every year however added to his reputation, and in 1767 he was elected a fellow of the Royal Society, and in 1768 surgeon to St. George’s Hospital. The latter appointment was of the greatest value to him; it increased his income, both by adding to his surgical reputation, and by bringing him into contact with those from whom he received large fees. Among his pupils were Jenner, with whom he remained throughout his life on terms of the closest intimacy, and Sir Everard Home, whose sister he afterwards married. From the time of his appointment as surgeon to St. George’s Hospital, he was employed in the laborious investigation of every branch of natural history and comparative anatomy, physiology, and pathology, to all of which he devoted every hour that he could snatch from the requirements of his increasing surgical practice. In 1773 he suffered from the first attack of the disease of the heart, of which he ultimately died. He had a severe spasm of the chest, and remained pulseless and cold, though perfectly sensible for three-quarters of an hour. For many years after however his health seemed pretty good, and he was subject to slighter returns of the disease only when much excited or fatigued; but in 1785 the attacks became more frequent, and of greater severity. In the following years he became gradually more debilitated, and the slightest fit of anger, to which he was unfortunately prone, was sufficient to induce severe spasms. In October, 1783, he was engaged in warm disputes with his colleagues at the hospital; and a remark being made by one of them at a meeting of the governors, which Hunter regarded as an insult, he left the room that he might repress or at least conceal his rage, and he scarcely entered the adjoining apartment, where he fell dead in the arms of Dr. Robertson, one of the physicians of the hospital.

The extent and importance of John Hunter’s works will be best shown by a brief account of his museum and his chief publications. The museum, which was considerable in size, and had upwards of 10,000 preparations, illustrative of human and comparative anatomy, physiology and pathology, and natural history. The main object which he had in view in forming it, was to make it a museum in which the subject of life by preparations of the bodies in which its phenomena are presented. The principal and most valuable part of the collection, forming the physiological series, consisted of dissected human and animal bodies, usually classed according to their different vital functions, and more or less classed arranged so as to present every variety of form, beginning from the most simple, and passing upwards to the most complex. They were disposed in two main divisions: the first, illustrative of the functions and nervous system; the second, of those which provide for the continuity of the species. The first division commenced with a few examples of the component parts of the organic bodies, as sap, blood, &c.; and then exhibited the

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organ of support and motion, presenting a most interesting view of the various materials and apparatus for affording the means of support and motion, and the various classes of beings. It was succeeded by series illustrating the function of digestion (which Hunter placed first because he regarded the stomach as the organ most peculiarly characterizing the human race), those of breathing, respiration, &c. These were followed by the organs which place each being in relation with the surrounding world, as the nervous system, the organs of sense, the external covering of the body, the organs of locomotion, and the organs of reproduction. The collection contained the sexual organs of plants and animals in their barren and impregnated states; the preparations illustrative of the gradual development of the young, and the successive stages of their transition to their existence before and after birth. Parts of the same general division, though arranged separately for the sake of convenience, were the very beautiful collections of nearly 1000 skeletons; of objects illustrative of natural history, containing of animals and plants preserved in spirit or stuffed, of which he left nearly 3000; of upwards of 1200 fossils; and of monsters.

The pathological part of the museum contained about 250 objects, arranged in three principal departments: the first illustrating the processes of common diseases and the actions of restoration; the second the effects of specific diseases; and the third the effects of poisons. The preparations illustrated several localities in the body. Appended to these was a collection of about 700 calculi and other inorganic concretions.

These few words may give some idea of Hunter's prodigious labours and the collector's. But his muse contains sufficient proof that he was no mere collector; it was formed with a design the most admirable, and arranged in a manner the most philosophic; and when it is remembered that it was the work of one man, labouring under every disadvantage of deficient education, and of limited and often embarrassed pecuniary resources, it affords perhaps better evidence of the strength and originality of Hunter's mind than all his other works, where he is the artist in which his museum are made to speak for themselves. Nor should it be omitted, that the manual dexterity exhibited in displaying the various objects is fully equal to that of the intellectual power which determined their arrangement. The museum was sold after Hunter's death, to pay the debts which he had incurred in its formation, and to afford the means of support to his family, to whom it was almost all that he had to leave, although for many years before his death he had been earning a very large income. The government gave 15,000l. for it, and presented it to the College of Surgeons (London), by which it has at a very heavy expense been greatly augmented and made accessible.

For two years before his death Hunter had been anxious to form a complete catalogue of his collection, and to embody in one large work the results of all his labours and observations. He died when he had completed but a small portion of his design, and left only the materials, with which his successors might have completed a work which would undoubtedly have been the most valuable of its kind ever published. These materials were contained in nineteen folio MS. volumes written under Hunter's dictation, and the ten most valuable of them contained records of his dissections, of all of which he had made copious notes. The formation of the catalogue was entrusted to Sir Everard Home, the brother-in-law and only surviving executor of Hunter, but from year to year he deferred his task, and after supplying only two small portions of his undertaking, he at length announced that in accordance with a wish which he had heard Mr. Hunter express, he had burned the manuscripts which he had taken without leave from the College of Surgeons, and among which were the ten volumes of dissections, and numerous other original papers. Thus nearly the whole labours of Hunter's life seemed lost: a few only of the least important of his writings remained, unless indeed we reckon as his the numerous essays which Sir E. Home published as his own in the "Philosophical Transactions," and subjoined six volumes 4to. of "Lectures on Comparative Anatomy." Many of these give strong evidence of his having used Hunter's writings in their composition; and the fear lest his valuable discoveries should be lost is the only probable reason that can be assigned for so disgraceful an act. The papers being thus lost, the formation of the catalogue was necessary dependent on the arrangement of the preparations themselves, including works, and the few scattered manuscripts that remained, and any account of what he had associated with Hunter would give. It is fortunate that by these means, and by making numerous fresh dissections and comparing them with the original preparations, the defects of the museum were in some cases supplied, although it cannot compensate for the loss of the other, confines the highest credit on those by whom it has been made.

Hunter's principal published works were the "Treatise on the Natural History of the Human Teeth," 2 vols. 4to., 1771-78; "Treatise on the Venerable Disease," 4to., 1786; "Observations on certain Parts of the Animal Economy," 4to., 1786; "The Anatomy of Gun-shot Wounds," 8vo., 2 vols., 1794. Of these two last the best proofs of his genius. The "Animal Economy" consists of a republication of several papers from the "Philosophical Transactions," and of nine others relating to various anatomical and physiological discoveries which Hunter had made. It is difficult to say which deserves the most admiration, the faultless accuracy of the observations themselves, or the clearness and simplicity of the deductions all drawn from them. His "Treatise on the Blood," &c., although he had been collecting materials for it from the time of his entrance into the army, was not written till late in his life, written by the hand of a man who had rather carelessly completed after his death by his executors Sir E. Home and Dr. Baillie. It contains his opinions on disease in general, the results of his long experience, illustrated by numerous physiological investigations. As a collection of physiological facts and observations it is far more precious than the evidence warranted. His doctrines were purely vital. The materia viva diffusa, a term which he says was recommended to him by his friends to express the real nature of the whole body, was the one he believed to be contained in the blood and all the tissues, and to govern all the functions of the living body, was to him the sole agent in the phenomena of life. But his errors were those of ignorance of collateral subjects, rather than of a deficient acquaintance with that which he made the object of his study; and when we consider that he was so little educated, that he was not even well acquainted with the language, and was ignored by all others, and that he had only the most fragmentary knowledge of the physical sciences, which every year now shows to have more applications in the study of the living body, we can only wonder the more at the genius which could surmount so many serious errors.

Hunter is, by the common consent of all his successors, the greatest man that ever practised surgery. Considered merely as a surgeon, and with reference only to the direct improvements which he effected in his practice, he was perhaps inferior to few: his improvement of the operation for aneurism [ANEURISM] was undoubtedly the most brilliant discovery in surgery of his century. He first described the important disease of inflammation of the veins; he first published lucid views on the venerable disease; and by his work on inflammation improved the modes of practice applicable to nine-tenths of the diseases which fall within the province of the surgeon. But it was less by individual discoveries than by the general tone of scientific investigation which he gave to surgical practice that he improved it. Before his time surgery had been little more than a set of empirical mechanical operations, by which he employed a knowledge of the disease which it was employed. Hunter first made it a science, and by pointing out its peculiar excellence as affording visible examples of the effects and progress of disease, induced men of far higher attainments than those who had before practiced to make it their study.

As an anatomist and physiological, his museum alone is sufficient to show that he had no superior; and while his published works confirm this opinion, and exhibit what he knew, they add to it the regret that many more he has been lost. Every year, as his museum is more closely studied, proves that Hunter had been well aware of facts for the discovery of which other observers have since his death received the honour. His remarks on fossil bones, for example, enunciate his knowledge of the principle carried
out by Cuvier, by which their investigation might be made the clue to the history of a former world. His notions, though short of modern convictions, prove that he knew the facts that are, as they were, representations of the natural form of animals lower in the scale of creation, and possess the form natural to themselves at an earlier period of development, though short of modern convictions, he was well acquainted with nearly the whole of that which is now known to one of the most illustrious physicians which is connected with the development of the embryo. The number of individual facts for the discovery of which he has lost his due honour by the destruction of his manuscripts cannot be calculated.

As a natural historian, Hunter's merits were of no ordinary character, as is sufficiently shown by his descriptions of various animals from New South Wales, published in Mr. White's "Voyage" to that country, and by his papers on them. &c. He seems however to have regarded the study of zoology as very inferior to that of physiology, and it is probable that the large collection of animals which he left preserved in spirit was only intended as a store of subjects for future dissection. &c.

The whole of John Hunter's works have been lately edited in four volumes 8vo, by Mr. James F. Palmer, who has added to those published by himself numerous papers from the collections of Hunter's sons, and many others taken by some of his pupils, and his Cooeon Lectures. Biographies of Hunter have been written by Sir Everard Home, Mr. Jesse Foote, and Dr. Adams. A Life by Mr. Drury Otley is prefixed to Mr. Palmer's edition of his Works.

HUNTINGDON. [HUNTINGDONSHIRE.]
HUNTINGDONSHIRE, an inland county of England, situated between 52° 8' and 52° 20' N. lat. and 0° 3' and 0° 30' W. long. It is divided into two parts, North and South, the former having a shorter diagonal from north to south, from the town of Huntingdon, of which it forms a part, to Peterborough, which is situated near the shorter diagonal from east to west, from Earith to near Keyteston, 23 miles. The area of the whole county is by one calculation 541,690 acres; by another 372 square miles. The population is by the Census of 1831, 53,190; by the last returns in 1871, 61,400. The county is in the north of the great division of the country between the border of Cambridgeshire to Huntingdon, and from whence turns west-north-west to the valley of the Nene at Wansford, west of Peterborough; to the north and north-east of which the county is in 52° 21' N. lat. and 0° 10' W. long, 37 miles from St. Paul's, London, in a direct line almost due north, 59 miles from Shoreditch Church by the road through Ware and Royston.

Surface, Hydrography, and Communications.—Huntingdonshire has no high hills. An elevated ridge enters the county from the south, near Potton in Bedfordshire, and runs northward till it subsides in the valley of the Ouse near Huntingdon. It is another elevated tract runs west from the border of Cambridgeshire to Huntingdon, and from whence turns north-west to the valley of the Nene at Wansford, west of Peterborough: to the north and north-east of which this ridge is continued. It is thus that the country is divided into the great fen district of the lower Ouse, Nene, and Welland.

The principal rivers are the Ouse and the Nene, with their respective tributaries. The Ouse touches the border of the county and a little stream that flows past that town 3 miles along the border to the junction of a stream from the neighbourhood of Higham Ferrers (Northamptonshire); after which it flows in a northerly direction about 8 miles to Huntingdon; from thence 7 miles in an easterly direction to Holywell, on the border of the county below St. Ives; and from thence 5 miles along the border of the county to Earth, where it enters Cambridgeshire: its whole length within north and west of the border is 23 miles, all navigable. The stream which comes from the neighbourhood of Higham Ferrers has a course of 17 miles through Northamptonshire, Bedfordshire, and Huntingdonshire; before it joins with the Ouse, a stream long from Hargrave in Northamptonshire, and from thence to Weston, Huntingdonshire. The other feeders of the Ouse are all small.

The Nene has no part of its course within the county, but only along its borders. It first touches it at Elton, below Oundle, from whence it flows northward 4 or 5 miles to Wansford; it then turns eastward, and flows about 9 miles to Standring Sliuce, a little below Peterborough, where it leaves the county. In the latter part of this river is the old channel of the river, now no longer continuously navigable, parts of the present navigable channel at Standring Sliuce, and runs first along the border of the county, being navigable for a mile or two, and then through the county, through Whittlesea and Ugg.
Meres. Near Ramsey Town it becomes navigable again, and passing close to Ramsey Mere quits the county and enters Cambridgeshire. It rejoins the present channel at Wisbeach. Whittlesea Dyke, which is partly on the border of Huntingdonshire and partly in Cambridgeshire, is a navigable cut from the short navigable part of the old channel of the Nene at Whittlesea. The channel of the Wisbeach and Whittlesea meres is broader than an area of several square miles; it affords excellent sailing and fishing, and is much frequented in the summer by parties of pleasure. These meres are visited by abundance of aquatic wild-fowl. A considerable part of the county is destitute of springs, and is supplied with water from ponds.

The high north road, travelled by the mail to York, Edinburgh, Inverness, and the north of Scotland, after passing through Ware and Royston, enters this county on the south-east side between Caxton in Cambridgeshire and Huntingdon; and passing through Huntingdon, Stilton, and Norman Cross, quits the county on the north-west side. Another road from London through Barnack and Holme Fen is crossed by the north road at Altonbury Hill, between Huntingdon and Stilton; this road is travelled by the Glasgow, Carlisle, and Wetherby mail. The Louth and Boston mail, which passes through Ware, and the north road through Baldock, turn off from the high north road at Norman Cross, and follow a road which leads by Peterborough into Lincolnshire. A road which branches off from the north road through Baldock, just on the border of the county, passes through Kimbolton, from whence one branch leads to Higham Ferrers, Harborough, and Leicester, and another to Uppingham and Nottingham. There are roads from Huntingdon to St. Neots, Cambridge, Ramsey, and other places.

Geological Character.—The south-eastern part of the county is occupied by the iron-sand. Whether the forma-
tions are termed "clunch" (indurated chalk marl) or "galt" (which may perhaps be identified with the Folkstone clay or the Weald clay of Kent and Sussex), which overlie the iron-sand and occupy the adjacent parts of Cambridgeshire and Bedfordshire, extend into Huntingdonshire is not clear, the district not having been fully examined, and being covered with the diluvial débris of the neighbouring chalk range. The iron-sand rises in Huntingdonshire into low hills. The rest of the county, excepting part of the west, is occupied by the Oxford clay, which forms the separation between the middle and lower assemblage of soils. The thickness of this formation is probably from 500 to 700 feet; its position is nearly horizontal. The hills on the confines of Huntingdonshire and Northamptonshire which overhang the valley of the Nene are of the stonemarsh or forest-marble.

Agriculture.—The climate of Huntingdonshire partakes of that of the inland counties. The low and flat districts, which are mostly drained fields, are subject to fogs, and not so healthy as the higher parts; but when well drained and cultivated, the crops are more abundant. The county contains a surface of nearly 195,000 acres, of which a very small portion only remains unproductive.

The soil varies considerably, and may be said to lie in patches. The fen soils, clay, and clay gray, grow more abundant; the southern part contains a surface nearly 195,000 acres, of which a very small portion only remains unproductive.

Although water abounds, there are not many springs, but the inhabitants are supplied from ponds, rivers, and wells. The well-water is not of the best quality: in this respect the county resembles the low-lying parts of the Fens. The farms are generally of considerable extent, and the farm buildings are generally situated at an inconvenient distance from the most productive fields. This is owing to the nature of the soil; a drier spot, rather higher than the level of the fen, is chosen for the buildings. Leases are not so common in this county as they might be, with great advantage to both landlord and tenant; and rents are not high in proportion to the produce. The expense of cultivation on the fen land, when it is first drained, bears no proportion to the produce. Paring and burning the surface is the general practice. The ashes being spread and thinly ploughed in, rape is sown, which a second sheep the first year, and left to ripen its seeds the next. The stem or straw of the rape is burned on the land, after the seed has been threshed out; and this is all the manure required to produce a good crop of wheat, if the land is sufficiently mellow. Where it is taken to untilled land, and the wheat being eaten, there are more profit made from the greater certainty of the crop on such lands. The next crop is beans, which are sown or drilled after a good dressing with dung, and with a deeper digging. The following year the crop is grass, before which the beans are mown or pastured from three to five years. The land is then pared and burned again, and the same rotation is repeated. There is no fault to find with this system, if it be accompanied with sufficient tillage. A fallow may be advantageously introduced; and without it the land will scarcely be kept sufficiently free from weeds, especially the coarse natural grasses, of which the roots remain in the soil, when it is not summer followed. The following rotation is more extensive, and, on good land, very profitable,—1, rape, after paring and burning; 2, wheat; 3, beans; 4, barley; 5, clover; 6, wheat; 7, fallow; 8, wheat; 9, beans; 10, grass; 11, fallow; 12, wheat. On poor lands the years the paring and burning may be repeated with advantage: oats are not included; but they may be sown on a portion of the wheat land after clover. Where land is rich, oats are not a profitable crop, and should be sown on the poorer lands. The grasses are always a portion of the rotation; clover is more profitable than wheat, and there the rotations may be different. On the lighter soils, where turnips will grow, paring and burning are not so advantageous, except in first converting waste land is sown to clover, and the grass and grass and rushes, into arable-land. On such lands the usual course is—1, turnips off with sheep; 2, oats; 3, beans; 4, barley; 5, clover; 6, wheat. The course then begins again. The grass seeds are sown in the spring, to lie several years, which greatly invigorates the soils, and, with good management, is the most profitable system.

The average produce of the county, according to the Agricultural Survey published in 1813, does not denote great fertility in the soil, or good tillage and management: of 94 parishes of which returns are given there are only seven which produce 24 bushels of wheat per acre, and only two which produce 30 bushels, while there are 23 in which the average is under 20 bushels. There are 16 which produce 40 bushels of barley, and 35 which average under 20 bushels, and 35 under 50 bushels, and the Kentish is the most productive. There is no doubt been considered the increase of the average produce by a better system of cultivation, but in many farms there is very little improvement. The reason of this low average must be ascribed to a long system of over-cropping, which all the fen-lands have been subjected to when first drained. The fertility was thought inexhaustible, because great crops were obtained at first with little trouble; but the vegetable portion of the soil was soon exhausted, and no subsequent manuring could adequately replace it. Folding sheep on the fallows is a very general practice; but, except on light soils, which are benefited by the treading of the sheep and by their urine, the practice is not productive. It is a most expensive mode of manuring, more being lost by the harm done to the sheep than can be gained by the increase of the crop. On dry grass-land the case is different; the urine is retained and turned into the soil, and the grass much benefited. Mustard-seed is grown to some extent in this county, and in good soils gives a good return: it is thought to exhaust the land, but it does not do more than rain falling naturally, to be well manured, and not repeated too often. The price of mustard-seed varies much, and there is not always a demand for it; but it may be stacked, and will keep well for a long time.

On the borders of the Ouse and Nene are some very rich meadow-land, but it is not a large extent. The supply of water to form artificial water-meadows. The grass is coarse naturally, but by close feeding with sheep in summer its quality is much improved.

A great part of the county is still in pasture, although
in the reign of Stephen or Henry II. Its annual revenue at the Dissolution was 2327. 7s. 6d. gross, or 1877. 13s. 6d. clear. The other houses were of less extent; they were an Augustin Friary, and two hospitals for lepers and infirm poor people. One of the hospitals had at the Dissolution a yearly revenue of 5s. 4d. gross, or 6s. 7d. clear. Some fragments of the garden-wall of this hospital and the ruins of the two hospitals for lepers are still standing.

In the civil war of Charles I, A.D. 1643, the town was invested by Cromwell, but it surrendered on the 21st of August, and the citizens, after a short resistance, were allowed to retire to the north bank of the Ouse, and was connected with the village of Godmanchester by a causeway across the meadows, which in time of floods were overflowed by the Ouse. In this causeway are three stone bridges, one over the main channel of the Ouse, of stone and antient; it has six arches. Our antient historians tell us that Huntingdon was once much larger. According to Lalond it had once fifteen churches. In the marbury parts willows grow rapidly, and are profitable, although not ornamental.

Huntingdon is rather bare of trees. There are a few woods and coppices, but not many trees in the hedgerows. In the marbury parts willows grow rapidly, and are profitable, although not ornamental.

In a few exceptions, the number of horses kept on a farm is greatly increased. The meadows of Godmanchester are of four or five hours of land. It is not surprising then that they should not be ploughed over. The pastures are not sufficiently subdivided; a farmer never has the land which he ploughs in the spring, the drier and moister parts. A contrivance is noticed in some of the pastures to enable the sheep to rub their backs. It consists of two short posts put in the ground at ten feet apart, and a strong rail fastened to them. One of the sheep by going under it can rub its back. This contrivance prevents their rolling, and consequently being cast, as often happens to fat sheep. Another method has been found out, which is to dip them in a liquor which kills the ticks; the disease of rubbing is thus prevented, and the wool is not damaged.

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by voluntary contributions, and eight others with 144 children; one day and Sunday-school of industry, attended by 47 girls daily, and by 100 on Sundays; and one Sunday-school with 125 boys.

Cammenden fixed the site of the Roman Durioliponte, or Dur- rolopton, with his opinion, and his determination, by the termination 'chester,' the frequent ploughing up of Roman coins, and the account of Henry of Huntington, that this village was in remote times a noble city; but other accounts are more probable. The station was rebuilt by Edward the Elder. The name, which Camden derives from Durio- liponte (more accurately Dar Os Ponte, signifying in Brit- ish 'the bridge over the water One'), is applicable to either position.

Kimbolton is one of one hundred and fifty towns near the castle 'rebuilt' by Edward the Elder. It is situated near the place called 'the bridge of water One,' and is applicable to either position.

The market is on Friday, and there are two yearly fairs. The living is a vicarage, of the value of which no record has been made. There were in the parish at the first survey, 18,993 children; an endowed grammar-school; another school endowed for the instruction in reading of nine poor boys of the hamlet of Stoney in this parish, and three other day-scholars; three Sunday-schools with 304 children; and several 'lace-schools,' where the children attending them are taught to read.

There was at Stonely, in this parish, a small priory of Austin canons, containing, at the dissolution, seven canons, and paying a revenue of 6/12. 3s. 4d. gross, or 4/12. 1s. 4d. clear.

Ramsey is in Huntingstone hundred, on the edge of the fens, 65 miles from Shoreditch church, London, and 10 from Huntingstone. The parish has an area of 467 acres (some 100 acres of which are in North Withford hundred, Cam- bridgeshire), and had, in 1831, a population of 3006, about half agricultural. The town derives its origin from a Benedictine abbey, founded by St. Remigius or St. Remigius, and at the time of the dissolution, of Ramsey's ey, i.e. Remigius's island, in the reign of Edgar, A.D. 965, by Aiilwine, duke or earl of the East Angles, at the instigation of Oswiel, successor or abbot of Worcester and abbot of Ramsey. The abbey stands on the island, and is a very great way of importance and repute. Many of the monks and abbots were men of considerable learning. A school almost coeval with the abbey itself was established within its walls; and the library was celebrated for its stock of Hebrew books, previously belonging to the synagogues at Stamford and Huntingdon, and purchased at the confiscation of the Jews' property in England, in the reign of Edward I., by Gregory Hunting- don, bishop of Ely. Another monk, who was eminent for his attainments in Hebrew; and a third, Lawrence Holme, the bishop of the time of Henry IV., profiting by the labours of his predecessors, compiled a Hebrew lexicon. The information broke up the library, and interrupted the studies that had distin- guished this secluded spot in the dark ages. The abbots of Ramsey were mitred. The yearly revenue of the abbey at the dissolution was 195l. 13s. 4d. gross, or 171l. 12s. 4d. clear.

Ramsey consists chiefly of one long street running east and west, with another street running northward along the main street, a feeder of the Nene, which waters the town. There is a weekly market, which had on the dissolution of the abbey fallen into disuse, but was afterwards revived; there is also a yearly fair. The church is spacious, consisting of a nave, aisles, and chancel, with an embattled tower at each end. Of some of the buildings of the abbey church are in the Norman and early English styles inter- mixed. The only remains of the abbey, which stood not far

from the church, are the ruined gateway, a rich specimen of decorated English architecture, but in very dilapidated condition; and a statue of Earl Ailwine, the founder, supposed to be one of the most antient pieces of English sculpture extant. The living is a perpetual curacy, of the yearly value of 42l.

In the time of the plague, A.D. 1656—66, four hundred people died of that disease, which was brought into the town by some infected woolen cloth. In May, 1737, eighty persons were sick, but it occupied only a day. One of the townspeople, an old woman of ninety, a great quantity of malt and flour, were destroyed in the town by fire.

There were in the parish in 1833 two endowed day-schools, with 50 boys, another in the Poor School, with 79 children; and two Sunday-schools, with 225 children.

St. Ives is in Hultingstone hundred, on the north bank of the Ouse, 59 miles from Shoreditch church, London, and 7 miles from Hereford. The parish has an area of 2330 acres, and had in 1831 a population of 3314. St. Ives was in the Saxon times called Slepe, which name is still attached to one of the two manors comprehended in the parish. A market was first held in 1286, after the first instance of the manor was held, belonging first a church, and then a priory, subordinate to Ramsey abbey, which priory re- mained till the dissolution. The town stands on a slope; the houses are low, and the town is inundated in the floods of that river. A good stone bridge of six arches forms the entrance to the town on the London side; there is an antient building, probably intended for a chapel, but now used for a fish-market, and some good houses inhabited by respectable families. Brewing and malting are carried on, but there are no manufactories. Considerable business is done by means of the navigation of the Ouse, on which there is a wharf, rebuilt and widened by the Duke of Manchester, A.D. 1724. The market is on Monday, and is one of the largest in the kingdom for cattle; there are two large yearly fairs for cattle, second-hand clothes and haberdashery; at the market fair much cheese is sold. The town has a light near building, with some antient portions deserving attention, and a handsome tower and spire at the west end. The dove-house and barn of the antient priory are yet standing. The market is on Monday, and there are several dissenting meeting-houses. The living is a vicarage united with the chapels of Old Hurst and Wood Hurst; no return of its yearly value was made. There were in 1831, 85 children, two day-schools, partly supported by subscription, with 84 children; seven other day-schools with 246 children; and also three Sunday-schools with 395 children.

St. Neots is in Tolzeland hundred on the right or east bank of the Ouse, just out of the line of the great north road through Baldock, 56 miles from Hicks's Hall, London. The parish has an area of 4730 acres, and had in 1831 a population of 2617, about one-sixth agricultural. This place appears to have been antiently called Ainolshurs, or Onolshbury. A Benedictine monastery was early estab- lished here, to which the remains, or part of the remains, of Neot, a Saxon saint, were transferred from Cornwall; but afterwards removed to Crowland. From this Neot is derived the present name of the town. The monas- tery, after undergoing various changes, was finally sup- pressed at the dissolution, when its yearly revenues were 40l. 12s. 4d. and 24l. 11s. 4d. It consists of a large market-place and several streets of respectable appearance, but from the low site on which it is built it is liable to be overflowed. The church is a remarkably fine edifice in the perpendicular style. Its plan is perfectly regular; it consists of a nave, aisles and chancel, with a tower at the west end 150 feet high, of fine proportions and good composition. The church has a fine roof; and at one end there is a large arched arcade. Two large paper-mills at St. Neots were worked by patent machinery. There is a bridge of five arches, one large and four small, over the
Ouse, and there are six arches to the approaches across the low grounds on the banks, which are liable to be flooded. There are three dissenting places of worship. The market is on Thursday; there are three yearly fairs, besides a statute fair for hiring carts. The living is worth £130 per annum. The living a vicarage of the yearly value of £163, with a glebe-house, in the gift of the lord chancellor. There were in 1833 in the parish nine day-schools with 270 children, and four Sunday-schools with 51 children.

Two or three villages deserve notice. Yaxley is in Norman Cross hundred, just on the right of the road which leads from Norman Cross on the high north road to Peterborough. It is 77 miles from Hick's Hall, London. The parish consists of a few scattered farms, which, with a mile or two of surrounding land, bring the value of 1140, nearly three-fifths agricultural. Yaxley is small, and irregularly laid out, but the houses are neatly built, and the situation, on a fine gravelly eminence, is good. The church has various portions in the perpendicular style, intermixed with others of earlier date; it has a tower and a fine crocketed spire with pinnacles and flying buttresses. At Norman Cross, on the high north road, in this parish, are extensive barracks, partly of wood and partly of brick, used during the late war as a depot for French prisoners, of whom many thousands were confined here; the barracks are now partly dismantled. Yaxley is called Taunton, and was so named, it is said, because it was being discontinued, was revived when the barracks were occupied, but has since fallen again into disuse. The living is a vicarage of the yearly value of 177l., with a glebe-house, in the gift of the lord chancellor.

Stilton is in Norman Cross hundred, on the high north road, 75 miles from Hick's Hall, London, through Huntingdon. The parish has an area of 1320 acres, with a population of about 1100, of which nearly one-third agriculture. Stilton was once a market-town, but has dwindled into insignificance. The Stilton cheese takes its name from this village. The living is a rectory of the clear yearly value of 335l., with a glebe-house. There were in 1833 seven day-schools, with 242 children, and one Sunday-school, with 100 children.

**Division for Ecclesiastical and Legal Purposes.**—Huntingdonshire is in the diocese of Lincoln, and in the ecclesiastical province of Canterbury. It constitutes an archdeaconry, comprising the five rural deaneries of Huntingdon, St Ives, Leightonstone, St. Neots, and Yaxley: a very few parishes are in the archdeaconry of Belford. The number of parishes and places of worship whose yearly value is 100l. or over is 106; but of these 20 are, for ecclesiastical purposes, annexed to or dependent on other parishes; thus reducing the number of benefices to 86, namely, 33 rectories, 27 vicarages, and 6 perpetual curacies. The total number of benefices and curacies under 100l. of £100l. of 22 under 200l., of 13 under 300l. of 12 under 400l., of 9 under 500l., of 5 under 750l., and of 4 over 1000l. Of these there was no return made.

The county returns included in the Norfolk circuit; the assizes and quarter-sessions are held at Huntingdon, where is the county-gall. Huntingdonshire and Cambridgeshire form one circuit.

The county returns two members to parliament; the elections take place at Huntingdon; the polling places are Huntingdon and Stilton. Two members are returned for the borough of Huntingdon, to which the parish and municipal borough of Godmanchester was added by the Boundary Act. The Reform Act made no change in the number of members sent from this county.

**History and Antiquities.**—Huntingdonshire is generally considered to have formed part of the territories of the Iceni under their king Erkenwald, and been one of that nation, towards the Catteuchani. Upon the subjugation of Britain by the Romans, it was included in the province of Flavia Caesaris. Two Roman stations are believed to have been in this county: Duroplona, or Durolipontre, noticed above in connection with Huntingdon and Godmanchester; and Durobriva, which is by many fixed at Water Newton, on the Nene, near the high north road. The fort or station appears to have been on the south or Huntingdon side of the river, near the present village of Durobriva, and the road, with which is said, or which rose from it, extended to the northern or Northamptonshire side. Stone coffins and other funereal antiquities have been dug up in the neighbourhood, as well as many coins. Various fragments of Roman pottery have been dug up at Holywell, near St. Ives, a small urn and a variety of Roman coins on the road from Somersham to Chatteris, in the fens, and some Roman coins near Sawy, on the high north road. Of antient roads the Roman Ermin Street crossed the county, from south-east to north-west, as from Duroplona near Huntingdon, and nearly in the line of the present north road through Perkickam. Another road, which some distinguish as the 'British Ermin Street,' is thought to have entered the county from Bedfordshire, and run due north to Godmanchester, and from thence to Hatfield, and thence to the coast near Cambridge. A portion of the road ran through the villages of Sawy and Sawy, on the west of Godmanchester, and onwards to Cambridge, where the Via Devana crossed the county, passing from near Cambridge by Duroplona to Rata, or Leicester.

In the earlier part of the Saxon period this county was included in the kingdom of the Eastern Angles, and is said to have been even then called Huntdunescerce, or Hunandunescerce; it was subsequently annexed to Mercia, and shared the fate of that kingdom. In the latter period of the Anglo-Saxon dynasty it constituted an earldom by county, and was held by Siward, a noble of considerable power in the time of Edward the Confessor. Waltheof, son of Siward, married Judith, William the Conqueror's wife, and held this earldom. He was succeeded by Robert, and thereby continued in the royal family of Scotland, until seized by the kings of England in the wars occasioned by the contests of the Bruce and Balliol families for the crown of Scotland. The earldom, after having passed through various families, was conferred by Henry VIII. on one of the Hastings family, in which it continued till A.D. 1769, when it was supposed to have become extinct; but a descendant of the claimant having put forth a good title A.D. 1819, it was revived, and still exists.

Huntingdonshire was in ancient times very woody, and appears to have been a forest till the time of Henry II, who disafforested the greater part of the remainder was not disafforested till the reign of Edward I.

There were antiently two abbey's in the county; one at Ramsey, noticed above, and one of the Cisterian order at Sawy, St. Judith. The yearly revenues of the latter, at the dissolution, amounted to 192l. 11s. 6d. gross, or 14fl. 3s. 6d. clear; there are no remains of the buildings. Beside other religious houses noticed above, there was a Benedictine nunnery on the site of Hitchinbrook House, where are the remains of a tower. At the dissolution, the revenues were 195l. 2s. 2d. gross, or 17l. 1s. 4d. clear.

Of the churches, Alwalton, Conington, Harford, and Leighton Bromswold, have some portions of Norman architecture. The churches at Cheneys and Conington are of the men of early English, with a fine spire. Upton and Wootton churches have also some fine portions of early English architecture. Besides Kimbolton and Huntingdon Castles there was one at Conington, on the border of the fens; but these do not appear to be any remains of it.

In the civil wars of Charles I. Huntingdon was plundered A.D. 1645, by the royalists, under the king's own command. In A.D. 1646, the earl of Holland and the duke of Buckingham, who had assembled troops for the relief of the parliamentarians, having been driven from Kingston-on-Thames by the parliamentarians, and compelled to wander over the country with 100 horse, came to St. Neots, where they were beaten by their pursuers. The duke of Buckingham forced his way through the enemy, but the earl of Holland surrendered without resistance.

An establishment which existed at this period in the parish of Little Oakley, in connexion with Sir Thomas Ferrar, a lawyer of eminence, led by the seriousness of his disposition, purchased the lordship of Little Gidding, repaired and fitted up a large dilapidated mansion-house, the only habitation in the village, repaired the church, which had been converted into a barn, and settled there with several of his kindred, servants, and others, to the number of nearly forty persons. Having been ordained deacon, he formed rules for his establishment, the members of which passed their lives in religious retirement and the study. Charles I. twice visited the establishment, which was kept
up after the death of Mr. Nicholas Ferrar. It was broken up by some zealots of the parliamentary army, to whom it had become obnoxious under the title of the Protestant Hun

town, which the common people had given to it. In the churchyard are several memorials of the Ferrars.

An incident of rather earlier occurrence, but illustrative of the age, took place at Warboys, in this county, near the close of the sixteenth century. The children of Robert Throckmorton, Esq., having been afflicted by fits of a peculiar kind, and the lady of Sir Henry Cromwell having died, after experiencing similar fits, a family of the name of Samuel or Samwell, consisting of an old man and his wife and daughter (Agnes), were charged with bewitching them; and being found guilty at the Lent assizes, a.d. 1593, were executed. They are traditionally known as 'the Witches of Warboys.' Sir Henry Cromwell, to whom, as lord of the manor, their goods were forfeited, gave them as an endowment for ever for preaching an annual sermon at Huntingdon against the sin of witchcraft; and the sermon continued to be preached long after the statutes against witchcraft were repealed.

(Beauties of England and Wales; Paterson's Roads; Summary of the County of Huntingdon.)

<table>
<thead>
<tr>
<th>HOUSES.</th>
<th>OCCUPATIONS.</th>
<th>PERSONS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUNTINGSTON, Hundred</td>
<td>3,141 3,711 17 79</td>
<td>2,088 595 638 8,738 8,689 17,427 4,389</td>
</tr>
<tr>
<td>LEIGHTONSTONE</td>
<td>1,778 2,054 1 49</td>
<td>1,393 461 200 4,743 4,792 9,525 2,311</td>
</tr>
<tr>
<td>NORMAN-CROSS</td>
<td>1,754 1,955 9 47</td>
<td>1,340 424 271 4,418 4,418 8,828 2,156</td>
</tr>
<tr>
<td>TOSLAND</td>
<td>2,690 2,008 10 78</td>
<td>1,366 737 634 6,933 7,210 14,143 3,317</td>
</tr>
<tr>
<td>HUNTINGDON, Borough</td>
<td>627 670 3 37</td>
<td>2 313 555 1,543 1,724 3,267 765</td>
</tr>
<tr>
<td>Totals</td>
<td>9,990 11,278 40 390</td>
<td>6,231 2,940 2,107 26,377 26,815 53,192 13,061</td>
</tr>
</tbody>
</table>

COUNTY EXPENSES, Crime, &c. — The sums expended for the relief of the poor at the four dates of —

1831 were £23,667, being 12s. 6d. for each inhabitant.

1831 32,135 16 9
1831 32,090 16 2
1831 40,474 15 7
The sum expended for the same purpose for the year ending March, 1837, was 21,675l.; and assuming that the population had increased at the same rate of progression as in the ten preceding years, the above sums give an average of 7s. 4d. for each inhabitant. All these averages are above those for the whole of England and Wales.

The sum raised in Huntingdonshire for poor-rate, county-rate, and other local purposes, in the year ending the 25th of March, 1833, was 46,7331. 17s., and was levied upon the various descriptions of property as follows:

On land | £23,399 7
Dwelling-houses | 7,082 2
Mills, factories, &c. | 1,105 3
Monorial profits, navigation, &c. | 147 3
The amount expended was:
For the relief of the poor | £29,575 18
In suits of law, removal of paupers, &c. | 1,092 12
For other purposes | 6,169 10
The returns made up for subsequent years, the descriptions of property assessed are not specified. In the years 1834, 1835, 1836, and 1837, there were raised 45,500l. 8s. 4d., 45,694l. 12s. 3d., 35,577l. 15s., and 29,404l. respectively; and the expenditure for each year was as follows:

1834 | 1835 | 1836 | 1837

For the relief of the poor | 35,466 4 | 35,206 4 | 27,729 4 | 21,675 7
In suits of law, removals, &c. | 1,146 5 | 888 6 | 1,064 9 | 433
Payment towards the county tyra | 7,427 13 | 4,289 11 | 4,248 8 | 3,916
For all other purposes | 2,867 18 | 3,174 15 | 2,044 9 | 1,994
Total money expended | 44,663 0 | 46,439 7 | 26,050 15 | 27,257

The saving effected on the sum expended for the relief of the poor in 1837, as compared with the expenditure of 1834, was therefore more than 36 per cent.; and the saving effected on the whole sum expended in 1837 was more than 37 per cent., as compared with that expended in 1834.

The number of turnpike trusts in Huntingdonshire, as ascertained in 1835, is 7; the number of miles of road under their charge is 146; the annual income in 1835, arising from the tolls and parish composition, was 10,707l. 4s. 5d.; and the annual expenditure, 11,468l. 11s. 7d.

The county expenditure in 1834, exclusive of that for the relief of the poor, was 416l. 9s. 5d., disbursted as follows:

L.  s. d.

Bridges, building, and repairs, &c. | 225 12 9
Gazols, houses of correction, &c., and maintaining prisoners, &c. | 910 18 0
Shire-halls and courts of justice, building, repairing, &c. | 7 7 5
Prosecutions | 555 19 11
Clerk of the peace | 180 0 4
Conveyance of prisoners before trial | 9 6 8
Vagrants, apprehending, and conveying | 292 5 3
Contabales, high and special | 290 18 0
Coroner | 54 6 0
Payment of debt, principal and interest | 1,140 0 0
Miscellaneous | 396 14 0

The number of persons charged with criminal offences in the three septennial periods ending with 1820, 1827, and 1834, were 197, 205, and 313 respectively, making an average of 28 annually in the first period, of 29 in the second period, and of 44 in the third period.

The number of persons tried at quarter-sessions in each of the years 1831, 1832, and 1833, in respect to which any costs were paid out of the county rates, were 15, 22, and 27 respectively. Among the persons charged with offences, there were committed for —

1831 | 1832 | 1833

Feloniess | 11 | 17 | 22
Misdemeanours | 4 | 5 | 5

RICKMAN'S 'Gothic Architecture; Clerical Guide; Parliamentary Papers, &c.'

STATISTICS.

Population.—Huntingdonshire is entirely an agricultural county, ranking in 1831 the second in that respect among all the counties of England; in 1811 it ranked the fourth. None of the periods are engaged in manufactures of any kind. Of 13,061 males twenty years of age and upwards living in the county (in 1831) 7221 were occupied in agricultural pursuits.

The population of Huntingdonshire at each of the four periods when the census was taken was:

<table>
<thead>
<tr>
<th>Year</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1801</td>
<td>18,521</td>
<td>19,047</td>
<td>37,568</td>
<td>100</td>
</tr>
<tr>
<td>1811</td>
<td>20,806</td>
<td>21,086</td>
<td>42,208</td>
<td>12-35</td>
</tr>
<tr>
<td>1821</td>
<td>24,920</td>
<td>24,721</td>
<td>49,651</td>
<td>15-04</td>
</tr>
<tr>
<td>1831</td>
<td>26,377</td>
<td>26,815</td>
<td>53,192</td>
<td>8-97</td>
</tr>
</tbody>
</table>

showing an increase between the first and last periods of rather more than 41/2 per cent., which is 15/4 per cent. below the whole rate of increase throughout England.

The following table contains a summary of the population, &c., of every hundred, as taken in 1831:

[Table providing a summary of the population of every hundred in Huntingdonshire, 1831]
The total number of committals in each of the same years was 14, 18, and 23 respectively.

1831. 1832. 1833.
9 16 20
9 16 20
Discharged by proclamation. 1 3 5

At the assizes and sessions in 1837, there were 67 persons charged with crime in Huntingdonshire. Of these, 5 were charged with offences against the person, 4 of which were for common assaults; 5 for offences against property committed with violence; 52 for offences against property committed without violence; 3 for arson; and 2 for uttering counterfeit coin. Of the number convicted, 2 were sentenced to death, the sentence of one of whom was commuted to transportation for life, and of the other to imprisonment for one year; 7 others were sentenced to transportation for life, 3 for 14 years, and 4 for 7 years; 6 were to be imprisoned for one year or above 6 months, and 24 for 6 months or under; one was fined. Of the whole number of offenders, 46 were convicted, 8 were acquitted, 6 were not prosecuted, and no bill was found against 7. In this number 59 were males and 6 were females; 34 could neither read nor write; 27 could read and write imperfectly, and 6 could read and write well.

The number of persons qualified to vote for the county members of Huntingdonshire is 2,744, being about 1 in 19 of the whole population, and rather less than 1 in 5 of the male population twenty years of age and upwards, as taken in 1831. The expenses of the last election of county members to parliament were to the inmates of the county 347 sh. 6d. And were paid out of the county-rate.

There is one savings' bank in this county. The number of depositors and amount of deposits on the 20th of November in each of the following years were—

1832. 1833. 1834. 1835. 1836.
776 888 968 991 1,108

Amount of deposits £22,474 £24,014 £25,276 £28,659 £30,926

The various sums placed in the savings' bank in 1835 and 1836 were distributed as under:—

<table>
<thead>
<tr>
<th>Description of Schools</th>
<th>By endowment.</th>
<th>By subscription.</th>
<th>By legacies and other means.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>Schls.</td>
<td>Schls.</td>
<td>Schls.</td>
</tr>
</tbody>
</table>

Education.—The following summary is taken from the Parliamentary Returns on Education in the session of 1836:

<table>
<thead>
<tr>
<th>Schools.</th>
<th>Total.</th>
<th>Infant schools</th>
<th>38</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of infants at such schools; ages from 2 to 7 years.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males.</td>
<td>257</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females.</td>
<td>354</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex not specified.</td>
<td>201</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Daily schools. 190

<table>
<thead>
<tr>
<th>Number of children at such schools; ages from 4 to 14 years.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males.</td>
</tr>
<tr>
<td>Females.</td>
</tr>
<tr>
<td>Sex not specified.</td>
</tr>
</tbody>
</table>

Total of 228

Schools. 228

Total of children under daily instruction, 5,805

Sunday schools. 115

<table>
<thead>
<tr>
<th>Number of children at such schools; ages from 5 to 15 years.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males.</td>
</tr>
<tr>
<td>Females.</td>
</tr>
<tr>
<td>Sex not specified.</td>
</tr>
</tbody>
</table>

Assuming that the population between the ages of 2 and 15 has increased in the same proportion with the whole population since 1821, when the relative population at different ages was last taken, and likewise assuming that the whole population has increased since 1831 in the same ratio as it did the 10 years preceding that date, we find by approximation that there were 18,209 children between the ages of 2 and 15 in the county of Huntingdonshire in 1834, the time the Educational Inquiry was made. Nine Sunday-schools are returned from places where no other school exists, and the children (334 in number) who are instructed therein cannot be supposed to attend any other school; at all other places Sunday-school children have opportunity of resorting to other schools also; but in what number or in what proportion duplicate entry is made of the same children is thus produced cannot remain uncertain. Seventeen schools containing 743 children, which are both daily and Sunday schools, are returned from various places, and therefore duplicate entry is known to be thus created. General allowance from the number of children having been entered twice as under instruction, we may perhaps fairly conclude that little more than half of the children between the ages of 2 and 15 are receiving instruction in this county.
Horace on the Art of Poetry' and the ingenious Essays published with it, his 'Twelve Discourses on the Prophecies,' his Sermons, and his Life of his friend Bishop Warburton. There is also an octavo volume of the correspondence between Warburton and Hurd, a very pleasuring book, and calculated to render some portion of the common opinion which many persons have formed of the real character of Warburton, and of the nature of that friendship which so long subsisted between 'Warburton and a Warburtonian.'

Hurd was born in Thame, in Oxfordshire, in 1718, and was educated at Oxford. He was a student of Lincoln College, of that University, and took orders. In 1758 he published 'The Village Curate,' which seems to have been first produced anonymously. This work was followed by a tragedy, called 'Sir Thomas More,' and some other poetical works, as well as by two theological critiques on Genesis, and Remarks on the Arrangement of the Plays of Shakespeare.

In 1793 he was elected professor of poetry in the university of Oxford, and in 1801 he died.

Hurd is now remembered chiefly for his friendship with Cowper, which began about the beginning of the year 1791. Several letters to him appear in Hayley's 'Life of Cowper,' and the compiler hints that these were only a selection made from a number. It is difficult to call attention to him as one of those who awakened or attempted to awaken interest on the subject of Shakespeare criticism, as it is most desirable that all who study Shakespeare should be made acquainted with the several steps which have been made both here and elsewhere, in the critical investigation of his writings. (Chalmers' Biog. Dict.; Hayley's Life of Cowper.)

HURDWAR. [Hindustan.] [Gk. Ηυδωρα.]

HURONIA, the generic name assigned by Mr. G. Stokes to certain remarkable articulated bodies, of a partially radiated structure, found in the transition limestone of Lake Huron. Until lately the geological relations were referred to the group of Polyphthorus, but from a careful study of specimens more complete than those which he first observed, Mr. Stokes has found that the parts represented as lamellicorous corals are only the siphonophorous portions of shells of Cephalopoda, which may be included in the family of Orthoceratidae. The structure of the siphuncular parts in these and other chambered shells from the limestone of various parts of North America has led Mr. Stokes to propose and demonstrate an organic or endothecial theory of the chambered shells. (For figures of Huronia, see Geol. Trans., vol. i., new series.)

HURRIAH, Daudin's name for certain Indian Colubers, the type of the base of whose tails are constantly simple and those of the point double.

HUSBAND. [Wife.]

HUSBANDRY. The original of the simplest arts of life is involved in the obscurity which envelops the early history of the human race. Before there can be any motives to record events, some considerable progress must have been made in civilization. When attention is altogether directed to obtaining the means of subsistence, there is little leisure; nor is there time for contemplation, or for the accumulation of knowledge needed for the improvement of the condition of man. When the means can be produced by agricultural operations, the leisure so obtained will be employed in acquiring a stock of knowledge of the arts and sciences, which will be applied to the improvement of human condition. The arts and sciences, the less they are noticed in the early literature of a nation. We have however no other means of tracing the progress of husbandry than by the works of those who have written on the subject, until we come to our own times, when everything is noted and commented on, and every one who makes a discovery or improvement is anxious that the public should be acquainted with it. We have already mentioned some of the early Greek authors (Arable Land, vol. ii., p. 229), and likewise some of the Latin authors, such as Varro, Servius, and some of those who treated of husbandry in general (Re Rustica). From these authors we learn that considerable progress had been made in the cultivation of the ground and in the breeding and feeding of cattle. The first writer who mentions the rice of the Romans their victorious arms, they also introduced improved methods of cultivation. The practice of following land, to restore its fertility, can be clearly traced to them. For a long time the Latin authors were the source from which all writers on husbandry derived their knowledge; and hence many useless and absurd rules, which were connected with the pagan superstition were perpetuated.

The Mediterranean Sea and the countries situated around it were once the centre of all the arts, which had so slowly travelled westward from Asia and Egypt; and the colonies which the Greeks and Romans planted on all the coasts of this sea, and in the countries which they conquered, contributed to the progress of husbandry. The cultivation of the earth. The irrigation of the barbarians into the Roman empire greatly checked the progress of husbandry; but the destruction of the Eastern empire, while it made the Greeks retire and the barbarians retrograde, introduced improvements into those countries where men of learning and science sought a refuge from the invaders.

British Husbandry.—The husbandry of the aboriginal Britons was probably very imperfect before the invasion of Julius Caesar; but we have no records to inform us. Rural matters were of too little importance in the eyes of conquerors to engage much of their attention, but the madness of the climate and the general fertility of the soil made the husbandry of the Romans to revert to the old, and from them the natives learned a better system of cultivation than that of their ancestors.

As far as we can learn from ancient documents, the land in England formerly consisted chiefly of woods and of extensive pastures, in which sheep and cattle were bred, which constituted the chief wealth. A very small proportion of the soil was cultivated; and, while the population was thus, there was a fair trade in commodities, and which land was before broken up, and which with little trouble or manuring produced moderate crops of corn. But this system could not last long. The proprietors of land would soon perceive that the extensive distribution of the pastures, by frequently restricting the breaking up of pastures, and thus more attention was necessarily paid to the arable lands in cultivation.

Through the deficiency of the laws, or the difficulty of executing them, and the frequent intestinal wars between the barons, depredations were often committed with impunity; and the cultivators of the soil congregated in villages for mutual protection and defence. The best land nearest to the habitations was cultivated, and the common pastures fed the cattle without much trouble or expense. The consequence of this system, that was, very little manure was made, and the cultivated fields scarcely produced a return adequate to the expense of labour and capital. Foreigners who had entered into the king's forests were granted under the barbarian terms of mastagium and rootagium.

The religious orders, to whom extensive grants of waste lands were made, greatly contributed to the improvement of agriculture. These monks by their laborious diligence were enabled to study the Roman authors on husbandry, and, by applying the rules and principles which they drew from these sources, they greatly improved their estates, and made the land more productive: teaching and encouraging the tenants to till the land more effectually, they were, upon th
whole, better and more indulgent landlords than the nobles, who, provided they secured tenants and supplied their households with necessaries, gave themselves little trouble about anything else. Bread made of rye, barley, peas, or beans, was the principal food of the labourers, who were attached to the soil, and had no resort to another place or serve any other master. The immediate tenants of the lord of the soil cultivated a portion of the lands which they held for their own use, and let the remainder to smaller tenants, who, although as free, were little above the condition of the labourers, and lived much in the same manner.

There was so little capital among the farmers, that the live stock was frequently the property of the landlord, and was let with the soil. To store away capital, they were very few in number, and nedly made by the farmer himself; an iron plough-share, an axe, and a spade, were the principal implements for which he had to pay.

Oxen, which could be kept on the common pastures at very little expense, were used for the plough; and so badly fed were they in general, that it required six oxen to draw a plough, which barely turned up half an acre in a summer’s day. These oxen consumed almost the whole straw of the farm in winter, and little was left to make manure of. Horses carried the corn to the mill or market on their backs, the roads being mostly impassable for wheel-carriages, which indeed were unknown in many parts of the country.

The price of land was continually increasing by strips and inclosures, which reduced the supply of manure. Various authors, who incidentally mention the state of the agricultural population, and from ancient deeds and documents.

With the revival of letters, and especially with the invention of printing, the knowledge of agriculture was increased by society. The practice of exhaling earthy matters by burning them, and forming a theory respecting the food of plants, which he imagined to be extremely finely attenuated earth. He thought that manures acted only mechanically, and that not only would they dig up and bury the surface of the soil, but they would fertilize the deep part of it. The attractive part of this theory was, that whereas the supply of manure is limited, there is no limit to labour, and that consequently an increase of population only required an increase of agriculture and industry. This was well understood, and his theory adopted by many eminent men.

His practical system, to which the name of drill husbandry has been given, was looked upon as one of the most important discoveries. But it was soon found that his imagination had led him astray, and he had not examined the results of his experiments and his practice. Notwithstanding this, he must be considered as one of the great promoters of good husbandry. Even his errors have been useful by making men observe and reflect; and the introduction of machines to drill the seed in rows, and of others to clean and hoe the intervals, which he principally suggested, has been of infinite use to the improved cultivation of the soil.

The rearing of cattle consists of the multiplication of arable land, which followed the introduction of saffoin, lucern, and other artificial grasses, and the cultivation of roots for the same purpose, have made a great change in the old systems. Many experiments in this direction have been tried, and the land increases in productive power, and will bear more frequent crops of corn; better implements have been invented to save labour and to do the work more completely; and a system of drainage has been introduced which, by correcting the great fault of most strong soils in northern climates — excessive moisture which cannot evaporate. Many causes have conduced to produce these improvements. At one time high prices induced men to lay out their capital on the cultivation of the soil; at another, low prices stimulated industry, to make up by an increased production for a deficiency in the value; and what has contributed greatly to keep attention directed towards agricultural improvement is the rapid increase of the means of communicating information by the press. Every successful experiment, every new method which the inventor thinks of importance, is speedily announced to the public.

It is a useful experiment which has been tried to keep the breed of cattle and sheep may be considered as entirely modern. The profit which some eminent breeders have made, and, to some extent, still make, by their attention and their skill, is a sufficient inducement to experiments. Mr. Collins and Mr. Bakewell may be cited as examples of successful attention to breeding. Mr. Collins obtained at a public sale of his cattle:

For 17 head of all ages £650
For 11 bulls 2249
For 7 bull-calves under 1 year old 652
For 7 heifers 809
For 5 heifer-calves under 1 year 1000

Making for 47 head of cattle of all ages £687.
At another sale, Mr. Fowler's stock in 1791, fifty head of cows brought 428l. 46d.

Such prices are a great inducement to pay attention to breeding.

To enumerate the various works which have come from the press, and which, when introduced into outfields, would give a catalogue of a large library. We can only mention some of the principal authors, such as Lord Kames, Marshall, Arthur Young, Sir John Sinclair, and Dickson. Of these the most original author is the first. His General View of Agriculture was published in 1767, and has never lost its importance and usefulness. The others, although confessedly compilers, have great merit in the manner in which they have brought forward the various information which they have collected in their works. Many of the above authors, with appearances of the new agricultural operations, have done much good in disseminating useful practices in husbandry. British husbandry owes much to the zeal and activity of individuals who have formed societies for its improvement. The Bath and West of England Society, which still exists, has been greatly instrumental in spreading the knowledge of practical husbandry, and much useful information is contained in the Reports of its Transactions. The Highland Society of Scotland, of which all the principal proprietors and most of the large occupiers of land in Scotland are members, has greatly contributed to encourage experiments, and to promote improvements in every branch of husbandry.

The Board of Agriculture, at the head of which was Sir John Sinclair, the zealous promoter of all measures for diffusing agricultural information, although it has rather disappeared from the public eye, has not ceased to exist, was the means of diffusing a knowledge of the state of husbandry throughout Britain, at the beginning of this century, by the publication of the Board's Reports, and the establishment of agricultural schools. The improvement of the different counties, the substance of which has been condensed in the 'British Husbandry,' in 2 vols., lately published under the superintendence of the Society for the Diffusion of Useful Knowledge, is a work already established. The Society leads us to cherish the best hopes of a new stimulus being given to the improvement of British husbandry.

To complete this short sketch of British husbandry, it only remains briefly to mention the different systems which have been most prevalent at different times.

The first and most inartificial is that which consists in breaking up portions of pasture-land and sowing corn on a slight ploughing, which cannot fail to be productive for some years. Such crops may be taken, until the land is so exhausted, that the crop no longer repays the seed and labour. To defer this time, experience soon pointed out the crops which succeeded best after each other. Wheat or barley were probably the first crops; afterwards peas, beans, or oats, until the ground, being overgrown with weeds, would be left to the renovating effect of time, and a fresh spot would be broken up.

The first work on this system is that of infield and outfield. The infield is cultivated more carefully, somewhat like a garden, and all the dung of the cattle is exclusively put upon this part. The outfield is a continuation of the first-mentioned system. The infield consisted of inclosures or open fields near the dwelling, which it was most convenient to cultivate as arable land. Thus two distinct systems of husbandry were carried on at the same time; and while improvements were introduced in the management of the infield, the outfield continued to be managed as it was before.

The mode of recruiting lands which had been exhausted by crops, or were overrun with weeds, by means of a fellow, seems to have been introduced into the Roman province of Britain, and never to have reached Scotland till the eighteenth century, a thing almost incredible, if it were not capable of explanation by the circumstance that there had generally existed a great stagnation between Britain and the Continent, and communications were not frequent between English and Scotch yeomen, except on the field of battle. The alternate crop and fellow seem to have been later introduced than a fellow, which is the object of the present system, which consists of a summer fallow, a winter crop, and a spring crop, was probably longer established than any other, and is still the practice in many parts of England. The deteriorating effect of the outfield system would lead to its abandonment as soon as population increased, and with it the want of land for infield. The common-field lands, which were so extensive till within the last fifty years, many of which have since been inclosed by special acts of parliament, were probably at first only portions of commons, which were broken up by common consent, and formed into infield and outfield. After they had been inclosed, however, after the crops are removed, strengthens this supposition.

When common-fields are divided and inclosed, a better system of husbandry generally follows. Clover and turnips are more regular, and so are the light lands, take the place of summer-fallow. Clover grows in the fields for several years, and the old rotations. Two crops raised for the use of animals in four years require more cattle on the farm to expend them profitably; and thus more manure is made. In the light soils the sheep when fed on the turnips not only enrich the land by their dung and urine, but likewise render it more compact by treading it, which is advantageous to the clover and wheat which come after. If the land is a good loam, beans are sometimes sown after wheat, the land having been recruited with manure, and if the beans are kept clean by hoeing, another good crop of wheat may be obtained after them. Thus arises the improved rotation of turnips, barley, clover, wheat, the last; wheat; after being again cleaned and prepared for turnips with all the manure that can be spared. As in this system there is always a crop with succulent leaves intervening between two which have a white straw, it has been called the alternate system of husbandry.

The removal of the fallow year, provided the land be kept clean, is a decided step towards improvement. The best farmers effect this by the introduction of artificial grasses, and the rotation of the different grasses is made by dividing the crop in rows and keeping the intervals stirred, which is a partial fallow without losing a crop. Here Tull's system is introduced, which in its complete state, as the author recommends, the Scotch Agricultural Society. As the English systems have taken their origin chiefly from the infield cultivation, so the Scotch appear to have arisen from that of the outfield. Fallow lands were unknown; but the invigoration effect of grass fed off by cattle must have been perceived; and instead of leaving the land to recover slowly by the spontaneous growth of natural herbage, which on poor land takes a long time, it was obvious that this might be accelerated by sowing grass-seeds.

Some gentlemen on the Continent have been successful in the growth of the grass and clover, which is thus gained ground daily, and bides fair, in remote situations where no manure can be purchased, to be firmly established. The order of the conversion has been grass, clover, and after the grass is sown, the grass-seeds are sown, and the whole is broken up, the grass, instead of being a mere substitute for fallowing and manuring, is made highly profitable by feeding cattle and sheep; and the profit of the years when the land rests, as it were, by being depauperated, is often as great as that of the years when it is cropped; and the risk and expense are much less. The convertible system is not very generally known or adopted in England, and is often confounded with the alternate system. The alternative system comprises a great part of the straw crops. On good land the convertible husbandry may consist of three or four years' tillage and three years' grass. If the land is not quite clean, a summer fallow on the heavy soils, and a regular rotation of crops, with a few small holdings of grass and clover, may be the course; and only one crop should be taken after the fallow in which the grasses are sown, whether it be wheat, rye, barley, or oats. It should be fed off the first year, manure, and turned over in the second. The next step is the third year, when the grasses are sown, in which the crops are not broken up, oats are usually sown as the first crop in Scotland, then beans, if the land admits of them, and then wheat. If a fallow is intended, a crop of peas may be sown after the wheat, and the course begins again, with a clean fallow, and with turnips; the land may be kept clean, and continually improve in fertility by means of the cattle which are kept upon it, without the aid of any purchased manure, except lime, the expense of which is in most cases well rewarded by the crop. These are the only
regional systems in Britain; and every mode of cultivation and cropping may be reduced to one of them, unless it be considered as a whole.

What renders the improved systems of British husbandry so superior to that of all other nations is the attention paid to the perfection of the different breeds of domestic animals, especially the horse, the ox, and the sheep. In regard to the thorough work of these animals, no expense or trouble is spared to improve the qualities of cattle and sheep. It has been objected, that the rewards given by different societies for excessively fat cattle are not judicious, and tend to make the breeders of this animal very odd. No expense or trouble is spared to improve the qualities of cattle and sheep. It has been objected, that the rewards given by different societies for excessively fat cattle are not judicious, and tend to make the breeders of this animal very odd. No expense or trouble is spared to improve the qualities of cattle and sheep. It has been objected, that the rewards given by different societies for excessively fat cattle are not judicious, and tend to make the breeders of this animal very odd.

The same might be said of very high-bred racehorses; they are not so useful as a good hackney or hunter; but unless some individual animals possess the power, courage, and speed of the so-called 'post horse,' which could equal the quality of a thoroughbred, and which is not degenerate; so likewise if some oxen were not occasionally fattened to an extraordinary degree, the fattening qualities of the breed could not be proved. A badly bred ox will never become so fat, whatever food may be given him, as one of a choice breed. This the breeders of cattle are well aware of, and in no case hesitate to give a price for a young bull related by birth to a prize ox.

The great variety of new instruments which are daily invented, and some of which gradually come into use, however expensive they may appear, is another feature in British husbandry; and the letting out of drills and threshing machines, which are kept for profit by men who have little or no business in agriculture, and which have done much to increase the yields of grain, and which will no doubt in time do the same in the operations of husbandry. There is a fresh spirit of improvement among the men engaged in practical agriculture of every kind, and not the least favourable symptom is, that it begins to be acknowledged that 'much may yet be learned,' and that 'husbandry is still comparatively in its infancy.' This admission is a great step towards improvement; and coupled with the establishment of the British Agricultural Society before referred to, leads us to hope with confidence that husbandry in Britain will improve rapidly, and keep pace with other sciences.

Husbandry in Italy.—It might be expected that Italy would present some remains of the Roman husbandry, but such has been the pernicious effect of wars and intestine commotions, that this fine country, with all the advantages of soil and climate, is far behind less favoured regions in the cultivation of the soil and the rearing of cattle. The plains of Lombardy alone are an exception; but the cultivation of maize, the principal product there, partakes more of the nature of a stock than that of any other grain. The abundance of water which descends from the Alpine regions furnishes a great extent of soil by artificial channels, in which it is made to disperse itself, and produces a vegetation and a yield in proportion. That of the wheat, in the cultivation of which Italy has such an ancient and artistic tradition. But it is evident that, if it is necessary to its perfection that the flocks should run over half the kingdom every year, the flocks, and the oxen that supply its manure, have been imported originally from Britain. But it is evident that, if it is necessary to its perfection that the flocks should run over half the kingdom every year, the flocks, and the oxen that supply its manure, have been imported originally from Britain. But it is evident that, if it is necessary to its perfection that the flocks should run over half the kingdom every year, the flocks, and the oxen that supply its manure, have been imported originally from Britain. But it is evident that, if it is necessary to its perfection that the flocks should run over half the kingdom every year, the flocks, and the oxen that supply its manure, have been imported originally from Britain. But it is evident that, if it is necessary to its perfection that the flocks should run over half the kingdom every year, the flocks, and the oxen that supply its manure, have been imported originally from Britain.

Husbandry of Spain.—Spain possesses a considerable extent of fruitful soil, and the husbandry of the Romans, which has left a mark on the agriculture of the country, was in some measure revived by the Moors. When they were expelled, Spain lost many industrious husbandmen and manufacturers. A work on husbandry by a Moor, called Roldán, who was supposed to have lived about the thirteenth century, was published with a Spanish translation at Madrid in 1802, and does credit to the agricultural knowledge of the author. The cultivation of the sugar-cane, the vine, and olives, is extensively carried on in Spain, and speaks much in its favour. Herrera, who wrote on husbandry at the desire of Cardinal Ximenes, is one of the most esteemed authors of his time. His works have been frequently republished; and although the great seats of learning and the universities have laments that are generally used in Spain for the plough and other purposes of husbandry, instead of the ox. But Herrera did not succeed in changing the custom; and mules are still in general use. The most important invention in Spain is the production of fine wool; and the privileges given to the Mesta, a kind of corporation of shepherds, tend greatly to retard the introduction of a better cultivation of any other grain. The cultivation of grain and supplying other countries, Spain is obliged frequently to import corn in order to prevent a scarcity. The state of Portugal is not better, and the vine is the only plant of which the cultivation is moderately well understood in the whole of the peninsula.

Husbandry of Germany.—The husbandry of Germany varies greatly in such an extent of country. In the time of Tacitus half the country was covered with impenetrable woods. As population extended the forests were cut down, and the sickle succeeded to the axe.

The husbandry of the German towns first received the stimulus of the tractors and the implements in their system in its worst form. Johannes Baptista Porta, in his 'Recordo d'Agricoltura,' 1591, ascribes the deterioration of agriculture to the practice of letting land for three years only, which had been introduced in 1553 under the Calvinist government. The tractors of the Prussian and Hanseatic towns gave the first examples of encouragement to husbandry. In 1571 the work of Heserbach, entitled 'Rei Rustican, libri iv,' was reprinted at Cologne. Heserbach was born in 1561, and is considered the father of husbandry in Germany.

Augustus 1, elector of Saxony, wrote a treatise on the cultivation of the vine, which was published in 1636, entitled 'Churfürsten's Augusti in Sachsen Obstgartenbuccle.'

In Prussia, Mecklenburg, and Holstein, husbandry has made the greatest progress in modern times. The Prussian government, from the time of Frederick the Great, has taken agriculture under its special protection. In Prussia there are several schools of agriculture, where this art is taught on scientific principles, and where the practice is shown on large farms. That of Migelow, which A.
Thaer presided, has become conspicuous from the excellent work on natural history and agriculture which he published. The introduction of the Dutch system of dairying in Holstein, and the breeding of fine horses there, has given a reputation to this part of the Danish dominions. In Bavaria, along the banks of the Rhine, from Basel to Düsseldorf, there exists a fine fertile plain which is cultivated with some care; and although subjected generally to the triennial system (which is called in England the three-course shift), the husbandry of that part of Germany is not below the best. In Switzerland the management of grass-lands and water-meadows is carried to great perfection. The cultivation of lucerne and sainfoin is very general; potatoes are raised to a very considerable extent: and cattle is universally raised.

The scientific writers of Geneva have contributed greatly to throw light on the theory of vegetation; and it is scarcely necessary to mention Theodore de Saussure, Pietet, De Candolle, and Maclure, as men who have contributed more to the explanation of the functions of vegetable life.

As a practical promoter of husbandry we cannot pass over M. de Fellenberg at Hofwyl, near Bern. [HOPWYL.] On an estate of about 300 acres he has put in practice all that has been written by the most esteemed writers, particularly Thaer as his text-book, and making himself acquainted with the best modern writers. He has established an agricultural school for poor children, which is a part of his great system. He pursues education, and he will contribute more to promote good practical husbandry in his native country than all the works of the most eminent writers.

Belgium has always been foremost among agricultural countries. In Flanders especially the best husbandmen in Europe. There are no early writers on husbandry in this agricultural nation, but all travellers bear witness to their industry and to the perfection of their agriculture. They are probably the most modern times who cultivated turnips in the field to feed cattle in winter; and who, in the north of Europe, kept their cattle in the stables all the year round and cut green food for them, as had been done from time immemorial in southern climates, on our continent there was, in a great measure, the insufficiency of food. The Belgians are now far advanced beyond most other nations of Europe in the application and economy of manure. They fully make up by incessant attention and indefatigable industry for the inferiority of their climate to that of Italy or Spain, and their land produces abundantly every necessary of life. [FLANDERS.]

Husbandry of France—France has always been looked upon as a country peculiarly agricultural. The climate, the soil, the aspect of the country, the agriculture, all point to this. But France has been more than any other country the subject of investigations on agriculture; and the numerous works on husbandry have been published, without producing any very sensible effect on the general practices of the husbandmen. Charles Estienne is the first French writer on agriculture, and his work was published soon after the revival of letters; but together with many other maxims which he has copied from the ancient authors, he has repeated the most absurd superstitions. His works were collected and published in 1564, under the title of 'Prudium Rusticum,' and in 1660 he published his work called 'L' Agriculture et la Maison Rustique.' This work was reprinted with additions by his son-in-law Jean Libeaut, in 1576. But the author, who is still considered as the father of the French husbandman, is not to be found in any of the modern treatises on agriculture.

Olivier de Serres, a gentleman of fortune, proprietor of the seigneurie of Pradel, near Villeneuve de Berg, in Languedoc, was a friend of Sully, the favourite minister of Henry IV. He was not only a learned man, but a man of much sagacity, and he was at the head of the French agriculture. He wrote a work on husbandry, under the title of 'Traité d'Agriculture et Mensage des Champs.' In this book he shows a thorough knowledge of the great principles of husbandry, from the husbandman to the philosopher, by which he has been generally followed, must have advanced the agriculture of his country at least two centuries. But it is a general remark, that while there have been most good books written, and the subject of agriculture, by the very name, the practice has derived least advantage from them. While France swarms with agricultural writers, the fields are still cultivated as they were centuries ago; and the Flemings, who never write on the subject, have for ages carried husbandry to the greatest perfection.

Of those who have written on husbandry, one of the most zealous is Jacob Rolle. Born in 1642, he has devoted his life to this favourite pursuit. His 'Cours Complet d'Agriculture' is a text-book for all those who, within the last half century, have desired to become acquainted with the principles of husbandry. It has, through several editions, formed the groundwork of another 'Cours Complet,' which has been published by a society of writers on husbandry, and is now the best French work on every department of husbandry and cultivation. There is no doubt that Jacob Rolle has been the greatest desire to promote practical improvement in husbandry. Agricultural schools and veterinary colleges are multiplied; and the return of peace, if its blessings can be duly appreciated and transformed into a real gain, is one of the most important application of capital and skill to the improvement of that art which furnishes the staff of life.

HUSS, JOHN, was born at Husainzata, a village of Bohemia, of humble parents, about the year 1407. He studied in the university of Prague, where he distinguished himself by his assiduity and talents. Being ordained priest in 1469, he soon after adopted the opinions of Wycliffe, which he proclaimed loudly from the pulpit, and by so doing, through several editions, transformed the doctrines of another 'Cours Complet,' which has been published by a society of writers on husbandry, and is now the best French work on every department of husbandry and cultivation. Thence he undertook to promote practical improvement in husbandry. Agricultural schools and veterinary colleges are multiplied; and the return of peace, if its blessings can be duly appreciated and transformed into a real gain, is one of the most important application of capital and skill to the improvement of that art which furnishes the staff of life. The archbishop of Prague ordered these works to be publicly burned, and communicated those who still adhered to the opinions contained in them. The year 1480 is the boundary between the two functions, which however assembled the people, either in private houses or in the fields, where he preached against the pope, against purgatory, and above all against indulgences. The people were thus invited and encouraged to examine doctrines, which till then had been considered the sole province of the clergy; the humblest among them, women as well as men, began to discuss the mysteries of grace, predestination, and justification. The archbishop of Prague took the alarm, and Hus was summoned by the pope, John XXIII, to appear in person at Bologna to answer the charges against him, which neglecting to do, he was excommunicated. The pope, however, was not in his favour, and the consequence was that frequent tumults occurred in the streets of Prague between his partisans and those who supported the papal authority. Unsuccessful in this attempt to appear as encouraging these disorders, Hus retired to his native village, and there both by his writings and by his sermons he defended the propositions of Wycliffe, rejecting at the same time all human authority in matters of faith, and exhorting the multitudes who flocked to him to make the Scriptures alone their rule of faith. Some time after, on the death of the archbishop, Hus returned to Prague, and there publicly opposed a papal bull which had been just issued by the court of Rome against Laislasus, king of Bohemia, and his father-in-law, which was the direct cause of his arrest. In 1491 he was arrested and conducted to Constance, where he was tried and condemned. In 1493 he was burned at Constance however he was arrested. The sequel of his melancholy story is given in the article CONSTANCE, COUNCIL OF. Hus died with a fortitude which was admired even by his antagonist. His account of his last moments is given by Leonardo Aretino; and Aeneas Sylvius, Historia Bohemica. The morals of Hus were irreproachable; his opinions, whether right or wrong, were conscientiously entertained; and it is but a poor excuse for the members of the council
to say that they did not condemn him to death, but consigned him to the secular arm, as they were perfectly well aware of the meaning of that expression. The council thus gave a fatal example, which was followed over all Europe for centuries after, and almost to our own days. Jerome of Prague soon after met with the same fate as his master. The death of these two distinguished men created a revolt in Bohemia. The Hussites began a furious war against the Roman Catholics; they burned churches and mourning processions, and smashed the altars and images of the Church and in his death his brother, the Emperor Sigismund, found himself opposed by the Hussite leader Ziska, a man of extraordinary powers, who had taken possession of Prague. Sigismund, after a great loss of men in the field, was glad to come to terms with Ziska, and granted 1. That the church-service should be celebrated in the vulgar tongue; 2. That the communion should be administered in both kinds; 3. That clergymen should be deprived of all temporal jurisdiction; 4. That moral crimes should be punished with the same severity as violations of the criminal laws of the country. This truce however was of no long duration, and Ziska carried on the war with success against the emperor. The Hussites now divided into several branches, some very fanatical and cruel, such as the Taborites, the Horebits, and the Adaminites, of whom strange but not well authenticated stories are told; and other more peaceable generally named the Usligites. After the death of Ziska the warfare between the Bohemian Hussites and the Imperial troops continued until the convocation of the council of Basel, in 1431. After long and tedious conferences the council conceded to the Bohemian inhabitants of Prague the rights which they had then claimed, viz., the denial of the right of the Emperor Sigismund on his side agreed that the Hussite priests should be tolerated, even at court, that no more monasteries should be built, that the University of Prague should be reformed, and that there were only two college chapels granted for all past disturbances. Thus peace was concluded in 1437. Bohemia however remained still in a feverish state until about a century after, when the reform of the later reformation of 'The Thirty Years' War, which another century later desolated all Germany, may be said to have been the remote consequence.

There are a few Hussites now in Bohemia; the rest have melted into Calvinists, Lutherans, Moravians, and other sects. [BOHEMIA.]

HUTCHESON, FRANCIS, the reviver of speculative philosophy in Scotland, was born in Ireland, August 8, 1694. He was the son of a French Huguenot family. After completing his studies at Glasgow, Hutcheson officiated for some time in a similar capacity in the north of Ireland. In 1720 he first became known to the literary world. He must be specially noticed, as the origin of our Ideas of Beauty and Virtue, &c., with an attempt to introduce a mathematical calculation in subjects of morality, &c., and by its friendship of Archbishop King, and by the titles on the 'Origin of Evil' and 'Religion, &c., his essay 'On the Nature and Conduct of the Passions and Affections' appeared in 1728, and in the following year he was appointed professor of moral philosophy in the university of Glasgow, where he was admitted to the degree of Doctor of Laws. He published, as manuals for his class, 'Synopsis Metaphysicae Ontologiam et Pneumatomologiae Complectens,' and 'Philosophia Moralis institutio complectens omnes aspectus moralis virtutum, &c., which sold beyond expectation.' His great work, in 2 vols. 4to, entitled 'Systema Moral Philosophy,' did not appear until after his death, which took place at Glasgow in 1747. It was published by his son, Dr. F. Hutcheson, with a life of the author, by Dr. Loebach, which Sir J. Mackintosh characterizes as a fine piece of philosophical biogaphy.

In his metaphysical system Hutcheson rejected the theory of innate ideas and principles, but insisted upon the abstractness of our ideas. It is impossible to deny them, metaphysical axioms, which are self-evident and immutable. These axioms are primary and original, and do not derive their authority from any simpler and antecedent principles. He is therefore an imperious and absolute truth, for this is none other than reason itself, or, in the words of Hutcheson, 'menti congenita intelligendi via.' Of his ontological axioms two are important:—Every thing existing really, says, has the qualities, affection, or action is real, except in so far as it exists in some object or thing.
authority Hutchinson does not attempt to show, and is content with observing that we are directly conscious of its rule.

As to the question, what are the mental dispositions which this sense approves as good and moral, he at once excludes all those whose end lies in the attainment of man's personal happiness. No action the end of which is the profit of the agent can be accounted virtuous: it may be blameless, it cannot, however, be an instance of what one's own interests becomes culpable whenever the advancement of them will enlarge the sphere and the means of benefitence. Unanevolent dispositions and acts alone are the objects of moral approbation. By moral approbation he means the moral excellence, and the degrees of morality coincide with those of benevolence.

In this system the part of reason is very subordinate. His version of the doctrine of infinite diversity of the proper conduct of human conduct and of acting directly on the will, it is a mere servant, whose task is to discover and to digest the proper means for the attainment of those ends which the moral sense proposes. As to the mores to virtuous determinations. Hutchinson is not more explicit than Shaftesbury. But as he makes the moral sense to be something more than a simply perceptive faculty, and, like all other senses, to influence the will, it would appear that he recognized other moral motives also.

As a writer Hutchinson is remarkable for chasteness and simplicity of style, with great clearness of expression and happy fullness of illustration.

JOHN, author of a mystical and cabalistic interpretation of the Hebrew scriptures, was born in 1674, at Spennithorne in Yorkshire. Having received an excellent private education he became at the age of nineteen a student of the College of St. Buryan, in later years served the duke of Somerset, who bestowed upon him many marks of confidence and esteem, and when master of the horse appointed Mr. Hutchinson his riding surveyor, vailing himself of the opportunities which his situation afforded him for cultivating his favourite pursuit of mineralogy and natural history, he made a large and valuable collection of fossils, which, with his own observations, he consigned to the care of Dr. Woodward to digest and publish. This duty Woodward failed to discharge, but bequested the task and the collection to the university of Cambridge. In 1724, Hutchinson published the first part of a curious work entitled 'Moor's Principles,' in which he attempted to refute the doctrine of predestination, as taught in the Principles of Newton. In the second part of this work, which appeared in 1727, he continued his attack upon the Newtonian philosophy, and maintained, on the authority of scripture, the existence of predestination. From that time he published yearly one or two volumes in further elucidation of his views, which are written in a rambling and uncoady style, but evince a profound and extensive knowledge of the Hebrew scriptures. He died on the 29th of August, 1737.

According to Hutchinson, the Old Testament contains a complete system of natural history, theology, and religion. The Hebrew language was the medium of God's communicative with man; it is therefore perfect, and consequently as a perfect language it must be coextensive with all the objects of knowledge, and its several terms are truly significant of the objects which they indicate, and not so many arbitrary signs to represent them. Accordingly Hutchinson, after Origin and others, laid great stress on the evidence of Hebrew etymology, and asserted that the Scriptures are not to be understood and interpreted in a literal, but in a typical sense, as an object of the religious expressions. By this plan of interpretation, he maintained that the Old Testament would be found not only to testify fully to the nature and offices of Christ, but also to contain a perfect system of natural philosophy. The editors give the following compendium of the Hutchinsonian theory: The Hebrew scriptures nowhere ascribe motion to the body of the sun, nor fixedness to the earth; they describe the created system to be a sphere without any curvatures, and reject the assistance of gravitation, attraction, or any such occult qualities, for performing the stated operations of nature, which are carried on by the mechanism of the heavens in their natural condition of fire, light, and spirit, or air, the material agents set to work at the beginning; the heavens thus framed by Almighty wisdom are an instituted emblem and visible substitute of Jehovah Aleim, the eternal three, the co-equal and co-adorable Trinity in Unity: the unity of substance in the heavens points out the unity of essence, and the distinction of conditions the trine personality, in Deity, without confounding between the persons, or dividing the attributes. And from their being made emblems they are called in Hebrew Shemim, the names, representatives, or substitutes, expressing by their names that they are emblems, and by their conditions or offices what it is they are emblems of. The entire theory of Hutchinson is contained in his works, 'Herib,' which our translation renders Covenant, Hutchinson construes to signify 'he or that which purifies,' and so the purifier or purification for, not art, man. From similar etymological investigation of other terms he supposed all the rites and ceremonies of the Jewish dispensation were so many delineations of Christ, in what he was to be, to do, and to suffer, and that the early Jews knew them to be types of his successive dispensations. A full exposition of his system may be found in the works of Sir Isaac Newton. Some years after the publication of 'Moor's Principles' he became bishop of Rochester, Dr. Maskelyne, the astronomer-royal, Colonel Watson, the chief engineer to the East India Company, and Mr. Landen. After its termination the examination of the manuscript of Dr. Hutchinson, by the judges, who were eight in number, but gave a decided preference in favour of Dr. Hutton, and he was accordingly appointed to the professorship. The 10th of November, 1774 (Thomas' Annals of the Royal Society), Dr. Hutton was a fellow of the Royal Society, and upon the accession of Sir John Pringle to the presidency he was appointed foreign secretary to that body, which office he continued to hold.
with the greatest credit until he was displaced by Sir Joseph Banks in 1778-9, on the plea that it was requisite the secr
cety should reside constantly in London. [Banks, Sir John.] In 1775 the Royal Society instituted a series of
experiments on the mountain Schehallien in Perthsire, with a view to determine the mean density of the earth.
These were conducted principally under the direction of Dr. Maskelyne, and when completed the labour of making
the necessary calculations was allotted to Dr. Hutton, who was considered the most likely of the society to undertake
their execution. His report is contained in the 'Philosophical Transactions' of the year 1778. In the year 1779 the
degree of L.L.D. was conferred upon him by the university of Edinburgh. In 1781 he published his 'Tables of the Pressure of Water in the Provinces of Holland and the Dutch
Netherlands.' Mathematical Tables,' containing the common, hyper-
bolical, and logarithmic logarithms, with the sines, tangents, &c.,
both natural and logarithmic, Lond., 8vo. To these succeeded his 'Tracts on Mathematical and Philosophical Subjects,'
in 4to, Lond., 1786, which were reprinted in 1812, 1812,
Lond., 8vo, 3 vols. In 1785 appeared his 'Mathematical and
Philosophical Dictionary,' in two large quarto volumes,
which has since supplied all subsequent works of that de-
scription with valuable information both in the sciences treated
of and in scientific biography.

About this time he undertook, in conjunction with Dr.
Perronet Thompson, to carry into execution the 'Philoso-
physical Transactions.' The work was completed in 1809,
in 19 volumes, quarto, and Dr. Hutton is said to have re-
ceived for his labour the sum of 4600/. In 1806 he was at-
tacked by a pulmonary complaint, which a few years later led to his death. The Electro-Mechanical Board of
Ordeance manifested their approbation of his long and meritorious services by granting him a pension for life of
400l. per annum. Dr. Hutton died the 27th January, 1833, in
the sixty-ninth year of his age, and was buried at Charlton in
Kent.

Dr. Oliphant Gregory, the successor and biographer of
Dr. Hutton, says in his memoir, that as a preceptor he was
characterized by the love of truth, by his love of pipes, by
published this particular work, discoursing on the difficulties
which his pupils experienced, patience in labouring to remove those difficulties, unwearied persever-
ance, and a never-failing love of the art of communicat-
ing knowledge by original instruction.' He was equally
characterized by an unassuming deportment and general
simplicity of manners, by the mildness and equity of
his temper, and the permanency and warmth of his personal
attachments. His benevolence was great, and he was a kind frie-
d, a sincere, and an ardent lover of science.

Towards the close of the doctor's life, a subscription was
entered into by his friends and pupils for a marble bust,
which was admirably executed by Oebaberg, and at his death
he bequeathed to the Proceedings of the Royal Society of
Newcastle, where it now is.

Besides the works above mentioned, and the papers in the
'Transactions of the Royal Society,' Dr. Hutton was a constant contributor to the 'Ladies' Diary,' of which peri-
odical he was editor for many years. His remaining works
consist of:- 'Elements of Conic Sections;' 1787, 8vo; 'A
Course of Mathematics, designed for the use of Cadets in
the Royal Military Academy,' London, 1798-1801, 2 vols.,
of which several later editions have appeared; 'Recreations in
Mathematics and Natural Philosophy, from the French of
Montuclier,' London, 1803, 4 vols. 8vo; and some others.

HUYHENS, CHRISTIAN, son of Constantine Huy-
ghens, possessor of Zulichem, Zelhem, &c., in Holland;
whose Huyhens (Latinized Huygens) is often called
Zulichemius, though his inheritance was the second-named
estate, and the initials C. H. & Z., or C. H. D. Z., often appear on the titles of his works.

For the life of Huygens our authority is the account
prescribed by S'Gravenhage, but the cyclopaedia of the Hague. April 14,
1629. His father had been secretary to three princes of
Orange, and was advantageously known by some Latin
poets and other small works: he died in 1657, at the age
of ninety. His eldest son, Constantine, succeeded him in
the post of secretary, and accompanied William III. to Eng-
land in that capacity in 1688. The subject of this article
is his second son, from his boyhood showed an aptitude for
mathematical and mechanical studies, and in 1645 he pro-
secuted them at the university of Leyden under the care of
Schooten. In 1648-49 he studied civil law at Breda, a
course being then and there established, partly under the
management of his father. In 1649 he accompanied a count
of Nassau to Denmark; and in 1652 he travelled in France.
He then remained in Holland till 1660, when he went
again to France, and he undertook the voyages he repeated in 1663.
In 1660 he returned to France by Colbert, where he remained from 1666 to 1665,
with the exception of two trips to Holland in 1670 and 1675,
for health. This consideration prompted his final return to
Holland in 1669. His son Jan, who died in The Hague, June 8, 1655. The preceding enumera-
tion of changes of place is almost all that can be said of
Huygens unconnected with his philosophical fame. Con-
dorcet informs us that the edicts against the Protestant
occasioned his relinquishment of the honours and emolu-
ments which he held in France, and that he refused to be
made a special exception, we suppose to the edict incapaciti-
ing Huygens from office. His family also, according to
Condorcet, were displeased at this step, which may
have been the case, since his father was a strong partisan of the
French. (Biogr. Univ., art. ' Const. Huygens.') The same
author quotes a reply of his father to a verse of Voltaire:

('assez mauvais') to Ninon de L'Enclos.

The greater part of the works of Huygens which were
published during his lifetime were collected into four
volumes by S'Gravenhage, under the title of 'Christi
Hugenii Zulichemii Opera Varia,' Lugd. Bat., 1724.
But Huygens left his papers* to the university of Leyden, with the request that two profes-
sors, De Volder and Follen, would select and publish what
they thought fit. The two professors, in consequence, entitled
'Christiani Hugenii, &c., Opera Posthuma,' Amsterdam
(?), 1700. But in 1728 S'Gravenhage completed his
edition of the works printed by Huygens himself, and also
published 'Posthumous Works,' under the title of
'Opera Posthuma,' Lugd. Bat., 1724. Apart from these
the works of Huygens are to be found in various
periodicals. We shall publish, and, with the exception of
the 'Philosophical Transactions,' and other peri-
dicals, we must add the mention of his correspondence,
now publishing for the first time under the following title:
'Christ. Hugenii aliorumque Exercitationes Mathematicae
Philosophiae, &c., Lugd. Bat., 1797, ed. Ph. P. D.
Ulysses, 4th. Com. Lat., 1797, 2 vols. 8vo. It was
published, and it is understood that others are to follow.

* Weidler also mentions a volume of posthumous works
published at Leyden in 1669. We shall presently notice
the larger works, but Huygens, frequently during his
life, occupied a most conspicuous place among the immediate
predecessors of Newton. Had it not been known that the latter
was in possession of at least the main points of his system
before 1674, it would undoubtedly have been fair to suppose
that the researches of Huygens gave most material sug-
gestions to the investigator of the theory of gravitation.
His writings seem to form the natural and proper step in
the chain between those of Galileo and Newton.

We shall give the list of Huygens's works in the order of
subjects, with a short description of what is now memorable
in each.

1. Geometrical Works.

'`Theoremata de Quadraturae Hyperboleas, Ellipsis, et

Circuli, ex dato portionum Gravitas Centro;' quibus sub-
jectis est: 'Ergae Cyclometriae Cl. Viri Gregori & S.

The theorems have more merit than use; it is to be remembered that they followed
the work of Guldinus. [Guldinus.] The answer to the
quadrature of the circle by Gregory of St. Vincent will be
further noted in the article on that subject.

'De Circuli Sfera et prope Sfera Condylo, Theorematum precedent ejusdem Problematum quorundam illustrium Constructiones,' Lugd.

Bat., 1631. In this work Huygens gives some new and
very close approximations to the quadrature of the circle.

He was also engaged in preparing a treatise on this subject, for the details of which see 'Journal des
Spavans, July and November, 1668, and 'Phil. Trans.,' Nos

In one of these manuscripts is found the remarkable assertion that Newton
last his reason about 1699, 'which is so fully discussed by Sir David Brewster in
his 'Life of Newton.' [Newman.]

3 A 2

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had discovered Saturn's ring. The "Systema Saturnium" gives an account of the discovery, fixes the position of the ring, and explains the phenomena of its appearance and disappearance, &c. This work also occasioned some considerable controversy among astronomers, for there was reason to believe that Huygens was prevented from looking for any more satellites by the notion, then not uncommon, that the whole number of satellites in the solar system could not exceed that of the planets.

The "Cosmotechnos" was passing through the press when Huygens died. It was printed at the Hague in 1698, and was twice printed in English, first in 1698, and next at Glasgow in 1727; besides several translations into Continental languages, it was reprinted and entered into a large number of speculations on the physical constitution and probable inhabitants of the planets.

IV. Optical Works.

These are, the "Traité de la Lumière," Leyden, 1690, Latinized in the "Opera Reipuia;" the Dioptrics, and the "Commentaire de Vitris Figurandis," both first given in the posthumous works. The first treatise was reprinted by Baron Masseres, in his "Sciences Optic," London, 1823. It was written in 1678, and must now be considered as the "Principia" of optics. Huygens took up the theory of undulations in opposition to that of emanation, which was adopted by Newton. By this theory he gave a sufficient explanation of the phenomena of refraction and reflection, and also of that of double refraction, in which Newton could not succeed; that is, he gave an explanation of all the prominent phenomena of optics. The undulatory theory is now generally admitted, and Huygens is now considered as the founder of it; for though Hooke had previously advanced the notion, yet he made no application of it to the explanation of phenomena.

It remains to mention the treatise, "De Ratione ciinis in Ludo Aleae," which was printed at the end of Schooten's "Exercitationes Mathematica." Leyden, 1657. It is the earliest regular treatise on questions of chance, and first points out the manner in which the expectation of a player is determined.

We leave some minor writings unnoticed (referring to the collections of Huygens's works), and proceed to make some remarks on the character of Huygens as a philosopher.

He is distinguished by correctness, penetration, and the freshness of intellect which never left him. Before he was in possession of the formal differential calculus he was able to supply its place. His power of acquisition lasted to the end of his life. He was near sixty when he read the "Principia," and past that age when he began to study the Calculus of Leibnitz. At that time of life persons seldom change old opinions; but Huygens admitted the theory of Newton, and added to his system simultaneously. As an independent continental philosopher who published his adhesion to the theory of gravitation, not generally, but after minute examination, (for in the correspondence of Leibnitz and Huygens it is noted that a manuscript of Huygens's was sold at the same sale of books, of which the title was: "Errors of Newton," it will be worth while to quote what Huygens says on the subject in his "Discourse on the Cause of Gravitation," or rather in the appendix which he added after the receipt and perusal of Newton's work. It is to be remembered that the "Principia" was published in 1687, and what follows in 1690; and also that Huygens had explained the spheroidal figure of the earth upon the supposition of a central point of gravity, but not supposing the particles of the sphere to attract each other. This mutual attraction of the smaller parts he cannot admit, and it is clear from his expressions that he has the right to retain his own theories, but not his own form. But notwithstanding this, his fresh apprehension of the manner in which Newton's hypothesis explains facts, and his disposition to yield to that species of evidence, were not common in his day. We give then the following extract, remarkable as it is, the first published in the "Principia" from a continental philosopher:—"I have nothing to say against the "Vis Centrifuga," as Mr. Newton calls it, by which he gives the planets weight towards the central point; but I agree to it without difficulty; because not only do we know by experience that there is some such sort of attraction or impulsion in nature, but also because it is explicable in accordance with the law of motion, as appears in what I have written on gravity. For there is no reason why the
cause of this *Vie Centripeta* towards the sun should not be the same as that by which bodies which we call heavy are forced to descend towards the earth. I had long ago imagined that the spherical figure of the sun might be produced in the same way as, in my opinion, is that of the earth; but I did not extend the action of gravity to distances so great as from the sun to the earth, or from the earth to the rest of the world; according to M. Des Cartes, which I do now (thought extremely likely, and had then in my head) came in the way. Neither did I think on the law of diminution of gravity, namely, in the reciprocal proportion of the squares of the distances from the centre, which is a now and very remarkable property of the motion of which our present well worth examination. But seeing now by the demonstration of M. Newton, that in supposing such a gravitation towards the sun, diminishing according to such a law, it is still counterbalanced by the centrifugal forces of the planets, and produces exactly the effect of the elliptic motion which Kepler imagined and verified by observations, I am hardly able to doubt that those hypotheses concerning gravitation are true, and also the system of M. Newton, so far as it is founded upon them; which appears the more probable, because in it is found the solution of several difficulties which embarrass the vortices of M. Des Cartes. We see now how the excentricities of the planets remain the same, why the planes of their orbits do not coincide, but retain their inclinations, and why the planes of the orbits necessarily pass through the sun. We see how the motions of the planets can be accelerated by casting them in a direction contrary to that of a vortex strong enough to carry the planets. But in the doctrine of M. Newton this difficulty entirely disappears; since there is no reason why the motions of the planets should not be carried in a direction in contrary to that of a vortex strong enough to carry the sun like those of the planets, only more extended and differing more from a circle; and thus there is no reason why these bodies should not have their periodic returns, as some plants show their flowers at a certain season; Huygens resolved to devote himself entirely to that branch of the art in which he attained such unrivalled eminence. Every term of panegyric that language can furnish has been lavished, and with justice, on his productions; he seems to have dived into the depths of mechanism, and to represent the loveliest and most brilliant of her creations with all the magic of her own pencil. His flowers are more beautiful and true to nature than his fruits. He is equally successful in representing the state of development of the flowers with their eggs and feathers, are all painted so as almost to deceive the eye. The vases in which he puts his flowers are always from some elegant model, and the bas-reliefs are finished with the same exquisite care. He was the first that painted flowers on a light ground. He is supposed to have possessed some secret in the mixing of his colours and preserving their lustre. His pictures sold at very high prices during his life, and are still held in the highest estimation. He died in England, in 1749.

**Hycanth, a favourite flower in gardens,** is the Hycanthous orientalis of botanists, a bulbous plant, found wild on the borders of lakes and ponds. It is remarkable for its fragrance and the facility with which it succeeds in the coldest, size, and construction of its flowers when raised from seed.

פפואס are more worthy of cultivation than the hycanth, and perhaps no other flowers are more worthy of its regard. Rich varieties of this colour, the richness and cheapness of its perfume. The Dutch gardeners have been celebrated for the high state of perfection to which they grow it, and for the monopoly they have secured in the sale of the bulbs, which are always received in the shops the familiar name of Dutch. This flower is constructed as to run up and down in favourable weather; in bright sunshine the bed may be exposed from four o'clock in the afternoon, or for a few hours in the morning. If the bed is not shaded, the colours very soon spoil, and they will not bear in the open air.

Foreing of hycanths is carried to a considerable extent, both in England and also on the Continent. When they are bloomed in this way, they are either used as ornaments to the greenhouse, or as stocks, and they are also preserved where the sweetness of their perfume renders them general favourites. The method of forcing them is the following:

—Good Dutch bulbs, which are annually imported, are se-
lected for this purpose. To save trouble, all which are intended to be forced may be potted at the same time, and placed in a cool greenhouse or frame; then as many as are intended to bloom at once must be placed in a gentle heat; when their flower-stems appear, others can be brought in which will succeed them, and by going on in this way a regular succession will be kept up. The pots into which they are put need not be large, but rather deep. The soil used for potting may either be the same as is recommended above, or a good loam will answer equally well. In potting, the bulbs must not be firmly pressed into the soil, but lie rather loose, and be only about half covered with it.

Hyacinths are frequently grown and flowered in water-glasses. Sometimes before they are put into the glasses they are planted in pots, and when the roots have grown a little they are taken up and washed, and placed in the glasses, or they are placed in the glasses at first. The water must be frequently renewed, or it will soon become fetid and offensive. By far the most curious system of treating forced hyacinths is to invert them in large glass jars filled with water. This must be done when the flowers are nearly expanded; and by placing one above the glass, of the same size and colour with the inverted one, the latter presents an appearance of being the shadow of the former. The flowers retain their freshness much longer in the water than when exposed in the common way; but this circumstance, and the curious appearance presented, is all which can recommend the system; of course the fragrance of the hyacinth is in this way entirely lost. The principal difficulty that is experienced by those who work with hyacinths in water in sitting rooms is to prevent their growing long, weak, and pale, so as to flower badly, and be in constant danger of upsetting. This is remedied by keeping them close to a window, where they can be constantly exposed to bright light all day long. It may also be added, that in order to secure their pushing out their roots before the leaves lengthen, they should always be kept in the dark for a fortnight or three weeks after they are first placed in the water-glasses, care being taken at that time that the water and the bulbs are not in contact. The moisture that rises into the air will be sufficient to induce the bulbs to put forth roots; and the total absence of light will prevent the leaves from being stimulated to growth.

Varieties are obtained from seed, and particular kinds are propagated by offsets. With the greatest care in gathering the seed, it is very uncertain whether or not the young plants raised from them will turn out well; however, the best sorts to gather seed from are those with strong upright stems, semi-double flowers, and brilliant and distinct colours. The seed must be well ripened, and then sown in good soil, rather lighter than what is recommended for hyacinth compost. The young plants so obtained must not be disturbed or taken up until the end of the second, or, if they are weak, the third year; all that they require during that period is a little top-dressing. They may then be taken up and planted in the bed, where they will require the same treatment as old roots; they will flower in the third spring, but it is better to destroy all the flowers of the first season, in order to strengthen the bulbs.

HYACINTH. [ZIRCONIUM.]

HYADNA, the name of a family of digitigrade, carnivorous quadrupeds, distinguished by having their fore legs longer than their hind legs, by their rough tongues, great and conical molar, or rather cutting-and-crushing teeth, projecting eyes, large ears, and a deep and glandular pouch beneath the anus.

Dental Formula.—Incisors 6 canines 1–1 molars 1–1 5–5 4–4 = 34.

The false molars, three above and four below, are conical, blunt, and very large. The upper flesh-tooth (carnassie) has a small tubercle within and in front, but the lower one has none, and presents only two trenchant points. The whole of the dental and molar organization, and indeed the whole cranial structure, appears to have been formed with a view to the bringing into the most available action the formidable natural instruments which enable the Hymanas to break the hardest bones.

Dr. Buckland gives the following account of the facts of a Cape Hyman (the spotted species, we presume) which he saw at Oxford in the travelling collection of Mr. Wombwell, the keeper of which confirmed in every particular the evidence given to Dr. Wollaston by the keeper of Exeter Change, and noticed in Reliquiae Diluvianae, ii. 26. 'I was enabled,' says Dr. Buckland, 'to observe the animal's mode of proceeding in the destruction of bones. The shiine-

bone of an ox being presented to this Hyman, he began to bite off with his molar teeth large fragments from its upper extremity, and swallowed them whole as fast as they were broken off. On his reaching the medullary cavity the bone split into angular fragments, many of which he caught up greedily, and swallowed entire. He went on cracking it till he had extracted all the marrow, licking out the lowest portion of it with his tongue: this done, he left untouched the lower conyyle, which contains no marrow, and is very hard. I gave the animal successively three shin-bones of a sheep; he snapped them saunter in a moment, dividing each in two parts only, which he swallowed entire, without the smallest mastication. On the keeper putting a spar of wood two inches in diameter into his den, he cracked it in pieces as if it had been touchwood, and in a minute the whole was reduced to a mass of splinters. The power of his jaws far exceeded any animal force of the kind I ever
HYÆ

saw exerted, and reminded me of nothing so much as a tanner’s crushing-mill, or the scissors with which they cut off bars of iron and copper in the metalfoundries.* (Re-
lique Darwiane.)

pil of thorns and branches of the prickly tulip, several feet high, raised over it as a protection against the flocks of hyenas which nightly infested the burying-places in that country.

SYSTEMATIC ARRANGEMENT.

Linneus, in his last edition of the *Systema Naturae* (18th), places the Hyæna under the genus Canis, between the Wolf and the Fox, and describes the *Striped Hyæna* only, as *Canis Hyæna*, with sufficient accuracy. Bivon had already given the form a generic distinction under the name of Hyæna.

Gmelin, in his edition, adds the spotted species under the name of *Canis Crocuta*, and places these Hyænas between the *Canis Thous* and *aureus*, the latter being the Jackal; but Pennant had previously described both species in his synopsis under the title of *Hyæna*, and as the *Striped* and *Spotted Hyænas*, arranging the form between the *Dog* and *Cat* names which he uses for these distinctions for those carnivorous types, in the largest sense.

Cuvier makes the Hyænas the last subdivision of the digitigrades following his *Cetæs* (*Ferrera*), and immediately preceding the *Cat* (*Felis*). He describes the subdivision as containing the most cruel and most carnivorous animals of the class, and as comprising two genera (*which he does not distinguish*), adding that three species are known, namely, L. Hyæna rufus (*Canis Hyæna*, Linn.); L. Hyæna brunea (*Hyæna brunnea*, Thunberg; H. Villoso Smith); and L. Hyæna tachete (*Canis Crocuta*, not of Linneus, as Cuvier quotes it, but of Gmelin).

Mr. Gray, in his method (Annals of Philology, 1826), brings the Hyænas under the family *Felidae*, which he divides into two sections; the first consisting of those genera which have no tubercular grinders in the lower jaws; the second consisting of those which have tubercular grinders in both jaws. The first subfamily of the first section (which also includes *Felis*) is *Hyæna*, consisting of the genera *Hyæna*, Bivon, and *Proteles*, Goebri. (Aard-Wolf, vol. 1.)

Lessons arranges the genus *Hyæna* under his third section of the tribe of Digitigrades, which section consists of those genera which are without a small tooth behind the great canine of the lower jaw. Its situation is between *Proteles* and the *Cat* (*Felis*), and three species are recorded, the same as those mentioned by Cuvier, but two of them with different names: thus, the Spotted Hyæna is termed *Hyæna Capensis*, Domm., and the Brown Hyæna, or *Hyæna brunnae*, is named *Hyæna rufa*, G. Cuv.

Geographical Distribution of the Genus.—Entirely confined to the Old World, Africa and Asia.

Species.

*Striped Hyæna.*—Before we proceed to the synonyms of this animal among modern zoologists, we must inquire into its history, as it was current among the ancients. It seems uncertain whether this animal alluded to in the Bible. Some translate the words rendered in our copies of the Holy Scriptures, *the valley of Zeboim* (1 Sam. xii. 18; Nehem. xii. 34) as ‘the valley of Hyæna;’ and the Seventy render the words given by the English translators as ‘a speckled bird,’ and ‘a bird of divers colours’ (Jér. xii. 9), as ‘the cave of the Hyæna,’ εὐθάναυς βάτες, while others would substitute one of the Hebrew letters composing the word in Samuel for another, and make the reading ripers, as if certain streaked serpents were meant. Bochart, and Scheuchzer seems to agree with him, shows that by the Tashbun, or Tashbo, the word occurring in the ninth verse of the twelfth chapter of Jeremiah, the Hyæna was intended, and, if this opinion be correct, there can be little doubt that ‘the valley of Zeboim’ means ‘the valley of Hyænas.’

*Duba* and *Duba* are, it appears, Arabic names for this species.

Whatever may be the opinions as to the Spotted Hyæna being alluded to in those passages of Scripture which we have quoted, there can be no doubt that the most monstrous fables were rife respecting this animal, and the extent to which they had reached may be supposed when we find Aristotel (Hist. Anim. vii. 32; viii. 5) and the Greeks. The most monstrous fables were rife respecting this animal, and the extent to which they had reached may be supposed when we find Aristotle (Hist. Anim. vii. 32) and Theophrastus (History of Plants, vii. 10) taking pains to demonstrate the absurdity of the assertion that the animal was bisexual, or a true hermaphrodite. He declares that the genital parts of the male resemble those of the wolf and dog, and that the part which had been taken for the female organ is

* From a skull in the Royal College of Surgeons.
an opening with an imperforate bottom placed under the tail. This, as we have seen, is characteristic of the genus Hyaena. Aristotle describes the parts with great minuteness; but notwithstanding his accuracy, we find Pliny (viii. 30, and xxviii. 8), and Aelian (i. 25, and vi. 14), stating not only that the Hyena is bisexual, but that it changes the sex, being a male one year, and a female another. It is true that Pliny, in the passage first quoted, after stating—'Hyæna utramque esse naturam, et alternis annis mares, alternis feminas fieri, parere sive mare, vulgos credi'—adds, 'Aristoteles negat ut ille, qui ...' and continues in such a strain, in both the books quoted, that his authority has been cited in support of these and other absurdities. Thus we are told that magicians looked on it with the greatest admiration, as possessing the magical power of alluring men.

It would be a waste of time and space to enumerate all the wonderful powers that were attributed to it; but among other accomplishments it was said to imitate the language of men, in order to draw to it sheepfolds where it devoured at leisure, and to have the power of charming dogs so that they became dumb.

The animal does not seem to have made a part of the Roman shows till a comparatively late period. The third Gordian appears to have been the first who so introduced it: ten are said to have made their appearance at the games given by the emperor Philip, about a.d. 247.

The naturalists regard the two fables of the antelopes. Even Belon, who was a good observer, gives 'Le portrait de la Cive, qu'on nommoit anciennement Hyena.' This figure is by no means bad for the time, and appears in the 'Quarto' of Serre's, 'Animaux, &c., &c.' is the following quarrain:

'Voyant oyez, ta voie de la Cive
Le vrai portrait: qu'el redoutait un moment
Par tout conduis le mazure, pour extremement
Dit gentil, que plus a scrire on sombrairement.'

And this is the more curious when we find the same author (Aquat.) giving a very fine cut of the Striped Hyena (which Gesner, Aldrovandus, and Jonston copied) as the sea-wolf, an amphibious animal, satiating itself with fish, and seen in the shore of the British Ocean.

This form and Hyena of the antelopes is the Canis Hyena of Linneaus; *Hyaena striata* of Zimmerman; *H. vulgaria* of Desmarest; and *H. antiquorum* of Temminck.

*Description.*—Bouc, colour uniform, brownish-grey, rather darker above than beneath. Sides marked by several irregular, distant, transverse, blackish stripes or bands, which are more distinct on the lower part. Towards the shoulders and haunches these stripes become oblique, and they are arranged in regular transverse series on the outside of the legs. Front of the neck, muzzle, and outsides of the ears black; the latter broad, moderately long, and nearly destitute of hairs, especially on the inside. Hairs of the body long, particularly on the back; the neck is on the spine, where it forms a full and thick mane, which may be said to be continued even upon the tail, the latter being furnished with strong tufted hairs of considerable length. Mane and tail both marked with blackish spots or stripes, variously and irregularly placed. Individuals vary much in colour and markings. (Bennett.)

*Food, Habits, &c.*—Pennant notices the propensity of this species to violate the repositories of the dead, and greedily devour the putrid contents of the grave. He also states that it preys on the herds and flocks; but adds, on the authority of Shaw (Travels), that for want of other food it will eat the roots of plants, and that it will feed on the tender shoots of palms. He speaks of it as an unsocial animal, solitary, and inhabiting the chains of the rocks, and says (also on the authority of Shaw), that the superstitious Arabs, when they kill one, carefully bury the head, lest it should be applied to magical purposes; as the neck was of old by the Thessalian sorcerers—

*Vivere non Lyncea, non dire moles Hymena Defoci.*

*Nor entraile of the spotted Lynx she lacks, Nor busy joints from tall Hymena's back.*

After referring to the wild opinions on the antelopes on this subject, he remarks, that it is no wonder that an ignorant Arab should attribute to its remains preternatural powers.

*They are,* continues Pennant, *cruel, fierce, and untameable animals, with a most malvolent aspect; have a sort of obstinate courage, which will make them face stronger quadrupeds than themselves.* Kämpfer relates that he saw one which had put two lions to flight, regarding them with the utmost coolness.' (Symposiæ Quadr.)

This is a somewhat extraordinary translation of a passage in the second fasciculus of Kämpfer's Amorimatis Exotica, where he relates that he went to see a male Hyaena (Kaf- toar), which a certain rich Gabr, or fireworshipper, kept as a curiosity, the animal having been taken when a sucking. It was muzzled by means of a rope fastened round its jaws, led out, and the rope lengthened so as to enable the animal to run more freely; and Kämpfer goes on to say, 'Narrabant Gabri, sic frumentum nuper se opposide duobus leonibus, quos, adeptamque serenitatis, in fugam vererit.' Kämpfer gives a figure which, though rude, cannot be mistaken for any animal but a striped Hyæna. Pennant seems to have been aware of his misconstruction, for afterwards, in his 'History of Quadrupeds,' he stops at 'put two lions to flight,' omitting 'regarding them with the utmost coolness.'

In the last-mentioned work Pennant remarks, that I will venture near towns; and quotes Niebuhr as authority that it will, about Gabrun, in the season when the inwa bitants sleep in the open air, snatch away children from the sides of their parents.

It has been the custom, among other fabulous assertions, to state that the Hyena is not to be tamed; now, as Mr. Bennett observes in the 'Tower Menagerie,' there is scarcely any animal that submits with greater facility to the control of man. He speaks of the docility and attachment to his keepers manifested by the Striped Hyena, especially when it was allowed a certain degree of liberty, which the animal shews no disposition to abuse, though those which are carried about from fair to fair in close caravans are surly and dangerous from irritation and ill treatment. The individual which Mr. Bennett figures was remarkably tame, and confined in the same den with one of the American bears. (B. Z. v. 4, p. 87.) Col. Sykes (Proc. Zool. Soc., 1830—31) remarks, that this species, Turris of the Maharattes, is numerous in Dakkhan (Doeman), and susceptible of the same domestication as a dog.

*Locality.*—Asia, and Northern and Central Africa, the mountains of Caucasus, and the Atlas chain, Asiatic Turkey, Persia, Barbary, and Senegal, and even as low as the Cape. (Pennant, but see post. p. 376.) There are three living specimens (1838) in the gardens of the Zoological Society at the Regent's Park. The locality of one is marked Asia and Africa, of another North Africa, and of the third Asia.

Spotted Hyena.——This species is the Tiger-wolf of the colonists at the Cape; *Canis Crocuta* of Erxleben and Gmelin; *Hyaena Crocuta* of Zimmerman; *Hyaena Capensis* of Desmarest. Gesner has a figure of this species devouring a dog; and the spotted Zillo Hyaena of Jonston appears to owe its origin to the same animal.

*Description.*—Cuvier remarks that this and the preceding Hyena are entirely distinct specifically, notwithstanding they resemble both externally and in the skeleton. The Spotted Hyaena has, he observes, no mane on the back, and instead of stripes has only round

The king of Persia, apparently.
or black spots more or less scattered. He states that the last lower molar in the Spotted Hyena is simply compressed and bilobed with a heel or process behind, whilst the Striped Hyena has in addition a particular tubercle on the internal surface of its posterior lobe; there are also other differences seldom noted, which the reader will find pointed out in the 'Ossemens Fossilium'.

Size rather less than that of the Striped Hyena. Muzzle short, but not so abruptly truncated. Ears short and broad, nearly round in outline. The yellowish-brown, the toe-body covered with numerous spots of a deeper brown, tolerably uniform in size, but sometimes not very distinctly marked, and occasionally arranged in longitudinal rows. Hair of blackish-brown. Tail longer on the neck and in the central line of the back than elsewhere, it does not form so distinct and well furnished a mane as that of the Striped Hyena. Tail blackish-brown, covered with long bushy hair. (Bennett.)

Locality.—Southern Africa, and especially the neighbourhood of the Cape of Good Hope. Lesson and others say that it is found even as high as Barbary: quaere tamen. Ludolf in his 'Ethiopia,' or rather the translator (i. 10), says: 'The Hyena, or the Crocuta, near akin to the Wolfe, is the most voracious of their wild beasts: for she not only by night and by stealth, but openly and in the daytime, preys upon all she meets with, men or cattle: rather than find them in a stable, and stable. Gregory described her to be speckled with black and white spots.'

To this is appended the following note:—'Begot between a Hyena and a Lioness: familiar to Ethiopia. See Sylvarum: L. 5, 6, 151.' A case is also noted of speckled men in the gardens of the Zoological Society, at the Regent's Park, with 'South Africa' on the label.

Food, Habits, &c.—Numerous are the writers who have treated of the habits of this destructive animal. Le Vaillant, Sparmann, and other travellers give very interesting accounts of its manners; but we select the statement made in the first catalogue of the African Museum (where it is named as the Spotted Hyena). This has lately been dis- persed, because we think that the statement carries internal evidence of its having proceeded from the pen of the eminent and accurate zoologist under whose zealous superintendence that catalogue has been revised and drawn up, then, states that there are two species of Hyena in South Africa, and that the Spotted Hyena, or Tiger-Wolf of the colonists, is more numerous and more widely diffused than the other species, which has the name of the Sand, or Coast Wolf, and is also more voracious and destructive, not only devouring such animals as it chances to find dead, but also carrying off the smaller ones from the pens of the farmers during the night, and often succeeding in killing or mutilating some of the larger kinds of domestic animals. Since animals which feed on carrion are always more important than those which feed on live creatures, and which lastly枕induce him from attacks which might be successful if made. So anxious is he for the flight of the animals, as a preliminary to his attack, that he uses all the grimmace and threatening he can command to induce them to run, and never dares to attack them unless they do so. The character of this Hyena, continues the author, makes his destruction an object of no small importance to the farmers, whose ingenuous purses for him call forth a marvellous cunning and dexterity on the part of the animal to render them of no avail. The more common methods employed against beasts of prey, such as spring-guns, traps, &c., do not succeed, as he is said to be very quick in his movements; but he minutely examines every object that presents itself to his notice with which he is not perfectly familiar; and if he see reason to suspect that it can injure him, he will turn back and make his way in an opposite direction. Thus cords or leather thongs, which are often laid across the footpaths the Hyena is accustomed to travel upon, and which are attached to the triggers of loaded guns, with the design of frightening him, and thus charging the gun in his direction, are very carefully examined by him, and the usual result of his examination is his deciding against trusting himself in contact with them. The Hyena is then manifestly made to appear hostile, or as if he very rarely attempt his destruction by this means, but occasionally succeed by substituting for cords the delicate stems of creeping plants, which are regarded by him without suspicion until he has actually suffered through them. Many other ingenious methods, suggested by the necessity of the case, have been adopted by the farmers for the destruction of Hyenas; but a description of them, though elsewhere desirable, would here be out of place. This species seldom moves abroad during the day, but passes that period in a state of repose, either in holes in the ground, or in retired situations densely covered with bushes. Night is his favourite season for seeking his food; and towards nightfall he begins a noise which is very powerful in announcing to the various animals the approach of their voracious enemy, and thus enabling many of them to escape his wiles. The propensity this beast has for howling seems therefore to be a mode of trying to have his enemies convinced that he has not been alarmed. This continuous noise is not intended to put the animals upon which he preys upon their guard, its actual purpose is scarcely conceivable. Some have surmised it to be his call to creatures of his own species; but that this is not the case is certain from the fact that Hyenas are heard to utter their supposed call even while separating from each other farther and farther as each cry is uttered; in addition to which it may be remarked that it is contrary to the habit of this animal to hunt in company, or even to congregate in large numbers, save when assembled by the temptation of an abundance of carrion. A still further proof that the Hyena's cry is not a friendly call to his own species may perhaps be seen in the fact that a dead animal has been found in a dead animal they cease to utter their melancholy howl, as if in fear of calling participants of their feast.

It appears from the above interesting account that the Spotted, Hyena, or Tiger-Wolf, is a beast of such a nature as to threaten one to run; in other words, his plan of attack is founded upon intimidation. May not his bows be intended to inspire terror and shake the nerves of the animals within hearing of the doleful nocturnal sounds?

'Till lately,' adds the author in conclusion, 'Hyenas were in the habit of paying nightly visits to the streets of Cape Town, and were regarded as pests. They would not, however, eat away the animal refuse, which might otherwise have been disagreeable. This however no longer occurs, partly perhaps from better regulations now existing in the town, and partly from the Hyenas having been removed to the Caffres. The Caffres are very numerous and daring, generally approaching the villages during the night, and attempting, either by strength or stratagem, to pass the wattle by which the houses are defended. If they are defeated, they at least make themselves tolerably useful, and are glad to enter the houses, which they sometimes accomplish, in which case they not unfrequently carry off some young child of the family. Scars and marks on various parts of the body often testify to the traveller how dangerous a fate these animals have been to some.'

Mr. Steedman, in his 'Wanderings and Adventures in the Interior of Southern Africa,' gives most appalling accounts of the rapacity of the Spotted Hyena. He states that Mr. Shepherson, in a letter from Mamboland, relates that the nightly attacks of wolves, as the Hyenas are generally called, have been very destructive amongst the children and youth; for within a few months not fewer than forty instances came to his knowledge wherein those beasts had made a most dreadful havoc. 'To show clearly,' says that gentleman, 'the preference of the wolf (Spotted Hyena) for human flesh, it will be necessary to notice that when the Mandinka, (Caraboo) wanderers, like bee-hives, and tolerably large, often eighteen or twenty feet in diameter, the floor is raised at the higher or back part of the house, until within three or four feet of the front, where the doors are placed. The natives always live with the fire at their feet; but notwithstanding this, the constant practice of this animal has been in every instance to pass by the calves in the area, and even to paw the fire, and thus get near the horns of the animals, and then running back, and this in such a gentle and cautious manner, that the poor parent had been unconscious of her loss until the cries of her little innocent have reached her from without

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when a close prisoner in the jaws of the monster. Mr. Shepstone then particularizes two instances within his own knowledge, one of a boy about ten years of age, and the other of a little girl about eight, who had been carried off by this species, and wretchedly mangled, but recovered by the attention of Mr. Shepstone and his friends. Notwithstanding this ferocity, the Spotted Hyena has, it is stated, been domiciled in the houses of the peasantry, "among whom," says Mr. Bennett, "he is preferred to the dog himself for attachment to his master, for general sagacity, and even, it is said, for his qualifications for the chase."

**Spotted Hyena.**

*Hyena villosa.*—In a letter read to the Zoological Society of London (April 9, 1833, "Zool. Proc."), Dr. Andrew Smith, so well known for his enterprising character, and the additions which he is making to our knowledge of the zoology of Southern Africa, stated his belief that the Striped Hyena does not inhabit South Africa; its place being occupied by the *Hyena villosa* of Africa, a young, considerable resemblance to that species. *Hyena villosa* was first described by Dr. Smith in the "Transactions of the Linnean Society." This animal is considered by Cuvier as identical with *Hyena brunnea* (of Thunberg), which is quoted by M. Levaillant as *Hyena rufa*, of Cuvier. The following are the dimensions of a specimen in Mr. Steedman's collection:

- From the nose to the root of the tail: 2 ft. 7 in.
- Height at the shoulder: 2 ft. 4 in.
- Crest (height of head between the ears, when erect): 1 ft. 10 in.
- Length of head from nose to occiput: 1 ft. 9 in.
- Length of the ear: 1 ft. 4 in.
- Length of the tail to the extremity of the vertebrae with hole: 1 ft. 2 in.

The hair is described as remarkably long, coarse, and shaggy over the whole body of the animal; whilst on the head, ears, and extremities alone it is short and crisp. Its length on the back and sides is eight or ten inches, and it does not form a long mane on the spine, as is the case with the common Striped Hyena. The general colour of the hair is light brown, is grizzled brown from the long hairs being greyish at the roots and brown at the points, marked on the sides and hips with large but rather indistinct transverse bands of a deep vinous brown colour. The legs, particularly those before, which, as in other Hyenas, are much longer than those behind, are marked with transverse black bands much more distinct and apparent than those on the body. The upper lip is furnished with remarkably long, bristly, black moustaches, and the tail, which is thickly covered with long hair, and of greater length than in the common Hyena, is uniform dark brown. The fore-arms and thighs are darker than other parts of the animal, and a large collar of dirty yellowish white surrounds the neck and extends up the sides of the neck, occupying the entire space between the setting on of the head and shoulders. Under each eye is a large irregular black patch; the chin is black also, and a narrow band of the same colour marks the junction of the head and neck, bordered by the dirty white collar above mentioned. The ears are large, erect, and rather pointed. The individual was aged, all the teeth being much worn; the two exterior incisors were much larger than the others, and had the form and size of small canines. A young one, nineteen inches in length, also in Mr. Steedman's collection, exhibited all the general characters of the aged specimen, excepting that the hair was shorter and more woolly. (Steedman.)

**Locality.**—The sea-coast throughout the whole extent of Southern Africa, but by no means so common as the Spotted Hyena. The young specimen mentioned above was obtained alive with two others in the neighbourhood of the Nieuweld Mountains, a considerable distance in the interior of the country, which shows, as Mr. Steedman observes, that the species is not so strictly confined to the vicinity of the sea, as its habits, as the *Wolvie* would imply, or as the accounts of travellers would lead us to imagine.

**Food, Habits, &c.**—The Striped Wolf devours carrion and such dead animal substances, whales for instance, as the sea casts up; but when pressed by hunger its habits seem to resemble those of the other species, for it then commits serious depredations on the flocks and herds of the colonists, who hold its incursions in great dread. Mr. Steedman, who states this, says that he saw a very fine specimen, which had been shot by a farmer residing in the vicinity of Blouberg, and was informed that it had destroyed three large calves belonging to the farmer. He adds, that it is said to be a remarkably cunning animal, retiring to a considerable distance from the scene of its depredations to elude pursuit, and concealing itself during the day time in the mountains, or in the thick bush, which extends in large patches throughout the sandy district in which it is usually found.

**Spotted Hyena.**

*Hyena villosa.*

**Fossil Hyenas.**

Fossil Hyenas occur abundantly in the third period of the tertiary deposits (Pliocene of Lyell), especially in the ossified caverns. Dr. Buckland's fossils show, in particular, should be referred to by the student for the history of these extinct species and the bones collected by them in the caves of Kirkdale, Kent's Hole, &c., but particularly the former. He also in the same most interesting and well illustrated work gives the following localities for the remains of Hyenas in caves or fissures:—Kirkdale, Plymouth, Crawley rocks near Swansea, Pavillion caves near Swansea, district of Muggherduf, district of the Harz, Fouten in France, Sundwick in Westphalia, and Köstroiz near Leipzig. Those found in the superficial loam or gravel are stated to have occurred at Lawford near Rugby, at Herzberg, and Ostende, Canstadi near Stutgard, Eschstadt in Bavaria, and the Val d'Arno near Florence. The student should also consult the works of Simmerring, Schlotheim, Rosenmüller, Blumenbach, Cuvier, M. de Serres, Christol and Bravard, Croizet and Jolbert, Guildfuss, &c. The fossil species named are *Hyena spelaea*, Goldf.; *Hyena spelaeus* major, Goldf.; *Hyena pricca* (Hyena raggé fossile), M. de Serres; *Hyena intermedia*, M. de Serres; *Hyena Pericon*, Brav., Croiz., and Job.; *Hyena Arcmemus*, Brav., Croiz., and Job.; *Hyena dana*, Brav., Croiz., and Job. Captain Mudge found the remains of *Hyena* in the ossiferous cavern of Yealm Bridge, six miles south-east from Plymouth, among those of other animals, several of whose bones were split, chipped, and gnawed. (Geol. Proc. 1836.)

**HYÆNA-DOG.** This quadruped, which in size and form is smaller and more slender than either the Hyena or the Wolf, is the Wild Dog of the settlers at the Cape. M. Temminck first described it as a Hyena (*Hyena spica*), but subsequently regarded it as a species of dog. Desmarest considered it a species of Canis, and recorded it as *Canis pictus.* Brockles gave it the generic designation of *Lycodon*; and Fischer, in his "Addenda et Emendanda," quotes it as *Canis Lycodon*, and in his "Index Nominalium,"
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refers to it as Lycos tricolor of Brookes. Cuvier places it among the dogs.

In the number and form of its teeth the Hyena-Dog agrees with the dogs, as well as in its general osteological structure, which presents a remarkable difference from that of the Hyenas. Externally it is distinguishable from both the Hyenas and Dogs in the proportional length of its legs and the form and proportions of the body. There is no mane as in the Hyenas, and the tail resembles that of some dogs. The head is Hyena-like, and, like the Hyenas, it has only four toes to each foot.

Description.—Colour reddish or yellowish-brown, variegated in large patches along the sides of the body and on the legs, with black and white intermixed. Nose and muzzle black, with a strong black line passing from them up the centre of the forehead to between the ears, which are very large, black within and without, and furnished with a broad and expanded tuft of long whitish hairs arising from their anterior margin and filling up a considerable part of their concavity. Beneath each of the eyes a lighter patch. Tail moderate, covered with long bushy hair, and divided in the middle by a ring of black, below which it is nearly white, as are also the fore parts of the legs below the joint. Mr. Bennett, who thus describes the animal, had an opportunity of seeing a living specimen in the London Zoological Gardens; but he observes that their colours and markings are subject to variation in different individuals, though their general disposition and appearance are similar.

Locality. South Africa: troublesome at the frontier settlements, often destroying the young animals, and frequently being killed by them.

Habits. — Mr. Burchell, who brought to this country the first specimen and pointed out the distinguishing characters, describing it under the name of Hyena venatica, states that it hunts in packs, at night by procuring, but frequently in the day. He describes it as swift, fierce, and active, so that only those animals which are gifted with great fleetness can escape from it. It attacks sheep openly and fearlessly; it approaches oxen and horses with caution, and advancing upon them, by stealth, biding the tails of the oxen, and injuring the horses, especially young colts, so severely that they rarely survive.

Mr. Burchell’s specimen continued, however, though he kept it caged in his stable-yard for more than a year, and the man who fed it ‘dared never to venture his hand upon it.’ It however became familiar with a dog, its companion. The Tower-specimen arrived with a young Cape Lion, with which it agreed perfectly till the lion became too strong and rough in its play, when the Hyena-Dog was associated with a Striped Hyena and two Spotted Hyenas, and all lived tolerably well together in the same den.

Mr. Swainson gives the name of Proteles as the English synonym of Proteles. [Aard-Wolf.] The animal which is the subject of this article he describes under the name of Lycos, the Hunting Dog. He arranges both under the family Felidae, where they had been previously placed by Mr. Gray, who makes Proteles a genus of his subfamily Hyenina, and Lycos a genus of his subfamily Canina.

HYALÆDA, a family of Pteropoda according to the systems of Lamarck and Cuvier, but belonging to the family Thecosomatæ (order Apororhachia) of De Blainville.

M. Rang, in his Tableau Méthodique, follows De Férussac in making the Hyalidae a family, and enumerates the following genera as composing it: Cymbulia, Linacina, Hyalana, Cleora, Cuviera, Eutribus, and Pygache.

Definition of the Family. — Animal furnished with a head, but it is not distinct, with a third natatory membrane smaller and intermediate at the ventral part; mouth situated at the bottom of a cavity formed by the union of the locomotive organs, and presents a remnant from that side a third smaller lobe, which is three-pointed. The mouth with two small tentacula is placed between the wings, towards the shut side of the shell, and above two small eyes and the orifice of generation, whence issue an intense massive organ in the form of a small proboscis (trumpet). The transparency of the texture permits the observer to distinguish the heart, the brain, and the visera through the envelopes.

M. Rang gives the following Generic Character.

Animal oblong, gelatinous, transparent, furnished with two eyes? two tentacles? and a mouth in the form of a proboscis (trumpet)? Two lateral fins, which are large and rounded, carry the vascular net of the branches; they are united at their base, on the posterior side, by an intermediate appendage in form of an elongated lobe.

Shell gelatinous-cartilaginous, oblong, in the form of a slipper, entirely covered with a delicate and hardly visible membrane, with a superior opening, long and truncated at one of its extremities.

M. Rang further observes that this curious and very incompletely known genus only contains a single species, which is found in the Mediterranean seas; and he adds that he only knows it by a drawing communicated to him by Cuvier, who remarks (Règne Animal) that in the figure given by M. de Blainville (Mammalogie, xliv. 3) the animal is placed in the shell the wrong way (‘en sens contraire du véritable’), and that his (Cuvier’s) description rests on recent and repeated observations made by M. Laurent. M. Deshayes confirms this remark as to the inverse position of the animal, noting that he has had occasion to verify it often. The following is a copy of the figure given by M. Rang in his Tableau.

Cymbulia.

The following is Mr. G. B. Sowerby’s representation of Cymbulia (Genera, No. 39).

Figures. 1, the intermediate lobes; 2, the visera; 3, the shell, seen from above; 4, the animal, seen from above; 5, the shell, seen obliquely; 6, the visera, seen from below.

Cymbulia.
M. Rang, as we have seen, states (1829) that there is but one species. M. Deshayes, in his edition of Lamarck (1836), enumerates five. The species known to M. Rang must have been *Cymbulia Peronii*.

**Limacina. (Spiraletta, De Bl.)**

**Animal** elongated anteriorly, turned into a spiral form behind; branchiae in the form of plouts on the back; mouth furnished with two small appendages, which are united by one of their extremities to the anterior lobe; the other, which is twisted spirally ("contournée en spirale"), and is lodged in a very delicate shell, of one whorl and a half, umbilicated on one side and flattened on the other. Cuvier adds that the animal uses its shell as a boat and its wings as oars when it would swim on the surface of the sea. The same author remarks, that the only species, *Cito baticina* of *Spiraletta*, has in fact much analogy with the *Cleodora* of the icy sea than *Choco bolaria* [Clio], and is considered as one of the principal aliments of the whale. He observes that he does not know whether the animal figured by Mr. Scoreby, of which M. de Blainville (Mollusques, pl. xviii. bis, f. 5), makes his genus *Spiraletta*, is, in reality, as M. de Blainville believes, the same animal with that of Phipps and Fabricius. M. Rang considers *Spiraletta* of De Blainville as synonymous with *Limacina*, of which M. Rang states that but one species is known, and says that it would be interesting to have new accounts of it. He speaks of its inhabiting the North Sea, its prodigious abundance, and the possibility of the species as food for the whales. Phipps mentions it as being found in innumerable quantities in the Arctic seas, and describes its body as of the size of a pea, rolled up into a spire like a *Helix*, and its oval, oblique, and greater than the sides, branchial opening from those branchial openings taken from the figure of M. de Blainville, who founds his genus (which he places under his family of *Pteropoda*, between *Atlanticia* and *Argonutia*) on the materials furnished by Mr. Scoreby, and considers his *Spiraletta* as synonymous with Cuvier's *Limacina*.

**Spiraletta Limacina of De Blainville.**

Mr. G. B. Sowerby figures a *Limacina* (in his *Genera of Recent and Fossil Shells,* and in the same number as that which contained the *Spiraletta*) from Mr. Scoreby (from Mr. Scoreby) as a thin, fragile, spiral, discoid shell, umbilicated on both sides, and carinated on the back and below, with a membranaceous lamellar keel, and he says that it has externally much the appearance of a very diminutive umbilicated *Nautilus*.

M. Deshayes, in his edition of Lamarck, remarks that the *Limacina*, of which M. de Blainville formed his genus *Spiraletta*, has in fact much analogy with the *Cleodora* and that they are *Cleodora* whose shell is spiral, and not swimming gastropods, like the *Corinariae* and *Atlanticia*. M. Deshayes goes on to state that he has many individuals preserved in spirit, which he owes to the generosity of Dr. Fleming, that he has examined them with attention, and that they have not the projecting foot of *Atlanticia* nor a fin-like foot, but two lateral fins of the form of those of the *Cleodora*. He adds that they have no tentacles, and no eyes, but a mouth in the shape of a triangular slit at the summit of the angle which forms the fins. The mouth is not closed by an operculum as that of *Atlanticia* is. The anus and the organs of generation have an opening on the right side, below the fin and at its base. M. Deshayes is of opinion that the genus ought to remain among the *Pteropods*, where it was placed by Cuvier and Lamarck.

**Hyalea.**

**Animal** globular or oblong, furnished with two lateral expansions more or less elongated backwards; the intermediate lobe of a dimicircular form; two very short tentacles, hardly distinct, contained in a cylindrical sheath; the aperture of the mouth provided with two labial appendages; orifice of the anus at the right side of the mantle; that of the male organ in front and within the right tentacle; that of the female organ on the same side, at the point of separation of the two parts of the body; branchiae pectinated, on each side, in a particular cavity.

**Shell** horny or vitreous, transparent, and fragile, in form of a slipped, smooth or recurved, with an angular swelling, and split laterally, tricuspidated backwards. (Rang.)

M. Rang remarks that this beautiful and interesting genus, the anatomy of which has been made known by M. Curvier and De Blainville, is perfectly distinct from which approach it. He speaks of the *Hyalea* as very small animals, spread over all the seas of the torrid zone and a great part of those of the temperate zones, and of the occurrence of the same species on the most opposite points of the globe. He adds that the discovery which he had made of many species, one in a fossil state, had caused him to divide the *Hyalea* into the following two groups:

1. **Globulose.**

**Shell** subglobular, having the lateral slits nearly as long as itself, and the appendages placed very much backward. *Hyalea uncinata* &c. This group, he says, is the most numerous.

2. **Elongate.**

**Shell** elongated, having the lateral slits short and the appendages advanced. *Hyalea tridens*, &c.

He states that, at the time he wrote, five species completed the group, and gives the following figure of a *Hyalea*.

![Hyalea](image)

*Hyalea.*

a. fin; b. intermediate lobe; c. mouth; d. lateral expansions of the mantle; e. vienues; f. the shell.†

Curvier describes *Hyalea* as having two great wings, no tentacles, a mantle slit at the sides, the extremities of the branchial point in the bottom of the fissures, and covered by a shell equally slit at the sides, the ventral surface of which is very convex, the dorsal flat and longer than the other, and the transverse lines are covered with small, pointed or pointed dentinations. In the living state, the animal projects by the lateral slits of the shell; filaments more or less long, which are productions of the mantle. Curvier concludes by observing that the species most known (*Amoria tridens*, Forskål; *Cavolina natans*, Abildgaard; *Hyalea cornea* (*tridens*, Lamarck) has a small yellowish demitranparent shell, which is found in the Mediterranean Sea and in the ocean.

M. de Blainville, who has published a monograph of this genus in the *Journal de Physique,* and in the *Dictionnaire des Sciences Naturelles*, states, that it contains already (1825) from five to six species, all of which appear to be the inhabitants of warm climates. He considers the genus *Glandulosa* of De Montfort as belonging to the *Hyalea*, and quotes the observation of M. Defrance to that effect with approbation.

M. Deshayes, in his edition of Lamarck (1834), observes, that in the comparison which the latter makes of the *Hyalea* with the conchifers, he had remarked, that they approach closely to the conchifers; and he adds that he had found it proper to place the *Hyalea* at the head of the mollusks. Lamarck had suffered himself to be seduced by an analogy rather apparent than real. It is not with the lamellibranchiate conchifers, continues M. Deshayes, that the *Hyalea* should be compared, but with the brachiopods, an inferior class of animals [*Brachiopoda*, vol. v.]; for the *Hyalea* and the brachiopods are placed in the shell in the same way. We
find, he observes, in the _Hyalaea_ the two valves of the _Terebratula _soldered together; and, in becoming free, the animal has closed the umbo of the great valve, and the shell has left a passage always open for the ciliated appendages, changed into locomotive organs. This comparison, says M. Deshayes, would appear sufficiently just, and yet it is not. Upon the examination of the two groups, we are soon convinced of their dissimilarity in all the essential parts of their organization. To this we beg to add, that it will be probably difficult to establish any essential difference in the organization of the two groups, except upon the higher development of the nervous system, and the presence of a head in _Hyalaea_. M. Deshayes enumerates sixteen recent species, exclusive of _Hyalaea curtipedata_, which, he says, is not a true _Hyalaea_, as Bose, De Roissy, and Lamarck believe. MM. Rang, D'Orbigny, Lesueur, and Quoy and Gaimard, have principally contributed to the number of species.

This is the _Anomia tridentata_ of Forstkal, Gmelin, and Dillyn; _Hyalaea popolinae_ of Bory de St. Vincent; _Hy andria curtiperta_ of M. Deshayes known to M. Lamarck's synonym with a query—_Monoculus telemus_? Lin. _Locality._ Mediterranean, and the seas of warm climates. The size scarcely reaches that of a small hazel-nut.

**Cleodora.**

Cuvier remarks, that the _Cleodora_, for which Brown originally founded the genus _Clio_, appear analogous to the _Hyalaea_, in the similarity of their wings and the absence, or tentacles between them: their conic or pyramidal shell, he adds, is not at the sides; and he quotes M. Rang's genera and subgenera.

M. Deshayes, in his edition of Lamarck, states, that the _Cleodora_ are much more allied to the _Hyalaea_ than the _Cliola_, approaching the former not only in having a shell, but also in the form of the animal, which bears a great resemblance to that of _Hyalaea_. It is not astonishing, proceeds M. Deshayes, to see Lamarck, who had approximated the _Cleodora_ to the _Clio_, indicate not very natural relations to the former; for, when he wrote, but a very small number of species were known, and he could hardly foresee that the sandiness of the researches of MM. Quoy and Gaimard, Rang and D'Orbigny, should have contributed to throw so much light on the Pteropods in general, and the _Hyalaea_ and _Cleodora_ in particular. If, when we have before us a sufficient number of species belonging to the two last-mentioned genera, we shall see them blend into each other so as to make it impossible to draw the line between them. It is thus, continues M. Deshayes, that we proceed by insensible degrees from the globular to the lanceolate species. A globular _Hyalaea_ seems formed of two unequal valves soldered together, leaving between them a principal anterior slit, and also lateral slits, sometimes without communication with the aperture, and sometimes forming the prolongation of this part. The posterior extremity is prolonged into a spine, which is ordinarily short, sometimes straight, and sometimes curved. Taking these species of _Hyalaea_ as the commencement of the genus, M. Deshayes points out the following alterations of their characters in the rest of the series. At first the posterior extremity is seen to be elongated, and, in this case, the two parts of the shell are flattened, become nearly equal, and, in some of the species there remains the trace of posterior lateral slits, for the most part these slits rise sufficiently to be in continuation of the aperture. This aperture is always transverse and narrow, as in the _Hyalaea_ properly so called. When the shells are thus elongated, some have their posterior extremity curved; others have it straight, as in the _Cleodora_. These last are elongated more and more, and in proportion as this elongation exists the aperture is enlarged, and the lateral slits progressively diminish, are reduced to simple indentations, and at last entirely disappear. These changes in the form of these shells are not, M. Deshayes observes, more extraordinary than those to which he has drawn attention in other groups, and principally in the cephalous mollusks. If, continues the same author, the animals coincide with these modifications in their external form, their internal organization offers but little alteration; and he cites the authority of MM. Quoy and Gaimard, who assert positively that the lanceolate _Cleodora_ differ in nothing essentially from the _Hyalaea_ properly so called. This M. Deshayes considers as the more important to him, inasmuch as he is thereby confirmed in the opinion which he had long entertained as to the analogy of the _Hyalaea_ and _Cleodora_.

The following is M. Rang's definition of _Cleodora_——

_Animal_ of an oblong or elongated form, furnished with an intermediate semicircular lobe, but having no lateral expansions; mantle open in front; branchiae and organs of generation incompletely known. _Shell_ fragile, vitreous, in form of a sheath or case (gaine on corne), more or less pointed posteriorly; aperture very large, nearly always without a slit, and without lateral appendages.

The same zoologist having, as he states, obtained many new species, and studied their organization, divides the genus into the following subgenera——

1. _Cleodora_ properly so called.

_Animal_ of an oblong form, having the mantle very much dilated and advanced on each side. _Shell_ pyramidal, angular, very much dilated anteriorly, with a very large aperture, carinated on each side, and rarely slit.

M. Rang makes this subgenus comprise (1829) five species, only two of which he considers as very doubtful. Type _Cleodora lanccolata_.

_Description._—Shell compressed, elongated, lanceolate; aperture dilated.

Locality. The seas of warm climates.

The following figure will convey a general idea of the form of the animal and shell.

**Cleodora pyramidata.**

a, animal and shell; b, shell, seen edge wise; c, shell, seen from above.

M. Deshayes, in his edition of Lamarck, records thirteen species, besides _Hyalaea curtipedata_.

2. _Creisa._ (Rang.)

_Animal_ very slender; the mantle not dilated on its sides; fins generally rather small.

Shell very slender, fragile, and diaphanous, in the form of a straight or curved case (corne), with an aperture almost always as large as the shell itself, and generally without a canal; no lateral appendages. M. Rang, who gives this description, says, that he formed this subgenus for some very small new mollusks, which he frequently met with in the middle of the ocean, and to which he gives, by a logo, the genera _Plagiostea_ of Daudin, and the _Gatinae_ of Mon.
tags, known in the fossil state; and M. Rang reckons nine species.

3 Tripter. (Quoy and Gaimard.)

* Animal oblong, fleshy, contractile, furnished with two small lateral fins, and surmounted by a membranous veil of the same form and size as they are.

Sheel diaphanous, vitreous, in form of a cylindrical sheath, rounded posteriorly, with a circular opening, horizontal and dentilated on its borders.

M. Rang observes that this genus is established on a single species, and that he is inclined to believe that the membranous veil described by MM. Quoy and Gaimard is nothing more than the intermediate lobe common to all the Petropods of the family of Hyaleidae, and he thinks that this subgenus should be united to the preceding.

Cuvieria.* (Rang.)

* Animal elongated, furnished with two rather large fins and with an intermediate semicircular lobe; the exterior branchio situated at the ventral part, and at the base of the intermediate lobe; organ of generation incompletely known; the mouth furnished with dentiform pieces proper for mastication.

Shell in form of a cylindrical case, rather flattened near its aperture, which is bordered with sharp edges; the side opposite to the aperture shut by a diaphragm which is convex externally, but not terminal, being surpassed by the walls of the cylinder.

M. Rang remarks that he established this curious genus on a species equally common in the Indian Sea, the ocean, and the South Sea.

Cuvieria.

a, fin; b, intermediate lobe; c, mouth; d, gills; e, visera, seen through the shell; f, ovaries; g, heart; h, shell; i, posterior cavity of the shell.

Euribia. (Rang.)

* Animal furnished with two horizontal fins, at the base of which is the mouth; the intermediate lobe is very small and of a triangular form; body globular, short; gills and organs of generation unknown.

Shell cartilagino-membranous, delicate, transparent, regular, and in form of a reversed cap (clavate).

M. Rang states that there is only a single species which he has not been able to observe sufficiently, but which presented well-defined generic characters.

† No Shell.

Psyche. (Rang.)

* Animal enveloped in a membranous mantle, furnished with two rather long fins, but which do not appear united on the ventral side by an intermediate lobe; branchial over-spreading the fins.

M. Rang established this genus on a species from the seas of Newfoundland (Terre-Neuve); he adds that M. Reynaud brought back from his Indian voyage some drawings of Petropods which appear to be referrible to it.

M. Deshayes (edit. of Lamarck, 1836) says that he is led to reject many genera proposed some years since by M. Rang, in the Annales des Sciences Naturelles as well as in his Manuel, under the name of Creta and Cuvieria. M. Deshayes observes that M. Rang has comprehended under his subgenus Cretes a living shell named Gadus by Montagu, and some other fossils placed by Lamarck in the genus Cretes (Cretes, vol. viii, p. 406). Although M. Deshayes is as yet uncertain of his opinions, he adopts the opinion of Lamarck as preferable, because, he says, M. Rang has contested it only on the supposition that they had been defined after the mutilation of their posterior extremity, which, being naturally short, only presented itself as open by accident. This view taken by M. Rang, he continues, is founded on any good reasons, and he believes that he has seen a sufficiently large number of individuals perfectly preserved, to be able to affirm that their posterior extremity was open when the animal was alive. These shells tell us the name of species in conclusion; they belong to the Petropods, and are more probably Dentalia. This opinion is a very strong one, and, coming from the quarter it does, is deserving of all respect: but as M. Rang has justly the reputation of being an observer in this department of natural history, we have thought it right to lay before the reader the descriptions and figures given by him.

FOSSIL HYALIDEAE.

M. Rang, as we have seen, mentions one fossil species of Hyalea, and Mr. G. B. Sowerby states that the genus occurs in a fossil state in Sicily. M. Rang notices the fossil analogue of Cletodora from Piedmont: if Vagnoli and Gaudin are to be considered as belonging to this family, they must be added. The last-mentioned author says that he has detected a fossil species of Cuvieria in the shell sand of Piedmont, where it had been collected by the elder De Luc. M. Denison, in his account of the shells of the Intermontane of Hyalea and three of Cletodora, tertiaries also; of the latter he records Cletodora lanceolata as a species found both living and fossil (tertiary).

HYALIA, a genus of brachyurous crustaceans belonging to the Maja family. (MALAC.)

HYBDODUS, a genus of fossil fishes placed in the order of Placodermia by M. Agassiz (Becheurs sur les Poissons, vol. iii., tab. 6, 185, 9, 10). The information which M. Agassiz has collected concerning this extinct group of fishes appears to be considerable, yet only in a few instances (from the lands of Argent and Brazil) has he been able to reconstruct the whole skeleton. In consequence, the spines and teeth of one species may be, and probably are, described under different specific names. The species of Hydrodonus are supposed to amount to two or more, and extend from the new red sandstone (grès bissar) to the chalk inclusive. They present analogies to the genus Squalus of Limnaeus, in the teeth and spiny rays; it appears that there were two dorsal fins, each having spiny rays, not differing more than in recent species of fishes with two spiny dorsal fins. (Agassiz, vol. iii.)

HYBRID. (MULE: and see, as far as Zoology is concerned, the different articles where Hybrids are noticed; CAMARO and HOKES, for instance.)

HYDATIDS (teretic, a vesicle, from υδατος, water). This name has been applied to various cyst-like productions, which are sometimes found in the bodies of men and animals.

The term hydatid is of the most indefinite application, for under this common denomination are included objects of the most dissimilar nature. In the first place, the term comprehends several species of ova, or parasitic animals, which have a distinct independent vitality; secondly, the simple unattached cysts which are frequently met with; and lastly, what have been called false hydatids, which are vesicular bodies, either entirely or partially connected with the tissues by which they are surrounded.

Hartmann in 1668 (Ephem. Nat. Curios., Ann. iv. dec. 2, obs. 73), and Tyson in 1649 (Philos. Trans., No. 193), first clearly observed that many of the bodies, or cyst-like tumours, called hydatids, were distinct living beings, or parasitic animals. They arrived at this conclusion from observing that they had no connection with the organs in which they were found, that some of them distended the parts in which they were located, and were also furnished with projecting processes or heads, having an orifice or mouth at their extremity. Morgagni and others have thought that some of the ancient medical writers, particularly Aretaeus and Galien, were acquainted with the true nature of these bodies; but nothing of the kind is clearly stated in their writings, though they often mention the occurrence of hydatids.

The discovery of Hartmann and Tyson was taken little notice of before the time of Limnaeus and Pallas, who pursued the investigation; since which time these beings have occupied the attention of many naturalists, among whom may be mentioned Hunter, Müller, Goethe, Curier, Lazzaro, and others. Including, probably, Cretes and Vagnolus.
and Rudolph, who have all admitted the animal existence of the greater part, if not the whole of them. Pallas arranged all the cystic entozoa, except the common globular hydatid, or scolycocyst, which was only considered as a simple cyst befire the time of Laennec, under the genus 'Tenia,' on account of the similarity of structure between their mouths and those of the tape-worm. In this classification he was followed by Goezoa. Cysticercus is the generic name of Rudolph (Ent.) has since shown that they cannot be all placed in one genus, but should be divided into several, as 'Cenurus,' 'Cysticercus,' &c., which together form the order Cysticercoidea. This order is divided into four families, as follows:—

Hydatids are found principally in the bodies of mammals; rarely in those of the lower orders of animals. They may occur in any part of the body, but are very seldom seen in the mucous cavities and passages, except when they have been discharged into them by the rupture of their containing cyst. This external sac, by which they are mostly surrounded, is generally attached to the tissue of the organ in which it is seated; it is frequently common to many hydatids, but each individual may have a distinct envelope, in the interior of which it floats, and to which it never contracts any adhesion. The fluid which fills the proper cyst of a hydatid is almost colourless and limpid. The liquid of the common cyst in which they float may present various appearances: sometimes it is quite limpid; at others it may be coloured. When formed in the liver it is often yellow.

Though these beings possess an independent existence, their life is connected with that of the body in which they are found; for if not removed immediately after the death of the parent animal, they can never be seen to move. The form of Hydatids varies according to the genus and species of Entozoa to which they belong; and they have been divided into two classes, Cephalocysts and Acrophalocysts. The latter consists of a simple bladder without any appendix: the former, a cyst with an appendix, is attached by one or more bodies or heads. When there is only one appendix, as in the cysticercus, it has been called a monophasocyst; when several heads or processes are attached to one terminal cyst, as in the Cenurus, the name of polycephalocyst has been applied.

The origin and mode of development of Hydatids are involved in the same obscurity as the production of all the other forms of cysts; but though first formed in an unknown manner, they are capable of reproducing their species, which, as no traces of organs of generation have been detected, probably takes place in all the genera by generation from a simple cyst, the reproductive power is spread over the whole surface of the cyst.

The principal genera of cystic entozoa, or true hydatids, are Cysticercus, Cenurus, and Echinococcus; to which may be added Acrophalocystis. For the characters by which the species are to be distinguished see Echinococcus. Seven species of Cysticercus are enumerated, but the most common are C. tenuissima, and C. cellulosus. The former (Tania hydatigena, Pallas; Hydatis globosa, Lamarck) is met with frequently in the peritoneum and pleura of ruminating animals and pigt. It is often generated in the disease of sheep called the rot, where another entozoa, the 'distoma,' or flute-worm, is met with in the ducts of the liver. The C. cellulosus (Tania cellulosus, v. Rana; Hydatis annae, Blum.) is found generally lodged in the tissue of the muscles between the fibres; it occurs sometimes in man, but more frequently in animals, particularly in the hog, where it causes a disease known as the 'springle.' The C. cellulosus is also very common in various parts of the brain of sheep, but most frequently in one of the lateral ventricles, where they occasion a kind of gingliness, in which the animal turns round and round internally or in a circular direction. This species is not uncommon in the German farmers' 'das Drehen,' by the French 'le Tournir,' and in England the sheep are said to be 'giddy,' or to have the 'staggers.'

When one large hydatid has occupied the middle part of the brain. In the first case one-half of the body is rendered partially paralytic from the pressure of the hydatid on the side of the brain, and the opposite muscles by their action turn the body round towards the unaffected side. In the latter form of the disease, Rudolph says that the equilibriums between the anterior and posterior muscles of the body is destroyed. The animal is made to spring up. Sometimes two hydatids are found in the brain, and occasionally as many as five or six have been met with. The internal surface of the ventricles is always smooth, and never contracts any adhesion to the cysts. This hydatid is sometimes found in the liver, gall-bladder, or omentum, the gall-bladder very thin and fibrous, and may be seen clearly to contract. The little worm-like bodies attached to it are scarcely half a line in length, and have the power of retracting themselves within the cyst. These bodies are most generally met with in sheep, cattle, and cattle, and their production, or that of the state of health which gives rise to them, seems owing principally to the effects of cold and damp, and misery pastureage, which also occasions the rot in sheep. The best treatment is removal to a dry and sheltered pastureage. In some cases sheep have been cured by the extraction of the hydatid by the operation of trepanning.

The hydatids belonging to the genus Echinococcus are not very well understood. They are considered by some as mere varieties of the Acrophalocystis. They are commonly called granules or edema, and are derived from the cells of granules minute particles which float in the fluid of the cyst, or adhere to its wall. Two species of Echinococcus have been particularly described: one, called E. hominis, has been met with in the brain and abdomen of man in a few instances; the other, E. vermiculosus, occurs more frequently in the hog and other animals.

The Acrophalocystis, or common globular hydatid, to which it is thought by some that the name of hydatid should be restricted, is a small cyst formed from the cysts of granules or minute particles which float in the fluid of the cyst or adhere to its wall. Two species of Echinococcus have been particularly described: one, called E. hominis, has been met with in the brain and abdomen of man in a few instances; the other, E. vermiculosus, occurs more frequently in the hog and other animals. The Acrophalocystis, or common globular hydatid, to which it is thought by some that the name of hydatid should be restricted, is a small cyst formed from the cysts of granules or minute particles which float in the fluid of the cyst, or adhere to its wall. Two species of Echinococcus have been particularly described: one, called E. hominis, has been met with in the brain and abdomen of man in a few instances; the other, E. vermiculosus, occurs more frequently in the hog and other animals. The Acrophalocystis, or common globular hydatid, to which it is thought by some that the name of hydatid should be restricted, is a small cyst formed from the cysts of granules or minute particles which float in the fluid of the cyst, or adhere to its wall. Two species of Echinococcus have been particularly described: one, called E. hominis, has been met with in the brain and abdomen of man in a few instances; the other, E. vermiculosus, occurs more frequently in the hog and other animals.

The cyst of the proper cyst is composed of several laminae or membranes, which consist of while semispongy pulp matter. The common cyst enclosing the hydatid is supposed to be formed by the condensation of the cellular tissue of the surrounding parts, but frequently it is but a loosely attached to the adjoining tissues, and the texture of the organ in which it is situated is unchanged, unless when it is of sufficient size to cause considerable pressure around. The coats of these common cysts are composed of a fibrous membrane, and possess no peculiar power. These hydatids have been divided into the solitary and the multiplied: the former is found in the visera of ruminating animals; it has been called the Acrophalocystis exogena, because it is said that the young in this species are formed by gemmation from the outside of the parent cyst. The multiplied hydatids have been found in most of the structures of the human body, particularly the brain, the visera of the thorax and abdomen. This species has been united to endogena, because the young are developed within the former; thus one large hydatid is frequently found to contain numerous smaller ones within it. In fact, the common containing cyst that has been called shows the only original parent hydatid of all the others within it.
remedies may be given which are most likely to remove that state and improve the general health. When a hydatid cyst is situated so near the surface of the body that it may be easily evacuated without risk of effusing into the subjacent serous cavities, it may soon be punctured with propriety, which operation will cause obliteration of the sac.

Pseudo or false hydatids are simple, yet serious cysts or vesicles, either singly or aggregated in clusters, but in both cases having a more or less close connection with the subjacent tissues, from which in fact they grow. The vesicles often found in the choroid plexuses belong to this class, which contain the choroid venous sinus, which may grow to an enormous size. Lastly, one of the most common situations for these false hydatids is in the uterus, where they are described as 'vesicles of a round or oval shape, which seem to be attached, by which, they adhere to the outside to one another.' They may here increase in number as to distend the uterus till it is too large to be contained in the pelvis, and rises into the abdomen. These cysts may be developed in many other situations and contain fluids of various characters. For further information respecting them we must refer to a paper by Dr. Hodgkin, in Med. Chirur. Trans., vol. x., p. 266.

HYDE, EDWARD, EARL of CLARENDON, the third son of Henry Hyde, of Dinton, in Wiltshire, near Salisbury, and Mary, one of the daughters and co-heiresses of Edward Langford, of Trowbridge, in the same county, was born on the 16th January, 1645. He was first instructed by the clergyman of the parish, who was also a schoolmaster, and afterwards at Magdalen College, Oxford, where he was entered in 1621. It was his father's desire to make him a clergyman, but by the death of his two elder sons he was induced to alter his intention; the law, under these circumstances, was thought a more desirable profession, and Edward, under the auspices of his uncle, George Hyde, who was treasurer of the King of the Temple, was entered as a student in that Society. Three early impediments obstructed his early legal studies; the weakness of his health, the habits of his companions, and an attachment which made him more talk than talk, by which, the daughter of Sir George Ayliffe, of Grettenham, in Wiltshire, whom he married in 1629. The death of this lady six months after their marriage blast the happy prospects he had enjoyed. In 1632, having been a sole almoner, he was again married. His second wife was Frances, daughter of Sir Thomas Aylesbury.

After his father's death Hyde found himself in possession of such a competent fortune as to render exertion in his profession unnecessary, and the more than necessary. His early studies however were not neglected; he devoted the forenoon to the business of the courts, and the evenings to taking instructions and other legal employment. It was his habit to assist at the Temple Hall, where the students were accustomed to do, but with some of the many eminent friends whom his abilities and increasing reputation had attached to him.

In the spring of 1640 he commenced his political career; he was returned to parliament by the constituencies both of Shaftesbury and Wootton BASSET, and made his election to serve for the latter. The question of granting the supply demanded by the king formed the principal subject of discussion. Hyde argued in favour of a grant, but was successfully opposed by Hampden. The king dissolved this moderate and well-inclined parliament twenty-two days after its meeting. The House of Commons was named upon committees that were appointed. The borough of Salisbury returned him to the Long Parliament (Nov., 1640), and he laid aside his legal practice in order to devote himself exclusively to parliamentary business. The Earl of Strafford's oppressive court was abolished through his efforts; he also attacked the despotico 'Court of the North;' he was active in the condemnation of the Judges' decision respecting the money bill, and took a share in the proceedings against Strafford, and when the latter was impeached, in the vote of censure of the judges, and the impeachment of the popular party; but now he thought fit to detach himself from these friends. Within a week after the fall of Strafford a bill was passed for preventing the distribution of parliament without its own authority and consent. The knowledge that this encroachment on the constitution would render the parliament more powerful than the crown probably determined him to alter his political course. A conversation with Martin and Fiennes, in which these adherents of the parliamentary party expressed the importance of the occasion, is thought by Mr. Crookshank to have confirmed his determination. He now secured the support of the church, and defended the prerogative of the crown. His votes and speeches soon attracted the attention of the court; he was summoned to a private conference with the king, and received his thanks for the service he had rendered him.

He daily increased in favour at court. An answer which he wrote to 'The Remonstrance' was adopted and published by the king in his own hand, and this seemed to show the importance of this paper, and its author's utility to his cause, that he offered to make him his solicitor-general. The office was declined, but a request that accompanied the offer of it was accepted, and with it he consented to consult frequently with Lord Falkland and Sir John Coke to consult on the king's affaires, and to conduct them in parliament.

It may be thought that because the king had promised to take no step without the advice of these three counsellors, they are in a great degree responsible for his conduct; but this is not the case: Charles sometimes acted without their consent, and without their knowledge on the most important occasions. For instance, in the day of the execution of his former ministers, his advisers were wholly ignorant of his intention, and so displeased and deserted by his perjury and rashness, that Clarendon writes (Hist. Rel., vol. ii., p. 153) 'so that they were not there when he was executed; they had nothing to do, and nothing of anything to transeacted in the house; finding already that they could not avoid being looked upon as the authors of those counsels to which they were so absolute strangers, and which they so detestfully rejected.'

The queen quitted England in 1642, and Charles left London, not again to reside there until he was a prisoner. 'He appears,' says Mr. Lister (vol. i., p. 166) 'to have been the only one of the king's ministers who, in the opinion of the strangers, could be trusted in his absence. If, after the departure of the queen, he had again resided at Whitehall; that if he had done so he would have been treated with more respect; that moderate compliance would have prevailed in the affairs, and that the ordinary business of the kingdom would have been. The queen, who was the chief cause of the king's unpopularity, he would soon have regained the affection of his people.

Although Hyde was suspected of framing the king's papers and the answers which he sent to the messages of the parliament, and danger was to be apprehended in case of discovery, he continued to write them. He used more moderation than the king would have used, and indeed King was much more severe in his storms than necessary. He could have been known by comparison that his papers were drawn with an ability far superior both in argument and eloquence to that which was evinced in the manifestoes of the parliament. So necessary did he think it for the safety of the king and nation that he often made his summons to repair to York, whither the king had retired (1642), as soon as he could be spared from London. He escaped from the parliament with difficulty, and reached York by circuitous and unusual routes, and continued to act as the king's adviser until the civil war broke out.

In the spring of 1643 a considerable change took place in the fortunes and condition of Hyde; instead of the secret counsellor of the king, he became his avowed and responsible servant. After he had declined the office of secretary of state, the chancellorship of the exchequer was accepted by him, and he was knighted and sworn a member of the Privy Council. He was now in the position of being called upon to compromise the differences of the contending parties; neither the summons of a parliament at Oxford, nor his subsequent negociations with the parliamentary leaders could have been carried on with so much success.

In 1645 the king thought fit to send the prince of Wales into the West, and to name Hyde one of the counsellors to attend upon and direct him. On the 5th of March he had an interview with the king, the last time he ever saw him, and it was on the way to Bristol to enter on the functions which he had undertaken. Disputes and difficulties arose; the prince's army was disorganized; and his situation daily became more hazardous, on account of the disasters which the king sustained at the battles of Stow Hill, and the rebellions in the country in the autumn. In December letters were received from the king urging the prince's speedy removal either to Denmark,
France, or Holland. His advisers hesitated about his depar-
ture, because there were differences of opinion as to where
he should be sent: at length both commissioned him; and
Hyde and others of his suite sailed with him, first in the
battlement and thence to Jersey, where he landed on the 16th of
April, 1646. After a short residence in this island, the
prince, persuaded by the queen, who desired to have him in
the French fleet, sailed thence to the main. Hyde sent to
his brother, the queen's son, that he was not in danger on that
account, made his will, and wrote letters to be delivered
to the king and the prince after his death. It
might be expected that under such adverse circumstances he
might have neglected his business, but nothing sustained
him; he collected all the materials that he was
able, and commenced his History of the Rebellion.'

After the seizure of the king his cause appeared to be
derpreate; there were however occasionally revulsions in
his favour which spread a faint gleam of hope upon the
minds of his adherents. Among these was the desertion
of 17 ships of war from the parliament to the prince. This
event had an influence upon the proceedings of Sir Edward
Hyde, who received orders to join Prince Charles. After
some fruitless travelling in quest of him, Hyde heard that
he had sailed for the Thames, and procured a small vessel
in which to follow him. Having taken pitch and
pitch-calmed, and seized by several pirates from Ostend, who
had him prisoner, and plundering him of all his money
and goods, landed him at Ostend. In September, 1648,
Hyde rejoined the prince at the Hague; and here he
had the command of the fleet.

The disposition of the Spanish court towards the youth-
ful Charles II. disposed him to send an embassy to Madrid.
Hyde and Cottington were fixed upon for the ambassadors,
and received instructions to the following purport:—that
they should endeavour to effect with Spain a league offensive
and defensive; should give assurances of the king's
resolutions of grace and favour towards his Catholic subjects;
should urge the royal projects to pass in Spain, and,
example a manner as might be desired, for any money
that might be lent by Spain; and should offer such civilities to
the nuncio as might tend to procure the assistance of the
popes. In May, 1649, the two ambassadors left the Hague:
Hyde established his wife and children at Antwerp, and
after some delay landed in Spain. During fifteen months
negotiations were carried on, until it became evident that
none of the desired objects could result from the embassy.
At length the ambassadors received the command of
the king of Spain to retire, having suffered mortification
from neglect, and inconvenience from excessive poverty.
Hyde quitted Madrid in 1651, and lived at Antwerp with
his family, when the king of Spain signed the treaty of
Paris. Here he conducted the principal business of the English
court, collecting for their benefit such sums as he could
procure to diminish their pecuniary embarrassments. That
they were in extreme penury is evident from Hyde's cor-
respondence. He says in 1652, 'I have neither clothes nor
fire to preserve me from the sharpness of the season; and
in the following year, 'I have not had a live of my own
these three months.' He had also other evils to contend
with; the queen was his open foe, and he had enemies
striving to undermine him in the favour of the king; and
though the behaviour of the king was friendly, he could not
avert both the queen's and his enemies' hostility, as was
his intention. Thus Hyde followed the fortunes of the king,
affording him during his exile all the service that he was
able; conducting his affairs, advising his actions, and com-
promising to his enemies to cabal against him with a greater
probability of accomplishing his overthrow, than had ever been
reasonably entertained. Among these enemies was the
Earl of Bristol, aValid intriguer, ambitious man, who
sought to aggravate himself at Clarendon's expense. Bris-
tol, who was politically embarrassed to such an extent, that
he could only extricate himself by some desperate effort,
thinking that Clarendon might be successfully attacked,
drew up articles of impeachment, and accused him of high
treason, in the House of Lords. 'The Lords referred
the charges to the Judges; the Judges unanimously returned
an answer that the charge had not been regularly and
legally brought, and as a consequence, they could not be
originally exhibited to the House of Peers by any one
peer against another; and that if the charges were
admitted to be true, yet there is not any treason in them.'
'The Lords resolved unanimously, that they concurred with
the Judges. Bristol absconded, and a proclamation was
issued for his apprehension; and thus ridiculously and
utterly failed this rash attempt to assail the character and
power of Clarendon.

Clarendon still continued the principal conductor of the
public affairs, and such was the condition of the kingdom
in politics both domestic and foreign, the poverty of the
public treasury, the profligacy of the court and the king's
absolute neglect of business on the one hand, the relation of England to foreign powers
and the Dutch war on the other, that he had difficulties of
no ordinary magnitude to contend with. He was
general throughout the country; the Duke of Holland was

Charles at Canterbury in his progress to London, followed
his triumphal entry to the capital, and took his seat on the
first of June (1660) as speaker of the House of Lords; he
also sat on the table of Lord Hyde de Burgh as the first
retained the office of chancellor of the exchequer until the
king could find a fit person to succeed him. Thus from a
powerless and poverty-stricken guardian of an exiled king
he was suddenly raised to the first place in power, authority,
among the ministers of a monarch, who, while
invested by the public with sovereign power, still evinced
him to the deference of a pupil.'

The part that Clarendon took in the principal measures that
occupied the parliament assembled after the Restoration
may be learned from Lord Clarendon's 'Life,' written by
himself, in Mr. Lister's 'Life of Clarendon,' and Burnet's
History of his time. We will notice here some of the
movements of an event of immediate personal importance and interest to
the chancellor which occurred in the autumn of 1660.
Anne Hyde, his daughter, who was in the household of the
princess of Orange, during a visit to the queen at Paris
had contracted an attachment to the duke of York, the result
of which was a secret marriage, solemnized in September,
in time to legitimise their first child, born on the 22nd of
the following month. This marriage was offensive, not
only at court, but also to the chancellor, 'who broke out,
as he tells us, ' into an immediate passion against the
wickedness of his daughter.' It was at first doubtful
whether this unpardonable outrage might not tend to
diminish the favour and interest of the chancellor.
These threats however were soon removed. The king entertained
no suspicions of artifice or collusion on the part of Hyde, and
to prove that he entertained none, created him a baron,
under the title of Lord Hyde of Hambly. Still the king's
marriage with Catherine of Portugal, the negotiation of a
loan from the king of France, and the sale of Dunkirk
Clarendon took an active part in bringing each of these
courses to a successful termination. It was important that all
important matters his opinions and decision should be
expressed. For his decision in each of these transactions
he has not escaped censure; we think it doubtful whether
the censure is merited for the promotion of the king's unhappy
marriage, or for the sale of Dunkirk; but his suffering
Charles to become a dependent borrower from the king of
France—'to have been the sanctioner of such a system is
one of the greatest faults with which Clarendon is charge-
able as an adviser of the crown.'

The opposition of the chancellor to the king's inclination
towards Catholicism, as well as to other wishes he had formed,
and the effect of his influence, in preventing the king from
returning to his enemies to cabal against him with a greater
probability of accomplishing his overthrow, than had ever been
reasonably entertained. Among these enemies was the
Earl of Bristol, a Valid intriguer, ambitious man, who
sought to aggravate himself at Clarendon's expense. Bris-
tol, who was politically embarrassed to such an extent, that
he could only extricate himself by some desperate effort,
thinking that Clarendon might be successfully attacked,
drew up articles of impeachment, and accused him of high
treason, in the House of Lords. 'The Lords referred
the charges to the Judges; the Judges unanimously returned
an answer that the charge had not been regularly and
legally brought, and as a consequence, they could not be
originally exhibited to the House of Peers by any one
peer against another; and that if the charges were
admitted to be true, yet there is not any treason in them.'
'The Lords resolved unanimously, that they concurred with
the Judges. Bristol absconded, and a proclamation was
issued for his apprehension; and thus ridiculously and
utterly failed this rash attempt to assail the character and
power of Clarendon.
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unpopular, and the terms of the peace which followed it were
less favorable to Calamity than to England; and disorder
and sedated the minds of the people and had created a
general impression of corruption and abuse in the adminis-
ii., p. 384.) These feelings of irritation and disgust were
vented upon Clarendon, and the public without regard to
justice, heaped upon him the odium of every measure and
event.

The war, which he 'had spiritedly opposed,' says Mr.
Lister, 'divided the fleet of the state, which he had not
suggested; even the want of royal issue, which he could not have fore-
seen (the queen having lately miscarried), were all laid to
his charge. Old topics of complaint were revived by the
people, and the public objects had nothing to meet;
and in the midst of the panic and rage of the
populace, at the alarming news that the Dutch were
at Gravesend, they broke the windows of Clarendon's
house, and painted a gibe on his gate, accompanied with this
rude rhyme:-

'Some things to be seen;
Dunkirk, Tangier, and a barren Queen.'

The vulgar belief that he had appropriated to his own
use the revenues of the state was fostered by a standing
tenantry, a magnificent house that he had built, and which
in derision was called Dunkirk House, Tangier Hall, and
such significant nicknames. At court the king's profligate
senses were occasionally overpowered by a desire to fasten
nourish his long-concealed dislike of his principal counsel-
or; and by the peroration of Lady Castlemaine, Buckingham-
ham, the chancellor's greatest enemy, was restored to
office. The death of Clarendon was suddenly ordered by the
king's command he resigned the great seal on the
30th of August, 1667; and in such a manner was he held
up as an object for persecution, that it became evident that
something should be instituted against him. The
Commons, angry with him for many causes, but more par-
sially for his recommendation of their dissolution, met in
October, when a resolution was passed, 'that it be referred to
a committee to reduce into heads the charges against the
Earl of Clarendon.' Seventeen members were drawn up (Lister's Life,
vol. ii., p. 424), and, after some discussion, an accusation was agreed upon and for-
warded to the Lords; it was rejected however, 'because the
House of Commons only accused him of treason in general,
and did not assign or specify any particular treason.' Upon
this refusal to commit, a serious contest arose between the
two houses; and great excitement prevailed. To compose
these, a resolution was passed by both houses of contenting
the friends of Clarendon advised him to quit the kingdom.
After some hesitation he consented to their proposal; and
on the 29th of November, 1667, he sailed for Calais, leav-
ing his enemies the means in his power to fasten on
himself from the unfounded charges made against him,
which his flight might otherwise have been thought to be an
acknowledgement. 'A bill for banishing and disena-
bling Lords was passed by the Lords on the 20th of
December, and by the Commons on the 18th. By this
bill, unless he returned and surrendered himself before the
1st of February, he was to be banished for life; disabled
from ever again holding any office; subjected, if he after-
wards returned to England, to the penalties of high treason;
and rendered incapable of pardon without the consent of
the two Houses of Parliament.'

The public life of Clarendon was now at an end; he was
peacefully banished by the king of France to his native
province within his kingdom. At Evreux he narrowly escaped
assassination at the hands of some English sailors; from
Evreux he went to Bourbon, thinking to derive benefit to
himself from the mineral water there; and later, removed to Montpellier; from Montpellier to Moulins, where, in the enjoyment of the society of his children, he
commenced the continuation of his 'Life.' In the spring of
1668, he presented himself at Paris, which was his last
residence. Repeated attacks of gout had enfeebled his
frame and constitution, and his malady continually
increased; at length he expired on the 9th day of
December, 1674, in the 56th year of his age. His body
was brought to England, and, according to the statement
of Anthony Wood, was buried on the north side of Henry
VII.'s chapel in Westminster Abbey. No monument has
been erected, and no inscription marks the place of in-
terment.

By his second wife, who died in 1657, at the time that
difficulties were arising around her husband, he had
six children, four sons and two daughters. Henry, the
second earl of Clarendon, died in 1709; Lawrence, created
earl of Rochester, died in 1711; Edward and James died
unmarried, Anne married James, duke of York, and was
the mother of Anne, afterwards queen; and Frances was
married to Thomas Keightly, of Hertingfordbury.

Clarendon's abilities were great. As a minister he was
wanting more in courage and firmness than in sagacity and
forethought: it was his 'disposition to take too much counsel
with temporary expedients and to be too little mindful
of remote consequences.' He was pure according to the
standard of the times. 'He had one great merit,' says Mr.
Lister, 'that he could write the English language, a
man, rare and valuable at all times, but peculiarly so
at such a period as the Restoration. He was not disposed
(except perhaps when the interests of the church were con-
cerned) to govern in the spirit of a partisan. He aimed at
appearing, not the leader of a political fiction, but the
minister of the nation—a minister to whom royalist and
republican might equally look up for justice.' His industry
was remarkable, and of his oratory Pepys says (vol. ii., p.
59) : 'I am very glad with my lord chancellor, for he could
comprehend and speak out well, and with the greatest
easiness and authority that I ever saw a man in my life.'

As a judge there but few scanty materials for the estima-
tion of his abilities were left. He was at this time very subordinate to the political: high
legal attainments were not considered essential qualifica-
tions. We do not find that he was negligent of the duties and
imperative duty under them.

In private life he was a warm and constant friend,
and strict observer of moral duties, in an age when vice
was openly countenanced and preferred. Haughtiness and irri-
tibility of temper were his principal faults. In his 'Hi-
story of his Life,' he speaks of that of 'Life' of himself, there
are many inaccuracies. In the latter he appears to have trusted
chiefly to the recollection of a somewhat fallacious memory.
We must refer to Mr. Lister's 'Life of Clarendon' for an
account of the political impeachments of

(Lister's Life of Clarendon, Life of Clarendon, by
himself; Burrell's Own Times; Diaries of Evelyn and
Pepys.)

HYDE, THOMAS, D.D., was born June the 29th, 1636,
at Billingbear near Bridgington, in Yorkshire. He received
his first instruction in the Oriental languages from his
father, and afterwards studied them under Wheelock, pro-
ung deep interest of the learned nation. The only
chair of Oriental languages was founded at the
universities of Cambridge and Oxford in 1655.

In 1685 he entered Queen's College, Oxford; and in
1639 was appointed under-librarian of the Bodleian
Library in 1655 principal librarian. In 1660 he became a
prebendary of Salisbury; in 1678 archdeacon of Gloucester; and
in 1682 took the degree of D.D. On the death of Popecock, in
1691, Hyde was appointed Laudian professor of Arabic;
and not long afterwards Regius professor of Hebrew, and
canon of Christchurch. He resigned the librarianship of
the Bodleian in 1701, and died on the 18th of January,
1723, in the 88th year of his age.

Oriental languages during the reigns of Charles II., James
II., and William III.

Hyde possessed an accurate knowledge of almost all the
Asian languages which were at that time accessible to
Europeans scholars. In addition to Hebrew, Syriac, Persian,
Arabic, &c., he was also acquainted with the Malay and
Armenian languages; and was one of the first Europeans
who acquired a knowledge of Chinese, which he learned
from a Chinese, who had been brought to Europe by the Jesuits. His most cele-

brated work, entitled 'Veterum Persarum et Magorum
Religionis Historia,' Ox., 1700, reprinted in 1760, displays

4 Lest Clarendon's oracles, dated 29th May, 1661, are printed in Pepys's General Correspondence, and a copy of the Court of Chancery of
cases in Chancery in the reign of Charles I. and the 20th year of
King Charles II. was given in Pepys's diary during the period in
which the court of Chancery was held.' In a very great number of
the cases reported in this book the chanc-

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which the court of Chancery was held.' In a very great number of
the cases reported in this book the chanc-

eller seems not to have decided without the assistance of the judges.
HYDER ALI was well known as the ablest and most formidable enemy of the British power in the East Indies. He was a soldier of fortune, who began his career in the service of the Raja of Mysore in 1749, and ascending step by step, reached in 1729 the rank of commander-in-chief of the Persian forces in Dafgh. After the war, he was appointed governor of Hyde, with the exception of the 'Veterum Persarum et Magorum Religionum Historia,' were republished by Granville Sharp under the title of 'Syntagma Dissertationum quae ad Historiam et Attentionem Didacta.' In this edition Sharp has printed several of Hyde's works which had previously been unpublished, and has also given a list of many other works which have never been published, amongst which he mentions translations in Latin of Abul-Feda, Abdul-All, and the history of Tamerlane, and dictionaries of the Turkish and Persian languages.

HYDER's son and successor Tippoo inherited the resentment but not the ability of his father. He found it expedient to evacuate the Carnatic in 1783, and in March, 1784, concluded peace, on the terms of a mutual restitution of conquests. (Mill. Hist. of British India.)

HYDRA, island. [Greek.] HYDRA (connotation, 660 in Ptolemy), the Water-snake, one of the old constellations. From the time of Aratus downwards it has always been a triple figure: a long snake, represented as trailing upon the ground, bears upon his back a cup (Crater), and near to his tail is seated a crow (Corvus). The mythological meaning is altogether unknown.

The great length of this constellation has caused it to be divided into four parts: it is now called Hydra et Crater, Hydra et Corvus, and Hydra continuat. The first contains the head and body up to about 10 hours of right ascension, all near to and south of the bright star Regulus. The second contains the tail of the body adjacent; the third the crow, with the parts of the body adjacent; and the fourth (beginning at about 13 hours of right ascension) contains the tail. For the third part see Corvus. In Flamsteed's catalogue Hydra and Hydra continuat are treated in all respects as two distinct constellations, with Corvus and Hydra et Crater intervening. Mr. Baily, in his new edition of the catalogue, has treated the two as one constellation, and numbered the stars accordingly, making 1, 2, &c., Hydra continuat to be 45, 46, &c., Hydra.
other vegetable alkalies do contain some oxygen. All the hydriacids are gaseous, and are easily combined with water, forming solutions which possess the well known and strongly marked acid properties of sourness, acting upon carbonates or reddening vegetable blue colours. They are all artificial products; at any rate hydrochloric acid is the only exception, which is sometimes a volcanic product, though in that case usually combined with ammonia.

Hydrochloric acid is the only one which can be obtained by the direct action of its elements; but the usual method of obtaining it, as well as other hydric acids, is that of treating a compound of the radical of the acid and a base with an acid of the water, that generally being a compound of sulphuric acid. Thus, as already mentioned, hydrochloric acid is obtained by acting upon chloride of sodium with sulphuric acid and water; the water suffers decomposition, and its oxygen combines with hydrogen to form water, while its hydrogen unites with the chlorine, giving rise to hydrochloric acid; the soda combines with the sulphuric acid to form sulphate of soda. This may be taken as a type of the general action.

HYDRANGEA, a well-known genus of hardy shrubs, of which one species is commonly cultivated for the sake of its beautiful flowers. This plant is a native of China and Japan; it was originally observed in the gardens of Canton by Louweno, who took it for a primrose, and called it Primula mutabilis. It was next met with by Commerson, a French traveller, who named it Hortensia, in compliment to Madame Hortense Lépucsé. Thunberg referred it to the genus Philostomum, and Smith called it by its present name, coupling with it the name Hortensia of Commerson, converted however into Hortensia. When this plant is hardy enough to survive the winter, it grows to a considerable size, and when covered by a multitude of its very large round heads of rose flowers, becomes a magnificent object. But as it is rather tender, we more commonly see it grown in pots, by which its beauty is much diminished. To have it in perfection it should be planted in the open ground in rich soil; during winter it should be covered with a mat well stuffed with straw. As soon as it begins to move its buds in spring, it should be unpacked, and during summer it should be most abundantly supplied with water. They have been observed to grow in the form of a salt dependent upon its presence. The blue colour which the flowers of this plant now assume does not indicate a distinct variety, but is only owing to the soil in which the plant is made to grow containing a greater quantity of iron than usual.

HYDRARGYRUS. [MERCURY.] HYDRASPIS. [TOROISES.] HYDRATES are compounds of bases and water, but all of them are not so termed; thus when water is united with sulphuric or nitric acid, the compound is very often termed a hydrate of the latter acid, or we say hydrated sulphuric or nitric acid. So also when crystallized salts contain water, they are termed hydrates or hydrated salts, but the water is usually called water of crystallization when the regularity of the form of a salt depends upon its presence.

The term hydrate is usually applied to compounds which contain water in definite proportion, which does not impart regularity of form, or in other words, give crystals with the body with which it is so united. Thus when water is added to potash it may form with it either water of solution, water of crystallization, or water which constitutes it an hydrate. If we take a solution of potash and evaporate it to a certain extent we obtain crystals of potash; if water is added and the water of crystallization is expelled, but no heat whatever is strong enough to expel the whole of the water, and the last remaining portions form with the potash a hydrate, which is a hard substance totally devoid of crystalline form. So also when water is added to lime, the crystals however of water and lime are obtained with difficulty, but hydrate of lime is the well known dry powder called slacked lime.

It appears, therefore, from the above statements, that water of solution has comparatively little affinity for the substance with which it is combined; water of crystallization has more, but water with which the body constitutes an hydrate has the greatest affinity of all.

The water with which substances combine often imparts colour to them; thus sulphate of copper when nearly de-
prived of water is colourless, but when dissolved in water it becomes of a fine blue colour; and water of crystallization produces the same effect. So also oxide of copper is of a black colour, but the hydrate of copper obtained by adding potash to a solution of copper is of a beautiful blue colour.

HYDRAULICS. This term is applied to the art of constructing machines in which water is employed as a moving power, or by which that fluid is put in motion; and in this case the steam-engine has attained the employment of hydraulic machines are executed. The art of constructing docks, quays, or any buildings whose foundations are laid under water, is denominated hydraulic architecture.

The hydraulic engines of the Roman engineer Heron of Alexandria, which is a kind of machine for raising water in order to drain lakes or marshes appears to have been executed in Egypt at a very remote period, nothing positive can be said to be known concerning that which existed at an earlier time than the building of the Ptolemies; and there cannot be admitted that a simple wheel carrying earthen pitchers on its circumference, a contrivance which is still employed there, was, as is likely, in use before that epoch. The spiral engine (sphynax) of Archimedes, as it is called, is said by Diodorus Siculus (l. 34) to have been used in that country for raising water from the river for the purpose of irrigation; and the clepsydra, for measuring the lapse of time, though probably far more ancient, is known to have been employed in Egypt and Greece, for astronomical as well as civil purposes.

The hydraulic machines described by Vitruvius in the tenth book of his 'Architecture' are sufficiently simple to allow them to have been constructed by men of any degree of skill even in an early epoch; and, as he mentions no others, it may be perhaps concluded that those alone, or together with an apparently simple machine for extinguishing fires, were in general use. They consisted of a tub in which a vessel excited by certain orifices in the circumference, from whence it descended to the axle by troughs in the direction of the radii; from the axle it was conveyed in pipes to the salt-works or gardens, where it was kept in a state of refrigeration. He mentions a wheel with buckets, which took up water from a reservoir on the ascending side of the wheel, and discharged it on the opposite side, in consequence of the revolution of their position. He moreover describes a species of chain-pump, and the spiral machine of Archimedean. All of these were intended for the same purposes, and were turned either by the impulse of a stream in which they were placed, or by men walking upon them; that is, probably, on the exterior circumference of the wheels attached to the axles of the machines.

Water-wheels for grinding corn are also described by Vitruvius; and, lastly, the same writer gives a brief and obvious description of theannel channel, and suggests the possibility of having a single arrangement for the conveyance and distribution of sound. These seem to have been effected by moving a piston up and down in a cylinder, and thus forcing the air which was allowed to enter the latter to pass through a pipe into the upper part of an inverted cone, which was sunk, like a diving-bell, in the water of a cistern. The air in the cone was prevented from returning into the cylinder by a valve placed at the orifice of the pipe; and being condensed between the top of the cone and the water below, and on touching the keys of the instrument the modulations were produced by its escape through the organ-pipes, which opened into the upper part of the cone. This instrument was invented in the second century a.c. by Hero of Alexandria, who is said to have been the first contrayer or pneumatic pump; and nearly at the same time Hero of Alexandria devised the artificial fountain which still bears his name.

Since those days hydraulic machinery has been brought to the state in which it now exists by many successive improvements. It may be remarked however that on account of the high degree of perfection which, within a few years past, the steam-engine has attained, the employment of hydraulic machines for raising great quantities of water, or as first-movers with respect to extensive works of any kind, has of late considerably diminished. Yet where the circumstances are favorable, as at a mine, or when working the machine can be readily obtained, and when natural means exist of conveying away that which has been raised, the latter, from being less expensive in its construction, is still preferred to the former.

The most remarkable of the hydraulic machines which have been employed for raising water are the works at Bury, and those which still lately existed at London Bridge. The former, by far the most extensive machine on the latter part of the seventeenth century, and raised the water of the Seine by three different stages to a reservoir at the height of 533 feet above the surface of the river; from that reservoir, the water was conveyed in the Great Vase to Versailles and Trianon. Fourteen wheels were employed in as many watercourses; the wheels were about 36 feet in diameter, and on their axles were cranks by which, in all, 253 pounds were worked. On the latter, the wheel raised is said to have been about 40,000 gallons per hour.

The Phoenicians, who in an early age were distinguished by a spirit of commercial enterprise, a year to have allowed vast care and to have displayed considerable talent in rendering the harbours of Tyre secure places for shipping, as well as in fortifying the town against the aggressions of their powerful neighbours. Tyre appears to have had two ports, the greatest of which was an oval figure, and capable of receiving 500 vessels. It was situated on the north side of the town, which thus protected it against the south winds, while a levee of land in front served as a dyke to break the force of the ocean. Two breakwaters were built in the form of segments of circles, extending into the sea towards the west, formed an outer port, and a third mole secured the entrance against the violence of the waves in that direction. The western breakwater was 1500 feet long, and the one on the ocean, which is said to have been there about 25 or 30 feet deep; and at the two extremities of the third mole, or breakwater, as it may be called, were constructed high towers, which served for the defence of the entrance, and were provided with turrets containing lights, by which ships were enabled to enter the harbour by night. The second port was intended for merchants' ships, and was partly enclosed within a wall, so that it was protected on the south side, and was also protected by an advanced mole or breakwater. Such, when the city was taken and destroyed by Alexander, appear to have been the disposition of the ports of Tyre and Byblos. The city was afterwards in Roman times placed on the continent, and became known by the name of Antioch of Tyre. In this period it was a great maritime place of the ancient world. On this account the Phoenicians may justly be considered as the founders of the civilization of Syria.

The city of Cartage, a colony of Tyre, was built on a peninsula, on the western side of which a tongue of land projected so as to form with it a large basin where ships were completely sheltered from all winds. On the same side was a small chain of mountains, which extended between the town and an arm of the sea; and this was converted into a magnificent harbour, which was occupied by vessels of war only. The two extremities were closed by walls stretching across the channel, and in the centre was a chain of forts or watch-towers. High walls concealed the port from the people of the town, and also from the view of persons in ships on the neighbouring seas; and the circuit of the island was bordered by magnificent quays.

The splendid port of Alexandria, which was constructed during the reign of Ptolemy Philadelphus, with those of Rhodes and Syracuse, attest the advanced state of hydraulic architecture among the ancients; but no written accounts of the methods employed by them in executing such works have been transmitted to us, except the very brief notice contained in the fifth book of Vitruvius.

The age of Augustus and Tiberius, Leges, and Civita Vecchia, afford sufficient evidence of the skill of the Italian engineers in forming secure harbours for shipping, while their country enjoyed the advantages of an almost exclusive commerce; and, in later times, the maritime power of Genoa was sparred no expense in the formation of harbours, as well for their ships of war as for those of their merchants.

No countries in Europe possess more advantages with respect to naval power than Great Britain and Ireland. The islands and headlands, with their situation on the coasts of Great Britain; and, in later times, the maritime power of Genoa was spared no expense in the formation of harbours, as well for their ships of war as for those of their merchants. No such countries in Europe possess more advantages with respect to naval power than Great Britain and Ireland.
British Isles a complete school for the study, in detail, of every subject connected with this branch of art.

Besides the construction of harbours for ships, the formation of the aqueducts which supplied the cities with water must have constituted an important part of the duties of the hydraulic engineer among the ancients; and Vitruvius, in his eighth book, explains at some length the manner of conveying the water between the castella, or reservoirs, at a greater height than the towns, and whether in the town itself. It may be observed here, however, that the ancients did not always construct aqueducts on arches, to convey the water across valleys; though this method was preferred, from an opinion that water transmitted through pipes was less healthy. We find that water was, occasionally, so transmitted; and that it was the practice to place, at intervals along the line of pipes, *columnariet*, or open tubes, in vertical positions, in order to allow the escape of the air, when the apparatus for raising the water in the pipes, had been impeded or entirely prevented its motion.

Hydraulic architecture is now chiefly concerned in the construction of walls, masses of masonry whose foundation are on the beds of rivers or in that of the sea; such are the piers of bridges; walls which support the banks; and jetties extending from thence into the water, either for the purpose of forming quays to receive merchandise from ships, or to prevent the growth of a river, or to increase the velocity of the current, in order to remove bars which might, if suffered to remain, interrupt the navigation. The practice of the art also involves the formation of artificial lakes, which, when used for shipping, constitute a valuable portion of the navigation of towns which may be made to find its way under or behind, and cause the destruction of the work; and the difficulties increase in proportion to the depth of the water and rapidity of the current. The stalks of reeds and rushes at London were examples of the rude methods antiquely employed in this country for building in water. Caissons resting on piles driven deep into the ground under the intended work are occasionally employed when the water is not very deep and the soil good. But no work of magnitude can be considered as secure whose foundations are not laid by the engineer in the bed of the water; for this purpose the part on which the construction is to be raised must be laid dry by excavating it in a coffee-dam, and actually drawing off the water by engines.

The following are brief descriptions of the hydraulic machines which are in frequent use for domestic and general purposes. The work to be performed is not of such magnitude or importance as to require an application of the power of steam.

The Siphon.—The simplest machine of this kind, and one which is employed in many different branches of art, is the siphon, This is nothing more than a bent tube whose arms are of unequal length: one of the arms being immersed in the liquid which is to be drawn from a vessel or reservoir, and the air being removed by suction, or by means of a syringe, or by previously filling the siphon, the liquid in the vessel immediately rises in the immersed arm, in consequence of the pressure of the atmosphere on that which surrounds the tube; then passing over the bend, it drops from the open orifice at the lower extremity of the other arm. When the fluid to be raised is water, the vertical height of the bend in the tube, above the surface of the water in the reservoir, must not exceed about 5 feet, because a column of water of that height would be its equilibriums with the pressure of the atmosphere, and could not by the latter be forced over the bend. If mercury were to be raised, the height of the bend in the siphon must, for a similar reason, not exceed about 60 inches. The external arm of the siphon must be longer than that which is immersed in the fluid, or its orifice must be on a lower level than the surface of that fluid, in order that the weight of the column of fluid in the former may equal that in the latter, and thus a continual stream be produced.

A siphon may be made to discharge water at the upper extremity by means of an air-veasel at that place. Thus, while the tube is filled with water, if a communication is made between the descending branch and the lower part of the air-veasel, it is closed by the shutting of a valve, the water, which would have otherwise descended, rises in the vessel, at both ends and wound spirally on the exterior surface of a cylinder, or it may be a plate of metal coiled about an axis, like the threads of a screw, and enclosed within a hollow cylinder so as to be completely water-tight. The machine, in its case, is fixed in an immersed position, with its lower extremity immersed in the water which is to be raised. While it is at rest the water occupies the lower part between two of the threads or bends of the spiral, at bottom; but when turned so that it may be made to ascend, the water will by its gravity be caused to descend into the lower part between the next bends of the spiral, while in reality it rises, with respect to its former position, in consequence of the rotation of the tube, or bends, within which it is confined. Thus the water continuously proceeds towards the upper part of the machine, from whence it is discharged into a reservoir placed to receive it. It is shown, by writers on hydraulics, that this machine cannot raise water when the angle which a line drawn centrally on the spiral bends makes with planes parallel to the base of the cylinder is greater than the angle which the latter makes with the horizon; and it is recommended that, in practice, the angle which the axis of the cylinder makes with the horizon should be between 40 and 60 degrees. Such a machine is particularly useful when the water is mixed with gravel, weeds, and the like, which would spoil the action of a common pump. For computations concerning the force requisite to turn the machine, and the quantity of water which it will raise in a given time, see Gregory's "Mechanics," 2nd ed.

A machine consisting of a pipe wound spirally about the surface of a cylinder, or cone, which is made to revolve about its axis when the latter is in a horizontal position, is called a *siphon tournant*. A similar machine, when the water and air in nearly equal quantities are allowed to enter, the former will, in consequence of the revolution, be forced up an ascending pipe which may be attached at the other extremity.

Pumps.—The common pump is a machine for raising water by the pressure of the atmosphere: it consists of a cylindrical body, or barrel, from the lower part of which a tube descends into the water contained in the well or reservoir. In the interior of the cylinder is a moveable piston surrounded with leather in order that it may be water-tight, yet capable of moving up and down with freedom. The piston is perforated, and the orifice is covered above by a valve, which is kept closed; and a similar valve at the bottom of the cylinder, or barrel, covers the upper extremity of the tube which leads to the well.

Now, if we suppose a power applied, by a lever or otherwise, at the extremity of the tube to raise the piston from A to B (fig. 2), the air contained in the tube D tends by its elasticity to occupy the lower part of the cylinder, which it enters by forcing up the valve B; and its elasticity diminishes in consequence of its occupying a greater space than before. Hence the air exerts on the surface of the water within the tube, at D, a less pressure than that which the external air exerts upon the water in the well; and the water consequently rises in the tube to a certain height above D, which is such that the weight of the column of water, together with the diminished pressure of the air, is equal to the pressure of the external air. The valve B then...
falls over the orifice; and the piston B being depressed, the
air contained between it and the bottom of the cylinder will
be condensed, in which state it will force up the valve F
and escape at the top of the pump. The valve F then falls,
and, if the piston be again elevated, the water will rise higher
in the tube D for the same reason as before. The opera-
tion of closing and opening the piston being repeated sev-
en times, the water will at length enter into the cylinder
through the valves E and F; after which it will, at each
stroke of the piston, be forced through the spout. The
valves E and F closing after the water has passed them, the
latter is prevented from returning, so that a cylinder of
water whose height is equal to that through which the
piston is raised, will, by each upward motion, be forced
through the aperture, provided it be of sufficient magni-
tude.

The vertical height of the piston above the surface of
the water in the well must always be less than 33 feet, for
the reason given in speaking of the height of a siphon. But
when the water has got above the piston it may be raised to
any height, provided the piston-rod be long enough and
sufficient power be applied.

That which is called a lifting-pump is frequently similar
in construction to the common pump above described; but
the lower valve E is always below the surface of the water
in the reservoir, and the piston B is so when depressed to
the bottom of the cylinder or barrel. On raising the piston,
the water above it, whose weight keeps down the valve F,
is lifted up and the pressure of the external atmosphere
forces the water of the reservoir into the cylinder
through the valve E. Then, by successive depressions and
elevations of the piston, the water is at length raised to the
top of the pump and discharged by the spout. The volume
of water lifted at each stroke is, of course, equal to that of
a cylinder whose base is the area of the upper surface of
the piston and whose height is the distance from thence to
the top of the pump.

The forcing-pump is one in which the water, when raised
in the barrel, is driven through an orifice in its side by
the depression of the piston; it is also, in general, provided
with an air-vessel, into which the water is forced, and
from whence, by the elasticity of the condensed air, it
is made to issue through a pipe inserted in the upper ex-
tremity. The principal cylinder, or barrel, is similar to
that of the common pump, and, as in the latter, a valve at
E (Fig. 3) opens upwards. The piston B is solid, or without
a perforation; consequently, when the water has been
raised as before, above the valve E the depression of the
piston drives it along the tube H and through the valve G
into the air-vessel N. Succeeding strokes continue to
force water into the vessel till it gets above the lower
orifice of the pipe K, and thus prevents the escape of the
air from thence. In the upper part of the vessel the air

consequently becomes condensed, and, acting by its elas-
ticity on the surface of the water, compels it to issue
through the pipe K in a continuous stream.

A centrifugal pump is sometimes made to consist of two
hollow cylinders at right angles to one another, in the form
of the letter T. The lower extremity of such a machine
rests on a support in the water which is to be
raised, and the machine is made to revolve on a vertical
axis by means of wheel-work. Near the bottom of the
vertical cylinder is a valve, opening upwards, which is
closed by the weight of the column of water above when the
tube is filled; and at each extremity of the horizontal cy-
derlin is a valve opening outwards, which, when the machine
is not in motion, is made to cover the aperture by means of
a spring. When the machine is to be put in action, it must
be filled with water by holes formed for the purpose in the
upper part; these holes being then stopped, the machine is
made to revolve rapidly, when the water in the horizontal
arm acquires centrifugal force, by which it opens the valves
at the extremities and flows into a reservoir placed there
to receive it. The diminution of the gravity of the water in
the vertical tube in consequence of that force, by taking off
part of the pressure on the valve at the bottom, allows the
pressure of the atmosphere on the exterior water to force
the latter through that valve into the cylinder, and thus
maintain a constant supply in the machine.

For raising water from great depths and in large quan-
tities chain-pumps, as they are called, have been frequently
employed. In this machine (Fig. 4) a chain, carrying a
number of flat circular pistons, passes round a wheel at the
upper, and sometimes also at the lower extremity; each
piston as it goes over the wheels being in part received in
the intervals between the radii, as in the figure. The wheel
being put in motion the pistons descend in a barrel on one
side, and enter from below into another on the ascending
side, when, pushing the water before them, they raise it
into the reservoir. If the wheel is turned with considerable
velocity the barrel will be generally quite full of water.

Pumps of this kind are frequently fixed in inclined po-
tions; and it is when the inclination of the barrel is about
24° degrees, the distance of the pistons from one another
being equal to their diameter, that the greatest quantity of
water is raised.

Chain-pumps are sometimes constructed without pistons
or barrel; in this case the chain passes over two wheels,
one at the top and the other at the bottom, and a number
of buckets are attached to it. By turning the wheel the
buckets dip into the water with their open ends downwards,
and rising on the other side, convey the water into the
reservoir.
with a number of buckets, or troughs, into which the water is received near the level of the axle of the wheel; the vessels thus filled becoming heavier than those on the other side, the wheel is made to revolve by that excess of weight merely. But if the water fall into the troughs over the top of the wheel, or at least from a certain height above the axle, the wheel will revolve both by the weight and by the momentum which the water acquires by its fall. The latter is called an overshot, and the former a balanced wheel.

Again, if the lower part of the wheel be placed in a stream of water which is made to act on float-boards fixed on the circumference, the machine has the name of an undershot wheel. Lastly, when the wheel is placed in a sort of channel, or race, as it is called, which is formed between two projections of masonry below the bed of the upper portion of the stream, and so as to coincide very nearly with the lower quadrant of the wheel’s circumference on that side, the water descending from the stream upon float-boards, or troughs, and thus acting both by its momentum and weight, the machine is called a breast wheel.

Many contrivances have been adopted for enabling the buckets or troughs of an overshot wheel to retain, during their descent, as much as possible of the water which, by entering into them, causes the wheel to revolve; and one of those, which Dr. Robinson considers as the most approved, may be thus briefly described: premising that the ring of wood between the concentric circles Q D S and P A R (Fig. 6), constituting the ends of the troughs, is called the shrouding; and that the inner circle P A R is called the sole of the wheel: the sole usually consists of boards made fast to strong rings, which are firmly connected with the radii. The partitions which determine the forms of the troughs consist of three boards, whose positions are indicated in Fig. 7 by the lines A B, B C, and C D, which may be thus traced.—Imagine A I, G H, &c., to be drawn in the direction of radii at a distance from each other equal to 9 degrees, or one-fourth of the circumference of the wheel, if there are to be forty troughs, then the depth A I and G H of the shrouding may be made equal to 1 of the interval, or sole, A G; and A B may be made equal to half...
HYD [163]

HYDROBATA, Vieillot's name for the Water Black-birds, Circaeus. [Meigr.]

HYDROBATES, Temminck's name for the Sea Ducks.

HYDROBROMIC ACID. [Bromine.]

HYDROCELE (from Hidropo, water, and kela, a tumour) is a collection of watery fluid in the tunica vaginalis testis. It is characterized by the formation of a tumour; when it enlarges gradually without heat or pain, has a pyriform shape, is firm and elastic, often appears transparent when a light is placed behind it, and does not, like a hernia, diminish in size when the body is in a recumbent posture, nor communicate any impulse when the patient coughs. In most cases the fluid collects without any distinct cause, but in some it follows rapidly after an injury of the part. The quantity of fluid which accumulates varies from a few ounces to four or six quarts. This disease often occurs in those who are otherwise in perfect health, and in persons of all ages; it may be seated on one or both sides of the body. The treatment consists, 1st, in the evacuation of the fluid by tapping'. The fluid is generally prevented from accumulating again by exciting such active inflammation of the opposite surfaces of the tunica vaginalis as may produce their adhesion and the obliteration of the cavity. The fluid is generally supplied by the injection of some stimulant fluid, or the introduction of a foreign body into the cavity.

HYDROCEPHALUS (from hidrapo, water, and kephale, head), water in the head, is a disease nearly peculiar to infancy and childhood, which are distinguished as the acute and the chronic. These diseases differ entirely in their nature. Acute hydrocephalus is a disease rapid in its progress, and short in its duration, and of which the effusion of fluid in the head is but one, and that not a constant effect or concomitant. To constitute chronic hydrocephalus (an affection which may last many years) it is essentially necessary that the accumulation of a watery fluid within the skull, which may or may not be caused by or attended with inflammatory action.

1. Acute Hydrocephalus is a most frequent and fatal disease of the early stages of life. It occurs most commonly between the first and the eighth year, and corresponds in a great measure to the inflammation of the brain (phrenitis and arechnitis) of later years.

The rapidity of its disease when once formed, and its frequently fatal termination, render it a matter of the greatest importance to detect its first or premonitory symptoms. But these, which it frequently fails to the collected and isolated, is unfortunately seldom so marked as to be thought of demanding medical aid, and are indeed with great difficulty distinguished from the symptoms of other affections of far less formidable nature.

The child is perhaps liable to momentary giddiness while moving quickly, is fretful and nervous, and its rest is disturbed; it loses its appetite, its bowels are inactive, and the motions offensive. The eyes become heavy and very sensible to light and air, and the parts are without animation. There is more and more indisposition to motion; the little patient complains of heaviness of the head, and loses its strength; its gait is unsteady. Of the above symptoms, those referable to the skull are most frequently prominent: purgative medicine is given, and sometimes relieves the symptoms for a time. The child may remain in this state for several days or weeks without anything more serious, or it may come to be being complained of, and without any fever; but when the symptoms persist after purgative medicine has acted, they should be looked upon with apprehension; and if there be any known cause, such as the presence of worms in the intestines or the existence of a tooth, they should be closely attended to from the commencement.

The symptoms more surely indicative of the disease are...
more intense pain in the head, to which the child constantly carries its head; intolerance of light, sound, and motion; squinting; heat of the head; knitting of the brow; disturbed sleep, with grinding of the teeth, the child frequently waking with a scream; the pulse being at the same time slow and irregular, and not quick as in fever from worms or tooth- ing. The appetite is lost, the evacuations from the bowels are unhealthy, and vomiting ensues. The abdomen, if previously distended, now falls in and becomes quite flat.

Support given by screams, follows. After these symp- toms have continued for some hours or days, there will sometimes be a temporary recovery of sense; the child will see, hear, and know its friends, and will take its food; but the promiscuous attacks soon intermitting convulsions of the whole body, or of one side, paroxysms of one side, return of the squinting, complete loss of sight and hearing, and in- ability to swallow; still greater emaciation ensues, the breathing becomes irregular, the extremities cold, and death follows.

This is the more usual course of the disease; it then generally lasts several days or even weeks. But it in some instances comes on suddenly, and proves fatal in a few hours. In other cases the symptoms are less severe and more prolonged; and chronic hydrocephalus, gradually de-

velops itself.

The appearances which are found in the brain after death are congestion of blood-vessels, effusion of serum mixed with lymph in very variable quantity between the mem- branes at the base of the brain or its cavities, and softening of the substance of the brain itself, particularly of those parts of it which cover the floor of the head and ventricles. Sometimes there is merely effusion of clear serum, some-
times no effusion, but merely softening of the cerebral sub-
stance.

Causes.—Children of acrochroal diathesis, or of irritable temperaments, and those, it is said, of precocious intellect, with a large head, are most subject to this disease. Such children should be as much as possible guarded from agencies likely to excite increased flow of blood to the brain, such as cold or external violence to the head, the influence of the sun, the suppression of eruptions of the skin, and particularly of the scalp, the use of narcotic remedies, as opium, too great excitement of the mind, and the early ex-

ercise of the intellectual powers.

The treatment must vary in the different stages of the disease, but will generally consist in endeavouring to subdue inflammatory action, in removing any causes which may, directly or indirectly by sympathy, keep up irritation of the brain; and lastly, in the latter stages, in supporting the strength of the system.

2. Chronic hydrocephalus.—The disease to which this name is applied is correctly denominated water in the head, being always accompanied with a considerable collection of watery fluid in the cavity of the head, sometimes within the membranes of the brain only and exterior to the organ itself, but more frequently in the ventricles or cavities of the cere-

bral hemispheres, which are then distended to the form of a sac. The quantity of fluid is sometimes so great as to cause an increased size of the skull, amounting to great deformity; the face, remaining of its natural size, appears disproportionately small. The disease generally arises before or very soon after birth; and the cranial bones not being completely ossified at the time of its commen- cement, they become separated to a distance from each other, and the sutures remain open for a long period. When the disease comes on after birth its early progress is very insidious.

Symptoms.—The intellectual faculties are always de-

ranged, and the senses generally more or less disordered; there is usually impaired vision or blindness, with squint-

ing; speech is imperfect; the voluntary power over the limbs is partially lost, giving rise to an unsteady gait, as a frequent symptom. The digestive functions, respiration, and circulation, are in most cases unaffected until near the ter-
minal of the disease. The unfortunate patient is some-
times the subject of occasional epileptic fits. In the latter stages of the disease the loss of intellect and of the power of motion increases, till at last complete coma and paralysis ensue.

The duration of the disease is extremely various. It may terminate fatally even before birth, or the child may live for many months or years. A man named Cardinal, the subject of water in the head, lived a few years since at Guy's Hospital, aged thirty-two years: and a woman is mentioned by Gall and Spurzheim as having lived to the age of forty-five years, though after death four pints of fluid were found in her head.

The amount of fluid accumulated in the brain or its membranes is as various as the duration of the affection. It may not exceed a half a pint or a pint, or it may reach the quantity of several pints. In the patient Cardinal, ten pints of fluid were contained in the head. Cases are re-
corded in which as many quarts have been found.

Causes.—The children of scrofulous parents, and those of a rickety diathesis, are most prone to chronic hydroceph- alus. Any causes acting on the mother so as to interfere with the proper nutrition of the fetus may produce it. Sometimes several children of the same parent are similarly affected from birth. Chronic hydrocephalus may be left as a consequence of the acute disease.

Treatment.—In the majority of cases medical treatment is quite useless, except in the early stage of the disease, and when it has come on subsequently to birth. If there are symptoms of subacute inflammation existing, the means calculated to subdue this are used with benefit. The next great object to be effected is to remove the accumulated fluid. This may be attempted by internal remedies sup-
posed to accelerate absorption, or it may be effected by punctur- ing the head. The latter operation has been performed at different times by many surgeons, and in numerous in-
stances with success.
HYDROCHLORIC ACID. [Chlorine.]


ORGANIZATION AND ARRANGEMENT.

Dental Formula: incisors \( \frac{2}{2} \); molars \( \frac{4}{4} = 20 \).

Molars compound, the posterior teeth the longest, and formed of numerous laminae, which are simple and parallel; the laminae of the anterior molars forked.

At a meeting of the Zoological Society of London (1839), Mr. Owen, on the occasion of exhibiting a large old cranium of the Copypara belonging to Mr. de la Fons, remarked, that perhaps the most extraordinary instance of the enlarged views which result from unwaried observation of the internal structure of animals is afforded by Cuvier’s bold enunciation of the affinity of the Elephant to that order of the Mammals which contain the most minute forms of the class, and, in support of that affinity, added the alveolus of the last molar tooth in Mr. de la Fons’s specimen as illustrating an additional analogy between the molars of the Rodent and those of the Elephant, namely, that the number of transverse laminae increasing as the jaw enlarges with age, the whole number not coming into use at once.

"In the Copypara," says Mr. Owen, ‘the posterior grinders, like those of the Elephant, present a greater number of component laminae than the anterior ones, which are of earlier formation. Those of the upper jaw, according to the figure and description in the “Osemens Fossiles” (V. pl. 1, p. 24), are composed of eleven laminae, of which all but the first, which is notched externally, are simple. In the figure too, it is worthy of observation that the last or eleventh lamina is imperfect, and exhibits a construction analogous to the imperfectly-formed laminae or denticles in the Elephant’s grinders, viz. a division into component columns. In the work of M. F. Cuvier, “Sur les Dents des Mammifères,” the number of laminae in the last grinder of the upper jaw of the Copypara is stated as “onze ou douze,” (Cœcorhæa); but eleven only are exhibited in the figure, and we may suppose therefore the doubt as to the precise number to be founded on uncertainty as to the propriety of considering the first deeply-notched laminae who have not been seen. In the cranium in the College Museum the number of the laminae is twelve, the forked one being regarded as single. In Mr. de la Fons’s specimen the alveolus clearly indicate that the number of laminae of the last molar had been thirteen, with the rudiment of the fourteenth; the extent of the grinding surface is however proportionally longer than would result from the additional laminae alone; for as these laminae do not grow so long as the others, they increase in thickness as age advances." (Zool. Proc.)

Mr. Morgan (1830, Lit. Trans., vol. xvi.) describes the stomach as formed by a single membranous bag; and, as in other mammiferous vegetable feeders, in which this simple form of stomach is found, the oesagus as large and complicated in proportion. Finding nothing requiring particular notice in the rest of the alimentary canal, Mr. Morgan proceeded to examine the structure of the mouth and throat. After extirpating the teeth and the projecting surfaces of the molar-teeth, he remarks that it must be obvious how necessary such an arrangement of parts must be to the health of the animal, when the nature of its food and the simple structure and limited functions of its most important digestive organ are considered, a provision being thus made for the proper mastication of the hard vegetable substances upon which the animal must occasionally subsist.

But Mr. Morgan found another undescribed up to the time when he made his examination, by which the process of perfect mastication is rendered indispensable to the passage of the food from the mouth to the stomach. This structure, by which the possibility of swallowing any portion of unmacerated nutriment is prevented, is shown in an extraordinary formation of the velum palati molis, or soft palate. In other animals this membrane generally forms an imperfect floating septum, suspended from the back of the roof of the mouth, and interposed between the cavity of the mouth and pharynx, but it was found in the copypara and in some of its congeous to be much more extensive in its attachments, and different in its internal uses. On separating the jaws in the mouth appears to terminate in a nearly blind pouch; for the communication with the pharynx seems as if shut by a strong membrane of a funnel shape, the concavity of which were directed towards the throat. This membrane is an extended velum palati attached to the whole circumference of the fauces and root of the tongue, and is prevented from forming a complete septum by the existence of a small central circular aperture, by which a communication between the mouth and the pharynx is established for passage of food; so that through this small membranous funnel, or strainer (if I may be allowed the expression), it is physically impossible that any considerable portion of unmacerated nutriment should find its way, by natural means, from the mouth into the alimentary canal; and from this circumstance the first process towards digestion must be rendered certain and complete; for this gourmand of food must remain in the mouth from the interposition of the membranous sieve or strainer, which is thus placed between the organs of mastication and those of digestion.

Mr. Morgan remarks that the same complete mastication of all solid substances, previous to their being swallowed, will be found in others of the same group, but he confines his well executed descriptions and figures of the anatomy of these parts to the dissections he had made of the copypara. To these dissections and figures we refer the reader, offering only the conclusion to which Mr. Morgan comes as to the use of this conformation of the velum palati: this appears to him to have reference to the digestive organs, and to be confined almost entirely to the process of deglutition.

In 1834 portions of the viscosa of a Copypara, taken from an individual which had recently died in the Zoological Society’s menagerie, were exhibited at one of their meetings. They consisted of the stomach, the enormous oesagus, and the fauces. In calling the attention of the meeting to the latter parts, Mr. Owen availed himself of the opportunity of pointing out the strainer-like construction of the organ, as described by Mr. Morgan, and the former zoologist remarked that the construction abovementioned is indeed found in many other Rodentia, but does not obtain in the whole of the animals of that order.

The size of the laminae in the posterior molar teeth, and the increase in their number, indicate some approach to the pachydermatous form, and we find among some of the earlier mammiferous we have no difficulty in approximating it to the Hogs. Thus Maregrave says (p. 30, book iii.), ‘Copypara inter porcos aquaticos sive fluviatiles recipitur, quia figura et natura omnium pororum emulatur.’ Brissou’s name, Hydrocerus, Water Hog, and Des Marchais’ Cœcorhæa d’Eau, point the same way; but Louis, in his last edition of the Systema Naturæ (12th), arranges it
under the genus *Sus* (Beliace), as *Sus Hydrocharis*, and immediately after the *Sus Typha* or *Peccary*, next to which animal it is placed in Piso's Marmagrace. Pennant, in his 'Synopsis,' calls the Cavybara, with River Hog (Wafer, in Dumpees), as one of the synonyms, the Thick- nosed Tapir; but his 'History of Quadrupeds' he makes it the first species of his genus Caryx, giving it a place immediately before the Guiney Pig. Gmelin (13th ed. 'Synt. Nat.') places it among the Glères, as the last species of the genus Cavia, immediately after the Guinean Pig, Cavia Cobaya; by which arrangement the animal comes next to the Beaver, Castor. Cuvier makes Hydrochorus a genus of his Rodents, giving it a position between Lagomys and the Guinean Pig. Fischer brings it under the Glères, between Lagomys and Dasypodius. Mr. Gray places it in the order Glères, family Leporidae, subfamily Hydro- chorinae; Hydrochorus being the only genus of that sub- family, which stands between the subfamilies Castoridae and Dasypodinae. M. Lesson arranges it between Kerodon and Cavia (Glères). Mr. Swainson also places it at the head of the Cavius, Cavia (Glères).

**Generie Character.**—The dentition we have given above.

The other characters are principally found in the four an- terior and three posterior toes with which the feet are fur- nished (all of which are armed with large nails, or rather horns) instead of claws, through which, the compressed muscle, the absence of the tail, and twelve teats.

The only species is Hydrochorus Cavybara, Cavia Ca- vypara of Gmelin, *Sus Hydrocharis of Linnaeus*, most of whose synonyms are given to complete the chain of affil- iations which links the Pachydermata to the Rodent and Catataeous orders. [TOXODON]

N.B.—The American Tapir is included under the genus *Hydrochorus* of Erxleben, and the Guinea Pig under the genus *Hydrochorus* of F. Cuvier, according to Dr. Fischer.

**HYDROCYANIC ACID.** This acid, which, as its name imports, is a compound of cyanogen (bicarburet of azote) and hydrogen, was first obtained by Conway in 1810; as it was procured, though intermediately, from Prussian blue, it was originally called prussic acid. This acid probably exists ready-formed in several vegetable products, as the leaves of the cherry-laurel and the peach-tree; for when these or bitter almonds are subjected to distillation with water, the distilled fluid has the peculiar smell and poisonous properties of hydrocyanic acid, and, like it, produces under certain circumstances of Prussian blue when added to a solution of iron. It is however possible that the hydrocyanic acid thus obtained is a product, and not an educt, its ele- ments only existing in the vegetable matter.

Various attempts have been proposed for obtaining this acid: that of Gay-Lussac, who discoursed on the compound nature of its base [CYANOGEN], and by which acid of the greatest strength and most marked properties is procured, is the following:—Put into a glass retort some biycyanide of mercury; then let a glass of water be retort a glass of water be added; let long and half an inch in diameter; put into one-third of the tube, and that which is nearest the retort, pieces of marble, and let the other two-thirds be occupied by frag- ments of chloride of calcium. Four upon the bica- onid of mercury about two-thirds of its weight of concentrated hydrochloric acid: apply a gentle heat to the retort, and by its action bichloride of mercury remains in the retort, and hydrocyanic acid is formed, and liberated in the state of vapour, and condensed in a receiver cooled by ice. The marble is employed for arresting any undecomposed hydro- chloric acid which may be volatilized, and the chloride of calcium to diminish the acid to a suitable pitch.

Another method of preparing this acid, which is adopted in the London Pharmacopoeia, is that of decom- posing ferrocyanide of potassium by distillation with sulphuric acid and carbonic acid, which are produced in the apparatus, when the decomposition is so far advanced that the acid procured by the process just described, the properties of which are as follows:—it is a colourless liquid, with a strong and peculiar odour; its taste is at first cooling and after- wards burning; its density, at a constant temperature of gravity is 0.9699; it boils at about 80°, becomes solid at about 5° Fahr., and then crystallizes in fibres. As an acid, its powers are but feeble; for though it reddens litmus paper, its blue colorations as the acid evaporates; and in this property it resembles carbolic. It is so very volatile, that when dropped on paper, the sudden evap- oration of a portion of it renders the remainder so cold.
that it solidifies; and this effect is produced even when the temperature of the atmosphere is nearly 70°. The vapour of hydrocyanic acid has a specific gravity of 0.9365, air being 1. With water and alcohol it combines in all proportions.

Hydrocyanic acid is composed of—

One equivalent of hydrogen 1 or 3:7
One cyanogen 26 98:3

Equivalent 27 100

In the state of vapour it may be considered as constituted of—

50 cubic inches of hydrogen 1'075 grains
50 cyanogen 27'950

100 cubic inches 29'025 grains.

Neither condensation nor expansion occurs during the combination of the gases which form the acid.

Hydrocyanic acid, especially if it be exposed to light, is subject to spontaneous decomposition, the first indication of which is that the acid acquires a brownish tint, which gradually deepens, and eventually ammonia is evolved, and a black powder subsides.

On account of the facility with which it decomposes, it forms for ever, like other hydrenes, a liquid state, but it is decomposed when added to metallic oxides, the results being a metallic cyanide and water. Hydrocyanate of ammonia may however be formed, but it is an unimportant salt.

HYDRODYNAMICS. Under this name are usually comprised the considerations of the equilibrium and of motion in non-elastic fluids, with the resistances which they oppose to bodies moving in them. When a fluid is in a state of rest, the investigation of its equilibrium and that of bodies immersed in it, together with the pressure exerted by the fluid on bodies immersed in it, or containing it, form the subjects of hydrostatics. Hydrodynamics, which was formerly included under the term hydraulics, is concerned chiefly in investigating, by mathematical reasoning, or by showing from observation and experiment, the laws relating to the discharge of fluids through orifices and tubes in vessels or reservoirs, and to their motions in canals or rivers.

Concerning the laws of the motions of fluids as they were known to the ancients little can be said; the only notice of this branch of science, even in the time of the Roman empire, is contained in the treatise De Aquarum Motibus, which was composed by Frontinus, in the reign of Nerva or Trajan.

This writer shows that the quantity of water issuing from an orifice depends on its magnitude, and on the height of the water in the reservoir above the orifice; and states that a short tube applied to an orifice occasioned a greater discharge of fluid than could be obtained from a simple perforation of equal diameter. He appears however to be unacquainted with the manner of determining the velocity of the fluid, or the force of the water when it is given; and it is not certain that this elementary proposition was solved till the time of Torricelli, who, in 1643, assigned the law correctly, for that case only however in which the aperture is very small compared with the height of the water in the vessel or reservoir.

It appears that, even at the end of the sixteenth century, the cause of the ascent of water in pumps was little known; for Galileo, having occasion to make some observations on the phenomenon, could give no better reason for it than that it was caused by an attraction which he supposed the piston exercised on the water; and not being able to make the column of water follow the piston when the latter was about 34 feet above the surface of that in the well, he attempted to explain the circumstance by saying that the weight of the column was then so great as to overcome the attraction of the piston. We are indebted to Torricelli for the discovery that the rise of the water is owing to the pressure of the atmosphere on that which, in the well, surrounded the pump; and which is thus forced into the barrel, in consequence of the removal of the internal air, till the weight of the column raised is in equilibrio with that pressure.

Castelli, a disciple of Galileo, in his treatise Della Misura dell' Acque Correnti (1639), appears to have been the first who distinctly enunciated the laws of the velocities of fluids in rivers; and, together with several other circumstances relating to such motion, he shows that when the bed of a canal whose transverse section is variable has taken a permanent form, the velocities at different sections are inversely proportional to the areas of those sections. This branch of the science was subjugated to the investigations of hydrodynamics; and though objections were made to the principle which he adopted, yet the independent investigations of succeeding mathematicians have only confirmed the results at which the former had arrived. The subject was taken up in 1744, by D'Alembert; who, assuming that the motion of each horizontal lamina of fluid in a vessel, during its descent in consequence of the efflux from the orifice, is compounded of two motions, viz. that which it had at the moment preceding any given time, and that which is subsequently lost, arrived at equations containing all the circumstances attending the efflux at the orifice. And, subsequently, he investigated corresponding equations from the first assumption, first, if the rectangular canal supposed to exist in a fluid mass which is in equilibrio is itself in equilibrio; and secondly, that a molecule of fluid supposed to be incompressible retains the same volume under a different form in passing from one place to another.

The researches of Euler, La Grange, La Place, and other Continental mathematicians have, since, contributed greatly to establish the principles of the science on an analytical basis. The laws of the motions of fluids in canals and rivers were, with every possible precaution to ensure accuracy, determined experimentally by the Abbé Bosaut in 1771, and by the Chevalier Du Buat in 1786.

In investigating the circumstances attending the discharge of fluids through orifices it is usual to suppose the fluid to be divided into an infinite number of indefinitely thin laminae perpendicular to the axis A B (fig. 1) of the vessel in which it is contained, and that in the descent of the fluid these laminae preserve their parallelism till they come near the orifice, when they assume the shape of a funnel, about which the fluid is stagnant. In the process immediately following, let the vessel be cylindrical or prismatical, in a vertical position, and have an orifice B. Now if p, q, r be the areas of the lamina, its distance from A being expressed by x and its area (perpendicularly to the axis) by s, we shall have a dx for the volume of the lamina;
It follows also, that the velocities of spouting fluids, at different depths below the upper surface, are proportional to the square roots of the depths; that the quantities of fluids discharged in equal times at different depths in the vessel, the latter being constantly full, are to one another in a ratio compounded of the square roots of the depths and the square roots of the heights; and that the quantity of water which would be discharged in a given time $t$, through an orifice $a'$ in a vessel kept constantly full at the height $h$, is expressed by $a't^{3/2}g^{3/2}h^{3/4}$.

The velocity $u$ or $\sqrt{2gh}$ expresses the length of a cylinder of water which would flow through the orifice in one second; consequently the time of discharging from a cylindrical or prismatical vessel, the area of whose base is $a$ and whose height is $h$, a quantity of water equal to that which the vessel will contain, the latter being however kept full during all the time that the water is flowing, will be found by making $ah$ equal to $a't^{3/2}g^{3/2}$; whence $t$ (the time required) = $a\sqrt{\frac{2h}{g}}$. The value of $g$ is 32.17 feet, or 386 inches; and in these values of $u$ and $t$ it is evident that the areas and height must be of the same denomination as $g$.

When a vessel is suffered to discharge itself gradually, the velocity of the effluent water diminishes continually. Now if $x$ be the depth to which the water has descended at the end of the time $t$, $h$ being the whole height when the vessel is full, then $x$ will be the height of the fluid at that time; and we shall have $\sqrt{2gh}$ for the velocity in the orifice. This may be supposed constant during the time $dt$, and then the quantity of fluid discharged in that element of time will be equal to $a'dt^{3/2}g^{3/2}(h-x)$.

In the time of this discharge the upper surface of the fluid will descend through the depth $dx$; therefore the area of the upper surface being $a$, we have $a'dx = a'dt^{3/2}g^{3/2}(h-x)$, and

$$\frac{dx}{a} = \frac{dt^{3/2}g^{3/2}(h-x)}{a^{3/2}u^{3/2}}$$

If the vessel is an upright cylinder or prism, $a$ is constant, and the integral of the expression is

$$\int_{x=0}^{x=\sqrt{2gh}} \frac{a'dt^{3/2}g^{3/2}(h-x)}{a^{3/2}u^{3/2}} = \int_{x=0}^{x=\sqrt{2gh}} \frac{a'^2}{a^{3/2}u^{3/2}}(\sqrt{2gh} - x) dx$$

But the equation of the integral becomes $\frac{dx}{a} = \frac{a'u^{3/2}}{a^{3/2}u^{3/2}} = \frac{a'dt^{3/2}g^{3/2}(h-x)}{a^{3/2}u^{3/2}} = \frac{a'dt^{3/2}g^{3/2}(h-x)}{a^{3/2}u^{3/2}}$;

whence

$$\int_{x=0}^{x=\sqrt{2gh}} \frac{dx}{a} = \int_{x=0}^{x=\sqrt{2gh}} \frac{a'dt^{3/2}g^{3/2}(h-x)}{a^{3/2}u^{3/2}}$$

The pressure at the bottom of the orifice is

$$-\frac{2gh}{a'^2}$$

or $\frac{1}{a'}$.

This expresses the relation between the velocity $u$ and the difference between the weights of two fluid volumes of the fluid having unit for the base of each, and whose heights are $h$ and $x$. When $x=0$, the equation becomes $o = -\frac{2gh}{a'^2}$; or considering the orifice as infinitely small so that $a'$ and the whole first term of the second member vanishes, we have $o = -\frac{2gh}{a'^2}$; if $u$ be $\sqrt{2gh}$.

Now $g$ expresses the weight of a prism of fluid having unit for the area of its base and whose height is $h$; and this is the pressure of the fluid against a small orifice at the bottom of the vessel: but, while the height $h$ is the same, the pressure is the same whatever be the position or inclination of the orifice; therefore $\sqrt{2gh}$ will express the velocity at the same depth, whether the orifice be at the bottom or side of the vessel.

By the theory of forces this is equal to the velocity acquired by a body descending by gravity through a height $h$, equal to that of the column of fluid, the orifice being infinite in extent.

It may be concluded from the above theorem that the velocity of a fluid spouting upwards through an orifice in a vessel would cause it to ascend to the level of the upper surface of that in the vessel, if the resistance of the air were abstracted.
the quantity discharged in the same time \( t \), the velocity of the effluent water being now equal in every part of the orifice, and being that which is due to the whole height \( h \), would be expressed by \( bt \sqrt[4]{gh} \). The discharge found above is manifestly equal to two-thirds of this quantity.

In the second book of the "Principia," Newton shows that all the particles of matter in issuing from a slit in a vertical plane and perpendicularly to the side or bottom in which it is formed, many of them converging towards the orifice in every direction; so that after passing it they form a stream of diminished breadth, which has called the name convergent. If measurement be found the diameter of the latter and that of the orifice to be one another in the ratio of 21 to 25; and he infers that the velocity in the contracted stream must be to that at the orifice in the same proportion as the squares of those numbers; that is nearly as 1 to \( \sqrt[4]{2} \). Hence, finding from experiment that the velocity in the said stream was equal to that which a body would acquire by falling through the whole height of the fluid column in the vessel, he concludes that the mean velocity in the orifice must be that which is due to half the height of the same column. The ratio between the diameters of the stream and of the orifice is rather differently stated by such, as A B B at 4 to 5 is the ratio assigned by Venturi. No actual acceleration of the particles is supposed to take place after they have passed the orifice; but those near the surface of the stream having their direct motion diminished by friction, or by motion in their descent, the mean velocity of the whole is reduced to something less than that of the central particles which issue more directly. Since, in theory, the quantities of water discharged through orifices are made to depend on the mean velocity of the particles, it follows, when the discharge is made through a small orifice in a thin plate, that the quantity which flows in a given time is always greater in practice than it would appear to be by the theoretical formulæ. The experiments of Bosc let show however that the ratio between the results of theory and practice is very nearly constant whatever be the height of the orifice, and is founded on the supposition that the discharges may always be represented with sufficient accuracy by the expression \( 0.654at \sqrt[4]{gh} \), a being the area of the orifice.

The results of experiments tend to show that, when the head of water is great, the mean of the diameters of an orifice in its base or side are given, the discharge of water through a tube in the orifice (its length not exceeding three or four times its diameter) is, to that through the simple orifice, nearly in the ratio of 12 to 11; and it is observed that, with a given diameter at its extremest extremity, the tube which is formed to coincide as nearly as possible with the natural figure of the vena contracta affords the greatest discharge. The simple orifice is fixed vertically in the base of a vessel, the effect is increased in proportion nearly to the length of the tube; since the velocity at the lower extremity of the tube is that which is due to the height of the fluid above the base of the vessel, but to the height above the extremity of the tube. Again, if a short tube be applied horizontally to an orifice in the side of a vessel, the part nearest to the vessel having the form of the vena contracta, and, from the narrow part of the tube, diverging conically, the discharge of water is found to be more abundant than from a tube whose form beyond the vena contracta is cylindrical. For, when the water has filled the tube, the cylindrical stream through the contracted part cannot be made so large as in a tube parallel to the rest of the water, till it causes the whole to acquire the same velocity. The quantity discharged in this case, compared with that discharged from a cylindrical tube, is nearly in the ratio of 12 to 11. And, if the conical tube at its extremity be to that of the vena contracta,
any two points at the surface in a longitudinal section is to the distance between those points on the surface. That the motive force of the molecules composing a river depends on the upper surface only may be easily admitted, when it is considered that the bed may have any inclination and any degree of irregularity, yet if the upper surface be horizontal the water will be at rest.

If the water of a river experienced no resistance from the sides and bed, its motion would go on continually accelerating from its source to its mouth, like a solid body falling by the action of gravity; and the consequences would be, that besides the destruction ensuing from the violence of the torrents in the lower lands, the moisture would be drawn from the soil in the upper regions, which would thus become incapable of supporting vegetable and animal life. The adherence of the particles of water to each other, and the friction against the beds, produce a resistance which increases with the velocity of the current, and becomes at length equal to the accelerative force of the descent; and then a uniform motion is established.

But when a current is in a state of equilibrium, the velocities in different transverse sections of the river may be very unequal, on account of the variations in the areas of those sections, through all of which the same quantity must flow in the same time; since otherwise the equilibrium of the river would not be permanent. It follows that the products of the areas of the sections multiplied by the velocities in each must be equal to each other, and that the velocities in different sections must be inversely proportional to the areas of those sections.

If the difference of level between any two points on the surface of a river or canal, in a longitudinal section, be equal to one inch, and if, in inches, be the distance of those points on the surface, the slope of the river may be represented by \( \frac{e}{l} \). Then, since the accelerative power of gravity vertically, is to the accelerative power on any plane, as the length of the plane is to its vertical height; we shall have \( \frac{e}{l} \) for the accelerative power in a river whose slope is \( \frac{1}{r} \).

Again, if the resistances to the motion of the fluid were, as is sometimes the case nearly, proportional to the squares of the velocities, so that the resistances might be represented by \( \frac{v^2}{m} \) (\( m \) being constant, and \( v \) representing the mean velocity); then, because when water in a river moves uniformly, the resistance is, as in all like cases, equal to the accelerative force, we should have \( \frac{v}{m} = \frac{e}{l} \); whence

\[
v = \sqrt{\frac{mg}{l}}.
\]

But the resistances in canals and rivers are not strictly proportional to the squares of the velocities; and it is found by experiment that, in one and the same bed, \( \sqrt{\frac{v}{l}} \) - hyp. log. \( \frac{v}{l} + 1 \) may be considered as constant, and may be represented by \( \sqrt{\frac{mg}{l}} \).

Fig. 3.

Similarly, in other beds whose transverse sections differ both in area and figure, when the mean radius is represented by \( r \) (where

\[
\frac{r}{\text{area} \, A \, C \, B} \quad \text{fig.}
\]

it is found by experiment that \( \sqrt{\frac{mg}{l}} \) is constant and equal to 307 inches; hence

\[
\sqrt{\frac{mg}{l}} = 307 \quad (\sqrt{\frac{v}{l} - 0}\) and \( m = 244 \quad (\sqrt{\frac{r}{l} - 0}\) inches. Consequently we obtain

\[
v = \sqrt{\frac{m}{l}} \quad \sqrt{\frac{v}{l} + 1} = 307 \quad (\sqrt{\frac{v}{l} - 0},\)
\]

or

\[
\sqrt{\frac{v}{l}} = \sqrt{\frac{m}{l}} \quad \sqrt{\frac{v}{l} + 1} = 307 \quad (\sqrt{\frac{v}{l} - 0} - 0.1).
\]

But further investigation leads to the conclusion that this expression for \( v \) must be diminished by \( 0.3 \quad (\sqrt{\frac{v}{l} - 0} - 0.1) \) on account of the resistance of the water opposing a separation from each other, (Du Buis, Trait留守儿童Edphydynamique).

As an approximation we may make \( \sqrt{\frac{mg}{l}} = 307 \quad (\sqrt{\frac{v}{l} - 1}) \) and \( v = 307 \quad (\sqrt{\frac{v}{l} - 1}) \). And by experiment it has been found that if \( v' \) = the velocity at the surface of a river, \( v'' \) the velocity at the bottom, and \( v \) the mean velocity (all being expressed in inches per second), we shall have

\[
v = \frac{v + v''}{2}. \]

The mean velocity in any one section may be practically found, taking the mean of those nearer the banks or the middle, or of a rod of wood loaded at one end with a weight sufficient to allow it to float upright in still water. The greater velocity at the upper surface will make the rod incline towards the direction of the current. As soon as the rod is acquired in a state of equilibrium, it will float in an oblique position: the top of the rod will move slower than the water at the upper surface of the river, and the bottom will move faster than that in the lower part. Hence, the mean velocity of the water in that part of the breadth of the river may be considered as nearly equal to the observed velocity of the rod. The experiment must be tried in different parts of the breadth of the river; and, in order to find the quantity of water which flows through the section in a given time, the area of the section must be obtained by measuring the breadth and sounding the depths at intervals across the river.

A knowledge of the velocity at the bottom of a river is of considerable use in enabling the hydraulic engineer to judge of the action of the stream on its bed; and it is evident that, to ensure permanency, the accelerative force of the water would have to be in equilibrium with the friction in the channel. It is stated that a velocity of 3 inches per second at the bottom will remove fine potter's clay: a velocity of 6 inches will lift fine sand; that of 12 inches will sweep away small gravel; 24 inches will roll away rounded pebbles, and 3 feet per second will carry along angular stones of the size of an egg. Bossett found, that when the velocity of the stream was just sufficient for lifting the sand, a ridge advanced about the sand in a day.

Irregularities in the sides and beds of rivers, whether arising from natural causes, or produced by artificial obstructions, are the causes of currents setting obliquely across, and of eddies being formed. These not only diminish the velocity of the water by creating impediments to its motion, but are sometimes seriously detrimental to the navigation, and to the stability of the structures which are founded in the bed of the river. When waves are made to project into the stream, the water striking them is forced to rise above its general level, on account of the obstruction; and is afterwards reflected towards the middle of the channel, with a velocity due to the rise thus produced. This current, by its lateral action, some of the water from the parts beyond the obstruction; the surface of the river being here, consequently, depressed, a portion of the water from the oblique current falls by gravity into the lower part, and thus a sort of whirlpool is formed, between the opposite place where the obstruction is situated, and the point of the stream from which the current was projected.

This process goes on continually; and the pressure upon the bed of the river under the whirlpool being diminished in consequence of the centrifugal force arising from the spiral motion, the water under the bed forces its way upwards, removing the gravel and sand, and frequently displacing the materials which form the foundation of the work there constructed.

When a body moves in a fluid at rest, its anterior surface being perpendicular to the direction of the motion; if an indefinitely thin lamina of fluid be supposed at every successive instant of time to be displaced, the resistance experienced by the moving surface may be considered, equal to the weight of a column of fluid whose base is the surface pressed, and whose height is that which is due to the velocity; that is to say, the resistance may be supposed to be equal to the pressure which would produce the same acceleration in the base or side of the vessel. A difference of opinion has however existed respecting the amount of the pressure sustained by the moving surface. For a vein of water issuing from a vessel and striking a plane surface at rest is shown by Newton (Principia, lib. ii. prop. 36), and the fact seems to be confirmed by the experiments of Kraft and Bossett, to exert a pressure upon that surface equal to the weight of a column of water whose height is that which is due to the velocity; however, it has not however proved that, even if such should be the case.
with respect to the central part of the impinging column of fluid, the mean pressure is less, on account of the lateral deviations of the exterior filaments, and the amount first stated above is that which is generally assumed.

If the velocity be represented by $v$, the height due to that velocity is equal to $\frac{vo}{2g}$; then a representing the area of the moving surface, and $D$ the specific gravity of the fluid, we shall have $\frac{ao}{2g} D$ for the pressure against, or the resistance experienced by that surface in moving through the fluid.

But when the anterior surface of the moving body is oblique to the direction of the motion, the resistance above found must be diminished on account of the inclination. The summation; the several partial filaments which act against a plane perpendicularly is, to the number which can act upon it in an oblique position, as radius $(=1)$ is to $\sin i$. And by mechanics, the intensity of any force acting obliquely on any plane is a decomposed part of the whole force, and is to the latter in the ratio of sin.$i$ to $\cos i$ $= (1)$. Therefore the effective pressure against an oblique plane varies, as sin.$i$; consequently when the body is oblique to the direction of its motion, the resistance which it experiences is to be expressed by $\frac{ao}{2g} D\sin i$.

If a cylindrical body, terminated in front by an equalateral cone, move through a fluid in the direction of its axis; it may be shown that the resistance experienced is one-fourth, and if the body be terminated in front by a hemisphere the resistance is one-half of that which would be experienced by the same cylinder if it were terminated in front by a plane. When a prismatic body is placed in a stream of water the effort necessary to keep it immovable in the fluid is equal to the difference between the pressures in front and behind it. The pressure in front is equal to the sum of the pressure produced by the moving water and of the dead pressure, as it is called, which takes place when the body is at rest in still water; and the pressure on the rear face is merely equal to this last. When a body of that kind is made to move in a fluid at rest, its progress is retarded by the same difference of the pressures before and behind, and by the friction of the water against the sides. Additional causes of retardation are the heaping up of the water in front when the velocity is considerable, and a diminution of the pressure on the hinder face on account of the surface of the water there being depressed below the general level; a circumstance arising from the lateral communication of motion in fluids, by which the water, driven off from the front, and proceeding in a diverging direction on each side towards the rear, carries away with it from thence some of the water which should counteract in part the pressure on the hinder face.

The circumstances attending the resistances experienced by bodies of various forms and lengths when caused to move in water have, within a few years, been made the subject of numerous experiments which were carried on by the late Colonel Beaufort in the Greenland Docks. Ample details of these valuable experiments are given in the volume lately published; and the following are some of the results:

The friction of bodies moving in water is equal to a power of the velocity whose exponent is 1.449.

The pressure sustained at the head end varies in rather a higher ratio than the square of the velocity, when the velocity is small, and the exponent diminishes with an increase of velocity.

The diminution of pressure on the stern, caused by the fluid not pressing so strongly there when the body is in motion as when at rest; varies in a lower degree than the square of the velocity; and the exponent diminishes with an increase of velocity.

A globe experiences about one-third of the resistance which is encountered by a plane of the same diameter, and the complete globe, is nearly equal to one-fifth of the latter.

Bodies whose head-ends are formed with curve lines have great advantage in respect of resistance over those formed with right lines.

The greatest breadth of a moving body should be at a distance from the head extremity equal to two-fifths of the body's length; that the body may move through the water with the least resistance.

Increasing the length of a solid of almost any form by the addition of a cylinder in the middle greatly diminishes the resistance with which it moves, provided the weight in water continues to be the same.

By comparing the resistance of bodies near the surface with those having similar head and stern ends, and which were immersed to the depth of six feet, those at the surface were found to experience more retardation than the others.

(Mariotte, Traité du Mouvement des Eaux, 1668; Newton, Philosophie Naturalis Princpia, 1713; Daniel Bernoulli, Hydrodynamica, 1738; D'Alembert, Traité de l'Equilibre et du Mouvement des Fluides, 1744; Essai d'une Nouvelle Théorie sur la Résistance des Fluides, 1752; Emerson, Mechanica, 1759; Leccehi, Idrostatica Esemplificata, 1765; Don George Juan, El Movimiento Marítimo, 1771; Micheletti, Sperimenti Idrauliche, 1774; Smeaton's Experiments on Water-wheels, in the Philosophical Transactions, 1759 and 1776; Belidor, Architecture Hydraulique, 1789; Prony, Nouvelle Architecture Hydraulique, 1790; Boussy, Traité Théorique et Expérimentale d'Hydrodynamique, 1796; Venturi, Recherches Expérimentales sur la Communication L BMlatère du Mouvement dans les Fluides, 1797; Prony, Recherches Physico-Mécaniques sur la Théorie des Eaux Courantes, 1804; Mollet, Hydrodynamique, 1810; Du Buat, Principes d'Hydraulique et de Hydrodynamique, 1816; Hachette, Traité Élémentaire des Machines, 1817; Borgius, Théorie de la Mécanique Universelle, 1821; Robison, Mechanical Philosophy, 1822; Gregory, A Treatise of Mechanics, 1826; Poisson, Traité de Mécânoise, 1833.)

HYDROFLUORIC ACID, a compound of fluorine and hydrogen which was first made known by Scheele in 1791. Knight (Phil. Mag., xvii, p. 357) first suggested an apparatus for procuring it in a state of purity, though not of the greatest strength. The properties of this acid were minutely examined by Robison, its analysis being given by him in 1810. (Recherches Physico-Chimiques.) Fluor spar, or what is more correctly termed fluorspar of calcium, is to be mixed with twice its weight of strong sulphuric acid, and put into a leaden or silver retort, to which a receiver of the same metal is to be adapted, and surrounded with ice or snow mixed with salt. When a moderate heat is applied to the retort the sulphuric acid acts upon the fluorspar of calcium, in a mode analogous to that in which its action is exerted upon common fluorspar; it is then converted into hydrogen fluoride; the results are sulphate of lime, which remains in the retort, while the fluorine of the fluorspar uniting with the hydrogen of the decomposed water of the sulphuric acid forms hydrofluoric acid, which, condensing in the form of vapour, is condensed in the cooler receiver; the product is best kept in a silver bottle with a stopper of the same metal.

The properties of this acid are, that it is fluid, clear, colourless, and volatile; and when it escapes into the air, which it does at about 60°, it forms with the moisture of it white fumes, as hydrochloric acid does. Its vapour is extremely pungent and irritating, and it acts strongly on vegetable blues. The specific gravity of hydrofluoric acid is 1.069, but by the gradual addition of a certain quantity of water, the density may be increased to 1.25. Its attraction for water is very great, and when dropped into it it combines with a hissing noise. The liquid acid is extremely pungent and corrosive; when a drop is allowed to fall upon the skin it produces painful sores.

The reason for the necessity of distilling and keeping this acid in metal vessels, is that it is a very strong and pungent substance, which is more easily set on fire than any other glass. (Fluor Furic Acid.) Although, on account of the difficulty of obtaining fluorspar in the separate state, if indeed it has ever been accomplished, the name of hydrofluoric acid has been given to this substance, the analogy is not direct proof that it is to be considered as composed of hydrogen and fluorspar, being exposed to voltaic electricity, hydrogen is evolved from the
negative pole, and the positive platinum wire is covered with a sensibly impervious substance, which is probably fluorofluoride of platinum.

It is considered as composed of—

One equivalent of hydrogen 1 or 5.26
One fluoride 19 94.74
Equivalent 19 100

When hydrofluoric acid is brought into contact with certain metals it is decomposed, hydrogen gas being evolved, and a metallic fluoride formed: upon potassium this action is extremely energetic, and is attended with the evolution of gas and the formation of a potassium fluoride. With metallic oxides it forms a fluoride and water.

Hydrofluosilic acid may be obtained by saturating the acid with the alkali; it is an unimportant salt, not being applied to any purpose whatever.

HYDROGEN, an elementary body, which, as it is known only in the aëroform state, is usually termed hydrogen gas. From the earliest days of chemistry, chemical substances have been known which had the property of burning on the approach of this fluid and were confounded under the general name of inflammable air. As it was afterwards found that there was a difference in their densities, they were distinguished as light and heavy inflammable air; in the first, which is called hydrogen gas; in the second, hydro- genic gas was first minutely examined, and the mode of preparing it in various ways stated, by Mr. Cavendish. (Phil. Trans. 1766.)

Of the most remarkable properties of inflammable air is that of forming water by combining with oxygen, the name of hydrogen was given to it by the framers of the French nomenclature, from hydro, water, and the root ye, which denotes a combining element. Hydrogen gas can be prepared in several modes, but it is usually procured by the decomposition of water, by causing some substance to act upon it which has affinity for its oxygen and none for the hydrogen, so that this element is separated, and assumes the elastic or gaseous state.

One of the simplest processes, but not the easiest, is that of putting iron turnings or wire into a gun-barrel, inserting a retort containing water into one end of the barrel and a small curved tube into the other, which is to be immersed under water in the pneumatic trough, and a bottle containing water inverted over the orifice of the tube. When the gun-barrel is heated to redness, and the water boiled in the retort by a lamp, the vapour of the water passing over the ignited iron is decomposed, oxide of iron is formed, hydrogen gas plentifully liberated, and received in the inverted bottle of water. For every nine grains of water decomposed, there are obtained eight grains of oxygen, and one grain of hydrogen gas, which measures 46 1/2 cubic inches.

There are some metals, as potassium and sodium, the affinity of the oxygen is so great, that they decompose water even without the assistance of heat.

The usual method however of obtaining hydrogen is that of acting upon iron or zinc by dilute sulphuric acid, and in this case water is decomposed, its hydrogen evolved, and the oxygen, as already mentioned, combined with the metal; but the metallic oxide formed is dissolved by the acid employed, and sulphate of iron or zinc is formed, and the crystalline salt is obtained by due evaporation.

When a metallic acid is used with a metal instead of the sulphuric acid, hydrogen gas is also procured by their mutual action; but in this case the hydrogen is derived from the decomposition of the acid, and not of the water, so that a metallic chloride and hydrogen gas result, not a hydrochlorate of a metallic oxide. The hydrogen gas however obtained by the action of zinc or iron is never perfectly pure; it appears not only to dissolve a minute portion of these metals, but also, especially when used, according to Berzelius, a small quantity of volatile oil is formed by the combination of a portion of the hydrogen with the carbon which the metal always contains; and it is to this that the peculiarly disagreeable and liable to be got rid of by passing the gas through alcohol or potash, with which the oil combines.

The properties of hydrogen gas are, that it is colourless, inodorous, insipid, and it has resisted all attempts which have been made to condense it by the united agency of cold and pressure; and it has not been separated into two or more kinds of matter, and is therefore undecomposed, and, as far as we are aware at present extends, it is simple or elementary in its nature. It is the lightest body in nature, 28.7 cubic inches weighing only 21.6 grains. It refines light powerfully; by heat it is merely expanded, and suffers no change by the action of electricity, and in electrical decompositions of its compounds it is evolved at the negative pole. This gas extinguishes flame by itself, but when it is mixed with other liquid, which is capable of combustion, it readily, and with a continuous but feeble flame, and much heat. When mixed with oxygen, a taper causes immediate and loud explosion, attended with the formation of water by the combination of the gases. It is irreproducible for any length of time, but when inspired for a short period it renders the voice remarkably, but not permanently shrill; it does not appear to be poisonous, for when mixed with a due proportion of oxygen it may be required without inconvenience; when it proves fatal, it seems to do so by the mere exclusion of oxygen.

It is very sparingly soluble in water, 100 cubic inches taking up only about one inch and a half of the gas; nor is there any other liquid which is capable of dissolving it in notable quantity. Hydrogen, neither in the gaseous state nor in solution, possesses either acid or alkaline properties.

In its separate state hydrogen has not been applied to any very useful purpose: in the gaseous state it possesses no power of making air-balloons; at present however, by reason of the facility with which it is obtained, from its being prepared for illumination, coal gas is substituted for gas obtained from coke in its greater density, requires much larger balloons than hydrogen gas.

When mixed with oxygen gas, and the mixture gradually burned in a small jet issuing from Brooker's blowpipe, intense heat is generated; and even if burned in the air, the oxygen of which serves as a supporter of combustion, a considerable degree of heat is generated.

When a very small jet of hydrogen gas is burned, the flickering flame bears the same relation to the flame caused when a tube of glass or metal, or even of paper, is held over it.

Hydrogen unites with all other elementary gaseous bodies, and forms with them compounds not only of great curiosity, but of vast importance and utility thus with oxygen it forms water [Water], with azote, ammonia [Ammonia], with chlorine, hydrochloric acid [Chloriæ acid], with fluorine, hydrofluoric acid [Hydrofluoric Acid]. It combines with bromine [Bromine] to form hydrobromic acid. By its union with extremely metallic solids, as with carbon, iodine, phosphorus, selenium, and sulphur, it forms compounds of very different properties; for an account of these we refer to the substances above named, except that it forms with carbon, and which will be now considered under the head of Carburetted hydrogen, or rather the carbures of hydrogen (or carbo-hydrides), for they are extremely numerous and offer some of the most remarkable instances of what is termed isomerism [Isomerism], or of the existence of compounds, of perfectly similar composition, possessing very different properties; not such as require nice chemical research for their detection, but the obvious qualities of gaseous, liquid, and solid forms.

The compounds of carbon and hydrogen may be divided into four classes; the gaseous, fluid, solid, and hypotetical, the last comprising substances such as the carburet of nitrogen, which is not found in a separate state, but which are considered as compound radicals or bases, and whose elements, at any rate, unquestionably exist in combination with certain other bodies. We shall treat of these compounds in the order mentioned.

1. Gaseous Carbures.—Carburetted Hydrogen Gas is that which has been longest known; it is frequently produced in coal-mines, and called fire-damp. When mixed with air and exposed to flame it occasions dreadful and destructive explosions. [LAW. Soc. Trans. 1790.]

It is the earliest state of pneumatic chemistry described as Heavy inflammable air, to distinguish it from hydrogen gas, which is lighter, before their different nature had been discovered. It has been termed light inflammable air, or hydrogen gas, to mark the difference between it and another gas since discovered, and also bihydroguret of carbon, inflammable air of marshes, and hydrocarburet.

Carburetted hydrogen gas is also generated in stagnant pools by the action of the carbo of composing vegetable
HYD

matter upon water, by which carboyclic acid and the gas in question are formed. By stirring the pools the mixed gases rise, and may be received in bottles filled with and inverted in water. The carboyclic acid amounts to about 1-20th part of the gas, and it contains nearly as much azote: the former may be separated by agitation with a solution of potash.

The fire-damp of coal-mines generally contains atmospheric air; the purest specimen examined by Sir H. Davy is the only one, from which it is free, but it contains other impurities. In the Apennines, near Pietra Mala, the gas disengaged from a shale stratum was found by Sir H. Davy to be pure carburetted hydrogen. Coal gas and the inflammable gas obtained by burning moat charcoal contain a large proportion of carburetted hydrogen, but very much contaminated with other products. No artificial process for obtaining this gas pure has been discovered. The best method of procuring it is that of disturbing stagnant water, as already stated, and washing with potash to separate the carboyclic acid: the azote which it retains does not prevent the exhibition of its peculiar properties.

The properties of carburetted hydrogen gas are, that it is colourless, odourless, and inodorous, and insipid. It has not been rendered fluid by the united agency of cold and pressure. Water absorbs about 1-60th of its volume. It is fatal to animals, extinguishes flame, but is highly combustible when it meets with a sufficient mixture of combustion, and extremely explosive when mixed with it. It burns when a taper is applied to it in contact with the air with a yellow flame, and on account of the color which it contains it yields more light during combustion than pure hydrogen gas. [Gas Lights.]

One hundred cubic inches of this gas weigh very nearly 17-2 grains: its specific gravity compared with air is 0-045. It consists of a mixture of hydrogen gas, weighing 43 grains, condensed to one-half, and combined with 12-9 grains of carbon. It is composed of

One equivalent of carbon 6
Two equivalents of hydrogen 2

Equivalent 8

It is theoretically also regarded as composed of

100 cubic inches of the vapour of carbon, 200 " hydrogen gas,

condensed to 100 cubic inches.

Its proper appellation is dicarburetted of hydrogen.

When carburetted gas is passed through tubes made intensely hot, it is decomposed, each volume yielding two volumes of water and carbonic acid is deposited. It is not decomposed by electricity.

One hundred volumes of this gas require 200 volumes of oxygen gas for their perfect combustion, and the results are water and 100 volumes of carboyclic acid. Chlorine gas and carburetted hydrogen, when quite dry, do not act upon each other at common temperatures, even if exposed to the sun's rays; nor although moisture be present does any action occur in the dark, but the action of light occasions it, the nature of the products depending upon the proportions of the gases employed: they are however hydrochloric acid, oxide of carbon, and carboyclic acid. No combination of carburetted hydrogen and any oxide of chlorine, either elementary or compound, has been discovered.

2. Olefiant Gas; Bicarburetted Hydrogen, Bihydrocarbon, Hydroguret of Carbon.—This gas is an artificial product, and was discovered in 1796 by M.M. Bondii, Dieman, &c. It is prepared by mixing in a retort two volumes of sulphuric acid and one volume of alcohol: when heat is applied decomposition readily takes place. Alcohol is composed of 5 parts of hydrogen, 12 of carbon, and 8 of oxygen. When heat is applied to a mixture of 5 parts of hydrogen and 6 of carbon, it is evident that 2 of hydrogen, 6 of carbon, and 8 of oxygen must be separated by the action of the sulphuric acid; water is probably formed, much carbon is deposited in the retort, and carboyclic acid and sulphuric acid are generated with the olefiant gas. It is purified from these by being passed through or sagitated with lime-water or potash.

Olefiant gas, so called from its property of forming an oil-like fluid when combined with chlorine, is a colourless, elastic fluid: when pure, it has but little odour and is tasteless. It has not been rendered fluid by exposure to cold and pressure; it is soluble in about eight times its bulk of water; it is destructive of animal life, is not inflammable unless a supporter of combustion be present, and then it burns with a dense white light, or, if mixed with air, it explodes with great violence on the contact of flame. On account of the larger proportion of carbon which it contains it gives much more light when burning than carburetted hydrogen, and when one measure is burned with three measures of oxygen gas, water and two measures of carboyclic acid gas are formed.

One hundred cubic inches of olefiant gas weigh 30'1 grains very nearly; consequently, its specific gravity is very nearly less than that of hydrocarbon. It is stated that it is formed of one part by weight of hydrogen, and 6 parts by weight of carbon; and although these are equivalents of those elements, it is generally supposed to consist of

Two equivalents of carbon 19
Two " hydrogen 2

Equivalent 14

Or theoretically of

200 cubic inches of the vapour of carbon, 200 " hydrogen,

400 " condensed to 100 cubic inches.

The correct name of this gas is carburetted hydrogen, but that has so long been appropriated to light carburetted hydrogen that it would now lead to confusion to make the alteration. Bicarburetted hydrogen is an improper appellation, because it implies a compound of two equivalents of carbon and one equivalent of hydrogen. It is, however, in some cases has been conveniently adopted.

When olefiant gas is passed through red-hot porcelain tubes, it is decomposed, at least partially, for carbon is deposited, and the gas increases in bulk, showing by the expansion that hydrogen is set free. When a succession of electric sparks is passed through it, it is resolved into hydrogen gas and charcoal; the hydrogen, for a reason which has been stated, occupying twice the bulk of the olefiant gas subjected to experiment.

Chlorine and Olefiant Gas, as has already been stated, act upon each other; when they are mixed and suffered to remain in contact they combine and condense into the oil-like fluid already eluded to, and which has been called chloric ether and hydrochloric ether of carbon. The best name is however chloride of hydrocarbon. When first formed it contains a little ether and hydrochloric acid, from which it is separated by being washed with water, distillation from chloride of calcium, successive agitation with potash, water, and sulphuric acid, from which last it is separated by distillation.

Chloride of Hydrocarbon is a colourless volatile liquid; odour aetheral, taste sweetish, insoluble in water, specific gravity 1-2, that of its vapour 3'4 (air = 1), boiling point about 150° Fahr., burns with a green flame, depositing charcoal, and evolving hydrochloric acid. When passed in vapour through a red-hot porcelain tube it is resolved into charcoal, light carburetted hydrogen, and hydrochloric acid.

It is composed of

One equivalent of chlorine 30
One " olefiant gas 14

50

Admitting this to be a neutral compound, it agrees with the view already mentioned as to the constitution of olefiant gas, namely, that though its constituents are six parts by weight of carbon and one part of hydrogen, that of the two equivalents of each = 14. When a mixture of two volumes of chlorine and one of olefiant gas is fired by a taper, combustion immediately takes place, a large quantity of charcoal is deposited, and two volumes of hydrochloric acid gas are formed.

Iodine and Olefiant Gas also combine to form iodide of hydrocarbon, or hydroiodite of carbon. It was discovered by Mr. Faraday, who obtained it by exposing iodine and olefiant gas in the same vessel to the solar rays. It is a solid, colourless, crystalline body, has an aromatic odour, a
sweatish taste, and is so dense as to sink in sulphuric acid: it neither water nor acid or alkaline solutions act upon it, but it dissolves in alcohol and ether, on the evaporation of which the iodide crystallizes.

It is composed of

One equivalent of iodine . . . . . 126
One " olefiant gas . . . . . 14

Equivalent . . . . . 140

Bromine and Olefiant Gas unite to form bromide of hydrocarbon. It was first formed by Serullas, who obtained it by adding one part of iodide of hydrocarbon to two parts of bromine in a glass tube. Reaction quickly takes place, accompanied with heat and a hissing noise; bromide of iodine and bromide of hydrocarbon are formed; water dissolves the bromide of iodine, and the bromide of hydrocarbon falls to the bottom of the vessel; it is coloured by bromine, which is to be removed by potash.

Bromide of hydrocarbon is fluid, colourless, very volatile, has a penetrating ethereal odour, and a very sweet taste. It is heavier than water; very slightly soluble in it; at about 22° Fah., it becomes solid.

It consists of

One equivalent of bromine . . . . . 78
One " olefiant gas . . . . . 14

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We have now described the only gaseous carburets of hydrogen which have been hitherto proved to be distinct and well-characterised species, and also some of their compounds. The following is probable that another gaseous compound exists in oil gas, and it has been called superolefiant gas, terthydrocarbon, and trecarboxhydrogen. It is supposed to consist of 3 equivalents of carbon and 3 equivalents of 6 equivalents of hydrogen condensed into one volume: no definite mode however of obtaining this compound in a separate state has been pointed out. It is also probable that oil gas may contain olefiant gas, holding in solution some of its compounds, or carbones, and hydrogen discovered by Mr. Faraday; it is therefore extremely difficult to determine by analysis what are mixtures and what are compounds, and to distinguish and separate them from each other.

Liquor Carburets of Hydrogen.—These are very numerous. Those which we shall first describe are all composed of six of carbon and one of hydrogen by weight; but they are of course isomeric bodies, and must be composed of different multiples of these proportions, which have not however been in many cases ascertained.

Caoutchou, obtained by subjecting caoutchouc to distillation. It is a colourless fluid, has a peculiar and ethereal odour; specific gravity 0.666. It remains liquid at 14° Fah., and boils at 582°.

Ceten, procured by distilling ethyl with anhydrous phosphoric acid. It is a colourless oily liquid, which boils at 327°; the density of its vapour is 2.584.

Elam, an oily liquid obtained by distilling metaeol and hydroeol acids. It boils at 230°, and the density of its vapour is 4.488.

Etherin, so called from being supposed to exist in ether.

Mr. Faraday obtained it from the volatile liquid which is derived from the inflammable vapours contained in oil gas when subjected to a pressure of thirty atmospheres. When this liquid is heated merely by the hand the vapour of etherin rises, and is condensed by a freezing mixture.

Its properties are, that it is a highly volatile liquid, which boils at so slight an elevation of temperature that it is converted below 32° into vapour. On being cooled to 0°, it again condenses into liquid, which, at the temperature of 54°, and while kept under the pressure of its own vapour, has a specific gravity of 0.627.

It is sparingly soluble in water; alcohol takes it up largely, and sulphuric acid condenses 100 times its volume of the vapour, and, though it becomes brown, the sulphuric acid is given out; neither hydrochloric acid nor the alkalis affect it. The vapour is extremely combustible, burns with a brilliant flame, yielding water and carbonic acid.

It appears to consist of

Four equivalents of carbon . . . . . 24
Four " hydrogen . . . . 4

Equivalent . . . . . 28

Or it is theoretically regarded as composed of

400 cubic inches of carbon vapour 51-6 grms.
400 " hydrogen gas 8-6 "

Condensed to 100 cubic inches, weighing . . . 60-2 grms.
Its density is therefore 1941, and by experiment Mr. Faraday found it to be 191.

Benzine. [Benzine.] The number of equivalents which it contains has not been ascertained, but the proportions are as above stated, or six of carbon to one of hydrogen.

Heveum, obtained by the distillation of caoutchouc with sulphuric acid. It is a comparatively dense fluid, its specific gravity being 0.931, and boils at 175°.

Liquid Hydrocarburet.—This was obtained by Mr. Faraday, after separating solid bicarburet of hydrogen from the fluid produced by pressure upon oil gas, at a temperature of 0°. The remaining liquid was found to exhibit such properties as to identify it as a peculiar and definite compound.

The number of the equivalents which it contains has not been determined.

Naphtha.—This fluid occurs, among other places, at Amian, in the daury of Parma, and exists also in petroleum, from which it may be obtained by distillation; and coal-tar yields a very similar fluid. Naphtha, when pure, is a colourless, limpid, very volatile liquid, with a strong peculiar odour; its specific gravity is 0.753; it boils at 106° to 212°; the density of its vapour is 2.833; it remains liquid at 0°. It is insoluble in water, but combines in all proportions with alcohol, ether, petroleum, oils, and sulphuric acid. It is very inflammable, and burns with much smoke.

Chemists are not quite agreed whether its composition is equivalent to 6 of carbon and 1 of hydrogen, or whether it is composed of 6 equivalents of carbon to 5 of hydrogen. In the last case its composition would be

Six equivalents of carbon . . . . . 36
Five " hydrogen . . . . . 5

41

Olein, procured by distilling metaeol and hydroeol acids. It is a fluid which boils at 131°, and the density of its vapour is from 2.875 to 3.92.

Benzine.—This is composed of 2 equivalents of carbon 12 + 1 equivalent of hydrogen 1 = 13. [Benzene.]

Volatile Ole. The following volatile liquid oils are constituted of carbon and hydrogen, and the proportion of 10 equivalents of carbon = 60 + 8 equivalents of hydrogen = 8. Their different properties would however indicate that they are isomeric compounds rather than that all should be composed of exactly these equivalents:—Oil of copaiva, juniper, lemons, black-pepper, savin, and turpenine.

A compound of ten equivalents of carbon and 8 of hydrogen has been called camphen and camphogen, as being the basis of camphor.

Solid Carburets of Hydrogen.—Hatchetine. [Hatchetine.]

Oxide.—This substance is composed of the same proportions of carbon and hydrogen as the preceding. It occurs in Moldavia, and a variety of it has been found in Urpath Colliery, near Newcastle-upon-Tyne; it is soft, unctuous, gives a marbled appearance to paper; it is transmitted by reflected light, of a brownish-yellow colour; by reflected light, yellow-green and opalescent; odour slight fatty, which is more perceptible when melted. It fuses at 140° Fah., retains its fluidity at about 160°, and boils at 250°. It distills without apparent decomposition. It burns with a pale blue flame, surmounted by a white one, and leaves no residue.

It is collected sparingly in alcohol, more soluble in ether, and does not appear to suffer any change when boiled either in concentrated hydrochloric, nitric, or sulphuric acid.

Paraffin was discovered about the same time by Dr. Christie and Dr. Riechenbach; the former obtained it from the petroleum of Rangoon, and called it petrolin. In distilling beech-tar, Dr. Riechenbach found that the greatest of these liquids which it yields is unctuous, and contains per cent which is separated and purified by repeated distillation, heat, and the action of sulphuric acid.

Its properties are, that at common temperatures it is a fatty but rather firm solid; it is tasteless, inodorous, and its
The liquid chloride of naphthalin is obtained by evaporating the ethereal solution. It has a light yellow colour, an oily appearance, is heavier than and insoluble in water. Alcohol dissolves it, but more readily; acids act but feebly upon it, and it may be distilled without suffering decomposition.

It is probably composed of—

One equivalent of chlorine  36
One naphthalin  64

HYPOTHETICAL CARBURETS OF HYDROGEN.—Ethole, or Etherium, is one of these, which has already been noticed; it is regarded as hypothetical because it has never been obtained in a separate state. Ether is supposed to be an oxide of etherium, alcohol a hydrated oxide, and sulphuric acid a hydrated binaque of oxide of etherium.

It is regarded as composed of—

Four equivalents of carbon  24
Five hydrogen  5

Equivalent 29

Methylene.—In the 60th vol. of the 'Philosophical Magazine' Mr. Philip Taylor described a peculiar volatile inflammable fluid under the name of pyroglaeous ether, as being obtained during the preparation of pyroglaeous acid from the distillation of wood. It has since been called pyroxylic spirit. [PYROXYLIC SPIRIT.]

According to Dumas and Peligot, pyroxylic spirit is composed of—

Two equivalents of carbon  37.4
Four hydrogen  12.6
Two oxygen  50

Equivalent 100

They consider however, that it contains a peculiar carburetted hydrogen which they call methylene, composed of 1 equivalent of carbon 6 + 1 equivalent of hydrogen 1 = 7, and that pyroxylic spirit is in fact composed of—

One equivalent of methylene  7
One water  9

Equivalent 16

Although methylene has never been obtained in a separate state, yet it has been separated from the water, and combined with various acids, as with hydrochloric acid, nitric acid, sulphuric acid, and oxalic acid, &c. with some of these it forms crystallizable salts.

We have now noticed the more important compounds of carbon and hydrogen; but chemical research is almost daily adding to their number. In the 'London and Edinburgh Philosophical Magazine' for October last, several new compounds are mentioned by M. Pelletier, who has promised further details on the subject; and some others are described by M. Laurent, but which appear to be isomeric with, if not absolutely similar to, previously described compounds.

It will be observed that some of these compounds, as naphthalin, ethole, and more especially methylene, act the parts of alkaies by combining with and saturating acids, and producing crystalline salts with them; and it is a curious circumstance that methylene, which is a theoretic carburet, appears to possess the most extensive power of combination; indeed it may perhaps be on this very account that it has not yet been isolated.

HYDROLEACEE, a very small and unimportant natural order of Monopetalous Exogonous plants, allied to

The convolvulacées, with which they were once united. They are weeds inhabiting the East Indies, with alternate gla
dular or stinging leaves, monopetalous regular flowers, with a gynae inflorescence, definite stamens, a superior poly
spermous 2- or 3-celled pistil, and seeds with the embryo lying in the midst of fleshy albumen. In their gynae
florescence they correspond with Boraginaeæ.
respectively, and by their successive application the instrument may be sunk so as to obtain the complete range of specific gravity, from that of pure alcohol to that of distilled water. The other weight is of the form of a parallelepiped, and may be fixed when necessary to the upper branch of the stem. The upper branch of the stem is divided into ten equal parts or degrees, each of which is subdivided into two parts. The whole is adjusted at the temperature of 60° Fahr., and tables are computed where the corrections may be determined for all variations above or below that point. In order to determine the strength of spirit by means of the hydrometer a portion is placed in a tall glass cylinder, and the temperature observed. One or more of the circular weights is then attached to the lower stem of the instrument, so that the lower extremity of the scale may sink beneath the surface of the fluid, and when the whole has become stationary the number upon the scale in contact with the surface of the fluid is observed. This number added to the number marked upon the circular weight employed will give a third number, adjacent to which, in the tables above mentioned, and under the head of the proper temperature, will be found the per centage of strength required.

The most convenient method of obtaining the specific gravities of fluids is by means of what chemists call a thousand-grain bottle. This is a bottle of a globular form, with a ground-glass stopper, so adjusted as to contain exactly 1000 grains of distilled water, at the temperature of 60° Fahr., and accompanied by a weight, which is an exact counterpoise for the bottle when thus filled. In order to determine the specific gravity of a fluid by this means, it is simply necessary to fill the bottle with that fluid at the temperature of 60°, and place it, together with the adjusted weight, in the opposite scales of a delicate balance; then the number of grains which it will be found necessary to add to one of the scales, in order to produce equilibrium, will be the difference between the specific gravity of the fluid and that of water taken at 1000.

HYDROMETRIDA.E, a family of insects, belonging to the order Hemiptera. This family was established by Dr. Leach, and is thus characterised:—Rostrum with two or three distinct joints; labrum very short; eyes moderate; feet very long, formed for walking on the water, with the claws minute, inserted laterally into a fissure on the extremity of the terminal joint of the tarsus.

The genera Hydrometra, Gerris, and Velia of Latreille belong to this family. Those species which have ceteceous antennæ, the head prolonged into a snout and receiving the rostrum beneath, belong to the first of these three genera, of which the Hydrometra stagnorum will serve as an illus-
tration. This insect is about 3-8ths of an inch in length, and not broader than an ordinary sized pin, of a black or brown color, with pale brown legs, and is very common on ponds and ditches, generally near the margin. Like the other species of the family Hydrodromys, it possesses the power of walking upon the surface of the water: it differs however from those of the two preceding genera, inasmuch as it can walk with ease upon the grass, and is comparatively slow.

In the genus Veleta the antennae are filiform, four-jointed, the first joint the longest, the remaining joints long, about equal to each other, and bent at an angle with the first; rostrum two-jointed; legs moderate, and nearly equidistant.

Veleta ricaulorum (Latreille) is a very common insect in this country, frequenting running streams, and running on the surface of the water. It is about 1-4th of an inch in length, and 1-12th in breadth; of a black colour, the body red, spotted with black, the thorax brown, with two white spots, and the elytra each with four white spots.

The principal characters of the genus Gerris are:-Antennae filiform, four-jointed, the basal joint nearly as long as the remaining three; rostrum three-jointed, legs long, the second pair the longest, and inserted far from the first.

Gerris paludum is about 5-8ths of an inch in length, and 1-12th in breadth, of a brownish black colour above, and silvery-white beneath. This insect is very abundant, and its habits have been observed. It is of a very beneficial nature to fish, as it must have attracted the attention of all persons. Its food appears to consist chiefly of such insects as are blown or accidentally fall into the water, which it seizes with its fore feet.

HYDROMYS. [Murr.]

HYDROPHILIDÆ, a family of Coleopterous insects established by Leach. The insects of this family are included by Latreille in his section of Pteroctenes. They have generally rather small, to the antennae, but sometimes only six; the terminal joints always form a perforated knob; the maxillary palpi are very long and slender; the body is usually oval or rounded, convex above and flat beneath, or nearly so; the tarsi are five-jointed, and the mandibles bidentate.

The principal genera of the family Hydrophilidae may be thus characterized:-

Genus Hydrodus.—Antennae with the terminal joint acuminate; sternum produced into an acute spine, which reaches considerably beyond the insertion of the posterior pair of legs; scutellum large; labrum entire; tarsi of the four posterior legs convoluted and furnished with bifid claws. The male sex has the anterior tarsi dilated.

Hydrophilus picus (Hydrophilus picus of the older authors) is one of the largest beetles of this country, measuring about one inch and a half in length. It is a black colored insect above and flat beneath, and has the elytra somewhat pointed at the apex. This insect is not very uncommon in stagnant waters in certain parts of England. It lives near the bottom of the water, and may be said to walk rather than swim in that element. The female insect deposits her eggs in a little nest composed of a gummy substance, which is ejected from the abdomen, and in this nest the eggs float until they are hatched. The larvae, which are of a lengthened form and brownish colour, live in the water.

Genus Hydrophilus (Leach).—Labrum emarginated; mandibles internally ciliated; antennae, with the terminal joint acuminate; legs and wings of the pupa, in a group terminating in a slightly acute spine, which scarcely reaches beyond the insertion of the posterior legs; claws dentate at the base; the anterior tarsi simple in both sexes.

Hydrophilus caraboides (Linnaeus), a common insect in some parts of England, and, like the species which is given as an illustration of the preceding genus, lives in stagnant waters. Its form is oval, convex above, and flattened beneath, the head dark brown or black above, and grey or yellow beneath, and as broad as three quarters of an inch in length.

The genus Spercheus (Fabricius) is chiefly distinguished from the antennae, with the terminal joint acuminate; claws dentate at the base; the anterior tarsi simple in both sexes; the eyes emarginate; the maxilla with the external lobe palpiform: this is smooth. The body is very convex.

Spercheus emarginatus (Fabricius) is about a quarter of an inch in length, and of a brownish colour above and blackish beneath. It lives in stagnant waters, and has been found adhering to the roots of plants. As yet, it has always been considered a very uncommon insect in England.

Genus Berusina (German).—Eyes prominent; elytra emarginate, the terminal joint large and somewhat glabrous; the thorax broader than the thorax, and also very convex; posterior tarsi ciliate.

Berusina lurida (Stephens) is less than a quarter of an inch in length, of an oval form, and greyish-yellow colour. The head is of a brassy green colour, and there is a spot of the same hue on the thorax. The elytra are striated. This species is common in ponds, &c. in various parts of England.

Genus Hydrobius (Leach).—Antennae nine-jointed, the terminal joint somewhat compressed and acuminate; elytra emarginate; scutellum small; sternum simple; eyes small and not prominent; claws simple.

The species of this genus are usually of small size, of an oval or rounded form, and always very convex. Like those of the preceding genera, they live in ponds and ditches, and appear to prefer stagnant waters. Mr. Stephens, in his "Illustrations of British Entomology," enumerates twenty-five species.

HYDOPHIS. [Hydrus.]

HYDROPHÔRIA (from ëêw, water, and ëôëû, fear) is the disease occasioned by inoculation with the saliva of a rabid animal, and is so called from the violent and suffocating spasms of the throat which occur when the patient attempts to drink, or when, in the latter stages, the mere idea of drinking makes him shudder. The disease is now produced in man by any other cause than the saliva of a rabid animal: those cases which have been said to arise spontaneously have not presented all the true characters of the affection, and the general case is one of hysteric or other convulsions, in many of which the excitement and the fear of real hydrophobia had much influence. Whether it is ever spontaneously generated in animals is less certain, because its origin in them is less easily traceable, but the fact that it is possible to keep the disease from packs of dogs, in which every fresh comer is submitted to a kind of quarantine, and the many instances now known of isolated situations in which, although dogs are very numerous, no case of hydrophobia has occurred for many years, does tend to prove that in the dog also it arises only in consequence of the bite of some other rabid animal. It is probable that all animals are subject to hydrophobia, for all that we have an opportunity of observing, that is, all our domestic species, are; but it has not appeared that any, except the wolf, fox, cat, and dog, are capable of communicating it to each other, or to other species. There is no evidence whatever that the disease is transmitted from one human being to another; men affected by it are not disposed to bite, and it is doubtful whether, if they did bite, the saliva would have any effect, for the experiments made with it upon animals are as yet contradictory and inconclusive.

The disease may be communicated to man either by the saliva being carried into a wound made by the tooth of a rabid animal, or by its being placed on the surface of a previous wound, as dogs have licked the hand or face of a person in which there was any raw surface. However, it is only a small portion of the bites which a mad animal gives that convey the disease; for, for example, he bites through the cloth that covers him, sometimes with such violence that all the saliva will be wiped off from his teeth as they pass, and hence wounds of the hands and face are generally the most dangerous. It is probable too that the saliva differs in the degree of its virulence. It is reported by Mr. Lister (Hodges, vol. i.) that though preventive measures were employed or not, only one person in twenty-five of those bitten by mad dogs would have hydrophobia. It appears that
animals are more subject to the disease than man; for in a case where a dog bit four persons and twelve dogs, all the dogs died, but not one of the men. These results, although they should not prevent the surgeon from employing those remedies which prevent the disease, fully explain how empirical remedies have obtained so much credit, the immunity from the disease being attributed to their influence, when it would have been as complete if they had never been used.

The period after the inoculation at which the symptoms of hydrophobia may exhibit themselves varies greatly. In the ten persons already mentioned who were bitten by the wolf, which lived on the sixth day, and another, the sixty-eighth day after their wounds were received; in the five bitten by the same dog the deaths occurred between the thirtieth and thirty-third days. In general the disease appears between the thirtieth and forty-third days from the injury; but cases are known where it has been delayed as long as eighteen months, and Dr. Barday believes that a person who has been bitten and used no preventive measures cannot be considered as perfectly safe till at least two years have elapsed since the accident, in order to regard the individual as being secure from the disease.

The bite of a rabid animal generally heals up like that of a healthy one: there is nothing whatever which would indicate danger from it, and the patient is attacked when he has ceased to feel anything. It was even believed that some cases bite, however, before hydrophobia symptoms appear, the scar of the wound becomes painful, red, and swollen, and pain is felt shooting from it along the course of the nerves of the part, as far as the ear. The most characteristic indication of the disease is that the patient has headache and general uneasiness; he loses his appetite, and when he is about to drink he suddenly feels an aversion to any liquid, and is obliged to attempt to swallow it. This covers this inability to drink accidentally, and often expresses his wonder that he should not be able to quench his thirst. The symptoms, once set in, rapidly increase in severity. He attempts to drink, and even anything that can suggest the idea of drinking; he is obliged to swallow constantly; he covers this inability to drink accidentally, and often expresses his wonder that he should not be able to quench his thirst. The convulsions, which were at first limited to the muscles of the throat and of deglutition, after a short time extend to other parts of the body; there is a constant agitation. It is remarked by Sir William Jenner, that the patient is restless, anxious, and timid, his eyes have a peculiarly unsteady glistening appearance, and he is often delirious, and talks with the greatest rapidity and confusion. These symptoms are so intense that his attendants are going to rob or murder him, and is haunted with frightful visions. As the disease proceeds, the convulsions of the throat become more frequent and severe; a breath of cool air, or the slightest noise or vibration of the room, is sufficient to excite them: there are severe headache, a rapid pulse, a foul tongue, and other symptoms of a generally disorderly condition of the system.

A copious secretion of thick tenacious mucus in the nose, and of mucus from the air passages, and increases the feeling of suffocation, and it is in his attempts to free himself from this that the patient coughs and makes a loud harsh noise, which has been supposed to resemble the barking of the animal by which he was bitten. Sometimes there is a fit of coughing for the last few hours of life the patient becomes quiet; he falls perhaps into a tranquil sleep, as if fatigued by his exertions, or he lies perfectly still, without spasms, and without respiration; the affection constantly decreases, in which how much may for a time seem to afford a hope of recovery. In most cases solids can be swallowed without much difficulty; and it is remarkable that in those who have been bitten by mad cats there is far less aversion to water than those who have received the disease from the other species.

Nothing can at present be regarded as certainly known of the true nature of hydrophobia. Dissections of those who have died of it have shown the effects, but not the causes of its symptoms; as redness and turgescence about the throat and larynx, and general congestion from the frequent subcutaneous attacks. With this ignorance of its nature there is no idea of the equal or equalizing effects of any medicine which it may be treated with a prospect of success; for of all the medicines recommended (and probably none has been more variously treated) there is not one which has been considered sufficient for its cure, nor near an important organ, excision may be deemed advisable, and in these the best remedy is some violent caustic: pure nitric acid, or fused potash, or nitrate of silver, which should be laid on the wound, and the wound sutured, so as to decompose every particle of the saliva. A third method is the careful washing of the wounds, but it is one on which it would be imprudent entirely to rely, though in some cases it may be of assistance. When general resistance can be obtained, and is useful after the parts have been cut out. The best mode of washing the wound is to pour water at a temperature of 90° or 100° on it, from a height of four or five feet, through the spout of a tea-urn, and it is not advisable to employ liquid poured on from one vessel into another, or the bright shining surface of polished metal looking like the surface of water, is sufficient to bring on the most frightful spasms of the throat, lasting more than six days, and it often terminates fatally, when the noise and accompaniments of death have been undeniably present. The probability that during that time it has only a local influence, it would certainly be prudent to remove the wounded parts after a lapse of even many days. Of course it is only the case of those whose general nervous temperament has already mentioned, that even when the patient does not suffer from hydrophobia it is uncertain whether his immunity depends on the measures employed; but it may be hoped that some will be sufficient to arrest the progress of the disease, which has frequently been unavailing, excision, when carefully employed, has been invariably successful, and the caustic has never had an effect.

As a large majority of the cases of hydrophobia which occur in this country are the consequence of the bite of the mad dog, it may be useful to add the symptoms which it presents when in that state. He grows sullen and snarly; he leaves his home and runs about wildly, biting at whatever approaches him, though he will seldom go out of his way to attack, and he constantly gnaws grass and straw and pieces of wood or stone. To these however with whom he associates his demeanour is at first unaltered, and he expresses them as usual, but has become decided in the last death has followed the licking of a wound by dogs who showed no symptom of hydrophobia. It is an error to imagine that the mad dog avoids the water, for he will both walk and drink it, and the inspector is often surprised at the terror and fear of that horror of it which characterizes the disease in man. Towards the close of the disease he grows more furious, gnawing and biting at everything around him, and frothing at the mouth, and when the death of the dog approaches, as in man, and usually lasts about the same length of time.
especially those of the genera Nemophila and Eutocia, are
beautiful objects: they are all natives of North America.

combined. But, whatever be the primary cause, it is ad-
mitted by all that the property must arise, immediately,
from the perfect mobility of the particles among one
another; in consequence of which the mass immediately
takes the figure of any vessel in which it is received,
its upper surface assumes a level position, and by which,
also, it begins to flow as soon as an orifice is made in any
part of the sides or bottom of the vessel. Some difference
exists however in the fluidity of different bodies: such
as mercury, water, or, &c., in their ordinary state, possess
property in a high degree: while the particles of many fluids,
as the oils, have a sensible adhesion to one another. Except
pure alcohol, all the non-elastic fluids, at certain tempera-
tures, become congealed, and thus entirely lose their
fluidity.

Since pores are known to exist between the particles of
all bodies, fluid as well as solid, it may readily be conceived
that no fluids can be absolutely incompressible; and exper-
iments have been made from which it is manifest that spirit
of wine, oil, water, and even mercury, can, by pressure, be
reduced in volume, in certain degrees; the fluids which have
the greatest specific gravity suffering the least compression.
But as this diminution is very small when compared with the
volume of the fluid (being for water, according to the ex-
periments of Mr. Canton (Phil. Trans., 1762, 1764), only
sixth part of the volume when the pressure is equal to that
of the atmosphere in its ordinary state), for all practical
purposes of hydrostatics such fluids may safely be considered
as experiencing no change of volume by the compressions
to which they may become subject.

Experiment has also shown that all the non-elastic fluids
possess the property of transmitting equally in every direc-
tion the pressure exerted against any point on their sur-
fase. If, for example, a piston were forced into an orifice
made in any part of the side of a vessel containing a liquid,
the effect of the pressure would be experienced equally
at every point on the whole surface of the vessel. This
property has hitherto been denominated the quinquadesmum
propagation of pressure, and it may be conceived to result
from that perfect mobility of the particles among one
another which has been above alluded to, and which enters
into our first conception of fluidity.

But the pressure exerted by a fluid against the sides and
base of a vessel in which it is contained, in consequence of a
force thus partially applied, should be carefully distin-
guished from that which is caused by the gravity of the
fluid; the former being the same in every part of the fluid
mass, while the latter, at every point in the sides, depends
on the depth of the point below the upper surface of the
fluid.

It has been said above that a fluid in any vessel will
have its upper surface in a level plane, or in a horizontal
position; but it must be observed that, since the fluids on
the earth are attracted towards the centre of gravity of the
latter (leaving out the consideration of all disturbing forces,
and considering the earth as a sphere), the fluid must
dispose themselves every way spherically about that centre;
and consequently the upper part of a fluid in any vessel
must be understood to form a portion of a spherical super-
ficies concentric with that of the earth.

The quinquadesmum pressure above mentioned has long
since been proposed to be employed as a means of trans-
mittirg the action of a moving power to any distance how-
ever great. For this purpose it has been projected to fill
with water a horizontal tube having at each extremity a
short arm in a vertical position; and in each of these arms
have a piston. Then that which is at one end of the
tube having received the action of the moving power, it will,
by means of the fluid, transmit the motion to the other;
the rod of which should be in connection with the machin-
ery on which it is intended to act. It may be remarked
that the principle has been recently proposed for adoption
in communicating intelligence between two places remote
from each other.

From the same property at follows that if a fluid at rest
in a vessel be supposed to consist of an infinite number of
filaments, or infinitely slender columns in vertical positions,
the pressure which, in consequence of the weight of the
particles vertically above a exerted in every direction by
each particle of such filament, will be counteracted by the
equal pressure of all the surrounding particles, so as to
remain at rest. For the same reason, it may be generally
understood that the pressure exerted by the fluid

P. C., No. 774.

HYDROSTATICs. [Iqu[ini[Li]

HYDRODYNAMICS is the science which relates to the
pressure and equilibrium of the fluids commonly called non-
elastic, or incompressible; as water, mercury, &c., and to
the equilibrium of bodies immersed in them. The elastic
fluids, as air, steam, &c., are the subjects of pneumatics.

The two books of Archemedes entitled, in Latin, ‘De
Humido Insidentibus,” contain all that is known concerning
hydrostatics, properly so called, among the antients. That
philosopher showed from experiment that a mass of fluid
will be in equilibrio when each of its particles is pressed
equally in every direction. He explained that a floating
body is held in equilibrio when its centre of gravity and
that of the displaced fluid are in one vertical line; and that
when bodies are immersed in a fluid of less specific gravity
than themselves they lose certain portions of their weights.
The latter principle led him to the means of ascertaining
the quantities of two different ingredients when mixed to-
gether in one mass; and he applied it in detecting the
quantity of alloy in a golden crown which had been exe-
cuted for the king of Syracuse.

The cause of fluidity in bodies has been the subject of
much discussion; it has been supposed to depend on the
globular form of the particles, or on the caloric contained
between them; or, finally, on both these circumstances

2 Hydrophyllum virginicum.
1, an entire flower; 2, the ovary; 3, a ripe seed-veesel; 4, a section of a
maicule seed.

HYDROSIAURUS. [Iguanidine]

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against every part of the surface of the vessel containing it, will, while the fluid is at rest, be perpendicular to the surface; since, otherwise, the reaction of the surface could not entirely destroy that pressure, and a part of it would disturb that equilibrium which, by hypothesis, is the condition of the fluid in the vessel. The amount of that reaction is, of course, equal to the weight of a filament of fluid vertically above the point and extending to the upper surface of the fluid; or to the weight of any one of the neighboring filaments comprehended between the upper surface and a horizontal plane passing through the said point. The pressure of all the particles in the upper surface of the fluid is evidently nil.

It may, hence, also be proved, that the pressure on the base of any vessel containing a fluid, will be the same whatever be the form or position of the sides of the vessel, provided the fluid have always the same height above the base. For if ABCD (Fig. 1) be a vertical section through a prismatic vessel; the pressure on any point a of the base is evidently equal to the weight of the vertical filament b; that on any point e of the inclined side BD is the weight of the filament d; and this last produces no effect on the base, because the lateral pressures of all the particles in every vertical filament, are counteracted by those of the particles in the neighboring filaments. The same thing must be understood of all the water in the portion BDB. The pressure on any point e under the inclined side AC is equal to the weight of the filament e; the pressure arising from the reaction on the side AC at f, in the vertical direction e; and this reaction is, from what has been said, equal to the weight of a filament which may be supposed to exist above f, with a height equal to d. Consequently, the pressure on AB, when the sides of the vessel are inclined to the horizon, will be equal to that upon the same base when the sides are in vertical positions. This is the foundation of the experiment usually exhibited in popular lectures, when columns of water of equal height, in cylindrical and conical vessels, having equal bases, but of course containing very different quantities of the fluid, are shown to be in equilibrio with one and the same weight applied to prevent the moveable base from descending.

It may readily be inferred from the above that the pressure on the base will be equal to the weight of a vertical prism or cylinder of the fluid, whose base is that of the vessel, and whose altitude is that of the fluid which it contains, whatever be the form or inclination of the sides.

When the bases of two vessels containing fluid of the same kind are equal, the pressures on these bases will be proportional to the altitudes of the fluids; and if the altitudes are equal, the pressures will be proportional to the areas of the bases.

On the same principle may be explained the experiment which has been denominated the hydrostatical paradox. In this is employed a cylindrical machine formed of two circular plates of wood, as AB and CD (Fig. 2), with sides of leather like the base of a pair of balloons. A tube of water is inserted in an orifice near the bottom, and through this tube water is poured into the cylinder, till the boards AB and CD are at any distance from one another within the limits allowed by the leathers. Then, if any weight be placed on the board CD, it will cause the water to rise in the tube EF to a certain height, suppose a; and the weight of the small column ab of water may be considered as holding in equilibrio the weight applied on CD; which will, in fact, be found to be equal to that of a cylinder of water whose base is the area of the board CD, and whose height is equal to ab.

If the tube EF were made to decline from the vertical so as to take any oblique position E'F'; it would now, since the pressure of a fluid by gravity depends on the vertical height only of the column, that the fluid in the tube, from the same pressure on CD, would rise till its upper surface is in a horizontal plane b' passing through a; and the weight of the column of fluid in the reservoir, must be estimated by the area of the horizontal section at b' multiplied by the vertical height of a' above b'. Hence, also, any fluid in a bent tube ABC (Fig. 3) will stand in each branch, the tube being open at both ends, at the same vertical height above C, the lowest point. Thus water, which is conveyed in pipes from a reservoir, will occupy all the bends of the pipes, and rise at the further extremity up to a horizontal plane passing through the surface of the water in the reservoir, provided no vertical bend be higher than that level.

The power produced by the hydraulic press depends on the principle exhibited in the above experiment; and this experiment is, at the same time, the proof of that equality of pressure which it has been said that the particles of a fluid exert in every direction.

The pressure exerted by a fluid against the whole side of a vessel containing it, or against a surface immersed in it, whether that side or surface be plane or curved, is equal to the weight of a column of the fluid having the surface pressed for a base, and the distance of the upper surface of the fluid from the centre of gravity of the former surface for its altitude. For let DB (Fig. 1) be the position of the surface pressed, and let an indefinitely small area at c on that surface be represented by mc, and be pressed by the weight of the filament of fluid above it; then, since every part of the indefinitely small area may be supposed to be at the same vertical depth, which may be represented by m, it follows that the pressure on c will be proportional to mn. And the same thing will hold good with respect to every point in the surface DB. Therefore this surface may be conceived to be pressed by an infinite number of parallel forces, whose points of application are on the same surface, and whose intensities are represented by the products of the elementary areas into the distances of those areas from the upper surface CD of the fluid. But, by the theory of parallel forces in mechanics, the resultant of all those forces is a force whose intensity is represented by the sum of all the elementary areas (that is, the area of the surface pressed) multiplied into the distance of its point of application, that is, of the centre of gravity of the surface, from the same
surface CD. By this theorem the pressure of water against the walls of reservoirs, &c. may be determined.

The pressure against one side of a cubical vessel filled with a fluid is equal to half the pressure upon the base; for the areas of the base and of each side are equal to one another, but the centre of gravity of the former is at a distance from the upper surface equal to the whole depth, and that of the latter at a distance equal to the half depth. It is shown moreover in treatises on hydrostatics, that if a hollow cone standing on its base be filled with a fluid, the pressure on the upper surface and on the sides of the cone is equal to the weight of the fluid; that the pressure against the interior surface of a hollow sphere filled with a fluid is also three times the weight of the fluid. Again, if a vessel of any figure be filled with a fluid, the pressure on the bottom and sides of the vessel, and the bottom of its vertical section, is equal to the weight of all the fluid. Lastly, the pressure exerted on the sides of a vessel, estimated perpendicularly to the base, is equal to the weight of a rectangular prism of the fluid whose height is equal to that of the fluid, and whose base is a parallelogram, one side of which is equal to the height of the fluid, and the other to half the waterline of the vessel, (Vince's Hydrostatics; Gregory's Mechanics, &c.)

It is of importance to determine the place of the centre of pressure against the side of a vessel filled with a fluid, or against a body immersed in fluid, that is, to subside the situation of a point in that surface, at which a force being applied in a contrary direction, to that in which the fluid presses, the surface will be kept in equilibrium.

If a fluid, the body is supposed to be rectangu-
lar, and in a vertical position; let, also, b represent the breadth, and \(a\) the altitude of the surface, or depth of the fluid: then \(\frac{a}{2}a\) will be the depth of the centre of gravity below the upper surface of the fluid. Now if \(x\) be the distance of any elementary area of the side below the same upper surface, such elementary area will be expressed by \(b \cdot dx\); and the pressure of the fluid against it being proportional to the depth \(\frac{a}{2}a\), the tendency of that pressure to turn the side of the vessel round, about its upper extremity, which is supposed to be a horizontal line, will be \(b \cdot dx \cdot \frac{a}{2}a\); consequently the whole tendency of the fluid to turn the side round in that manner will be expressed by \(\int_0^a b \cdot dx \cdot \frac{a}{2}a\); which between the limits \(x = 0\) at the top, and \(x = a\) at the bottom, is equal to \(\frac{a^3}{2}b\). But, if \(P\) be the required place of the centre of pressure, and its distance from the upper surface of the fluid be represented by \(p\), the tendency of the same pressure, expressed by \(\frac{a}{2}a\) from the side \(P\), will be \(\frac{a}{2}a \cdot \frac{a}{2}a \cdot \frac{a}{2}a\). Therefore we have \(a^3b = \frac{a}{2}a \cdot P \cdot \frac{a}{2}a = a^3\), that is, the centre of pressure is at a distance from the upper surface equal to the depth of the fluid round the side. And, in the analysis of writers on hydrostatics, it is proved that, in all cases, when the surface pressed is symmetrical on each side of a line joining the centres of gravity and pressure, the latter coincides with the centre of percussion in mechanics.

When a triangle in a vertical position is immersed in a fluid so that its vertex coincides with the upper surface of the latter and its base is horizontal, the distance of the centre of pressure from the vertex is equal to three-fourths of the perpendicular of the triangle. And when a circle is so placed in a fluid with its upper part just touching the surface, the distance of the centre of pressure from that part is \(\frac{1}{2}\) the diameter of the circle, or \(\frac{1}{2}\) the radius of curvature at that point in the fluid.

The equality of the pressures in every direction, at any point in a fluid mass, is the cause, that if a solid body were plunged in a fluid, the pressure of the fluid immediately under it would tend to raise the body upwards, with a force equal to the weight of the fluid displaced. But the weight of the body is a force acting vertically from above downwards; and, consequently, in an opposite direction to that caused by the reaction of the water. Since therefore the volumes now made with gravity and fluid are equal, and they act one upon another; if their weights or densities should be equal, the body would remain in equilibrium in whatever situation it were placed in the fluid. But, should these weights or densities be unequal, and the former would tend to ascend, or descend, according as its density is less or greater than that of the fluid; and, in order to counteract these tendencies, it would be necessary to use a force equal to the difference between the weight of the body and of the displaced fluid. Hence, if a solid body be weighed in a fluid, it will be found that its weight, or the weight of the same body in vacuo, will be less in the latter case by the weight of an equal volume of the fluid; and, consequently, when a body is weighed in a fluid, as water or air, its true weight, or that which would be obtained in vacuo, will be found by subtracting the observed weight that of an equal volume of the fluid.

When a body floats in a fluid, in order to bring its upper surface to coincide with that of the fluid, it must evidently be loaded with a weight equal to the weight of the fluid. Hence, the weight of the body or of the displaced fluid, and the weight of a volume of the fluid equal to that of the whole body. The weight which a floating body will thus bear is denomi-
nated the buoyancy of the fluid; and on the result we stated depend the common rules for finding the buoyancy of rafts, vessels, &c.

If a solid body float in equilibrio in a fluid, the centres of gravity of the body and of the displaced fluid must evidently be in one vertical line; otherwise the upward action of the fluid below, which necessarily has its resultant in a vertical line passing through the centre of gravity of the place occupied by the body would produce in the latter a rotatory motion contrary to the hypothesis made that in any position whatever: this is denominated an equilibrium of indiffERENCE.

The first case is that of a cylinder whose axis is less than the diameter of its base; the second is that of a cylinder whose axis is greater; and the last is that of a homogeneous sphere.

The absolute weight of a given volume of solid or fluid body is called its specific gravity. In this country, for convenience, it is customary to consider one cubic foot as the given volume, and to express the weight in footponds, or 2700 ounces; thus the weight of a cubic foot of rain water being 1000 ounces, and that of a cubic foot of cast-iron being 7207 ounces, those numbers are used to denote the specific gra-

vities of the bodies, as 100 and 7207 respectively.

And the density of bodies vary in a ratio compound of their volumes and specific gravities.

It may hence be easily shown that when two fluids of different specific gravities, as water and oil, are at equilibrium in a bent tube, the vertical altitudes of the columns above the horizontal plane of junction will be in inversely proportional to their specific gravities. For, let \(mn\) (fig. 3) be a line in the plane of junction; then the area of the section at \(m\) being common to both fluids, the bases of the columns in the two branches may be considered as equal to one another. Now, if the vertical altitude of the column \(m\) be denoted by \(a\), and \(b\) be the specific gravity of the fluid in \(m\) by \(S\), and the pressure of \(S\); then the weights of the columns, or rather the pressures on every point of their bases, at \(m\) and \(n\) may be expressed by \(Sa\) and \(Sa\); and in case of equilibrium these terms are equal to one another: therefore we have \(a = S = B\).

The specific gravity of a solid body is readily found by means of the hydrostatical balance, an instrument which differs in no respect from a common balance, except in being made with gravity and fluid instead of weight; this instrument is used both in air and in vacuo; from whence may be obtained the ratio between the density of the body and that of the fluid in which it is weighed.

The specific gravity of a fluid may be found from the following proposition: Let \(a + b\) be the volume of a body which will float in the fluid, \(b\) being that of the immersed part; let also the specific gravities of the body and fluid be represented by \(s\) and \(t\) respectively. We then have the
weight of the body \( y = (a + b) s \), and that of the displaced fluid = \( bs' \); but these weights are equal to one another: therefore, \( b = (a + b) s : s' = s' \). Consequently, the specific gravity of the solid body being supposed to be known, we have that of the fluid, after making a correction on account of the loss of weight in air. On the principle explained in this proposition is founded the construction of the hydrometer, by which the qualities of liquids are usually determined.

By means of the specific gravity of bodies may be ascertained the quantities of the different materials which enter into any compound body. Thus, let \( w \) and \( w' \) represent the weights of a mixed metal in air, or vacuo, and water respectively, \( s \) and \( s' \) the known specific gravities of the two metals in the mixture, and let \( x \) be the weight in air or vacuo of the heavier metal. Then \( \frac{x}{s-x} = \) the weight of water which would be displaced by \( x \); \( \frac{w-x}{s-x} = \) the weight which would be displaced by the lighter metal; and we shall have

\[
\frac{w'}{s'} = \frac{x}{s-x} + \frac{w-x}{s-x} \quad \text{whence} \quad x = \frac{s(w - w'x)}{s - s'}, \quad \text{and} \quad w - x = \left( \frac{w'}{s'} - w \right) (s - s').
\]

It has been shown that the pressure of a fluid against any point in an upright wall, or in the side of a vessel containing it, is proportional to the depth of that point below the upper surface of the fluid; but, in determining the form and dimensions of a retaining wall which shall be equally strong in every part of its height, it will be necessary to consider that the horizontal pressure of the fluid at any point, as \( a \) (fig. 4) (BAE representing a vertical section through such a wall), tends to overturn or fracture the wall at every other point, as \( C \). Now, let \( Ba = x \), and let the depth of an elementary portion of the wall at \( a \) be represented by \( b \). Then, as we have supposed \( C = b - x \), and \( (b - x) x = \frac{\text{the sum of all the forces of the water above } C \text{ to turn the wall about the latter point}}{\text{the interval between those limits is equal to } j \beta \text{; therefore the tendency of the fluid to fracture the wall at any point, as } C, \text{ is proportional to the cube of the distance of that point from the upper surface of the fluid. The strength of the wall to resist transverse pressure in the direction of its thickness is, by mechanics, proportional to the square of that thickness; that is, proportional to } CD^3. \text{ Therefore, in order that the wall may be equally strong in every part, the form of a vertical section should be such that the squares of the horizontal ordinates, as } CD, \text{ are proportional to the cubes of their vertical depths from the top. This is a property of the semi-cubical parabola, and the exterior or interior surface of the wall should have that figure. Agreeably to this principle also the thickness of tubes containing columns of fluid in vertical positions should increase from top to bottom, according to the same law.}

This article may be concluded by an indication of the principles on which the stability of ships or other vessels on the water may be determined.

Let \( ABC \) (fig. 5) represent a vertical section through the centre of gravity \( G \) of a ship, and let \( HO \) be the surface of the water; let also \( g \) be the centre of gravity of the immersed part, while the plane of the masts is vertical. Now, by the action of the wind or otherwise, let the ship be inclined so as to take the position \( a b c \); the centre of gravity of the immersed part, and of the displaced water will then be removed to \( A \), and that of the ship to \( G' \). Draw a vertical line through \( A \), and let fall upon it the perpendicular \( G'K \); then the stability of the vessel, or the force by which it resists the effort of the wind to overturn it, is expressed by the product of the upward pressure of the water (or the weight of the vessel) acting in the vertical line \( k A \) into the length \( G'K \) of the lever, whose fulcrum is \( G' \). And, that an equilibrium may subsist, this expression must be at least equal to the product of the force of the wind acting against the sails or hull into the distance of the centre of pressure from the centre of gravity of the ship.

HYDROTHORAX (from \( \text{hydro}, \text{ water, and } \text{thorax}, \text{ the chest} \)), dropsy of the chest, is a term applied to express the existence of a collection of serous fluid in the cavity of the pleura.

This collection may take place in consequence of inflammation of the pleura, which, like inflammation of other serous membranes, terminates in effusion; or it may result from the causes of general dropsy, viz. some obstacle to the circulation through the heart, or organic disease of the kidney. When it arises from the former cause it is merely a symptom of pleurisy. In some cases of pleurisy however, in which pain is absent, and in which fever does not exist, or is slight, this effusion and the difficulty of breathing to which it gives rise constitute almost the only symptoms of the disease. Abundant effusions of this kind, unattended by pain or fever, sometimes take place very rapidly, especially in old persons and in adults in a cachectic condition.

When hydrothorax results from inflammation of the pleura, it generally exists on one side only of the chest. When it is a consequence of obstacle to the circulation through the heart, or of organic disease of the kidney, it is generally double, although the effusions into the two pleural cavities may not take place simultaneously. In the latter case also hydrothorax is found in connexion with general dropsy. At first there is oedema of the lower extremities; this oedema gradually extends to the integuments of the trunk, to the arms, and even to the face; and subsequently serous fluid is effused into the cavities of the pleura, giving rise to hydrothorax, and into those of the pericardium and peritoneum.

A collection of fluid in the cavity of the pleura may be detected by physical signs - a dulness on percussion, and, when the effusion is moderate, a diminution of the respiratory murmurs, and the presence of a gogophony, on the affected side. If the effusion be so considerable as entirely to prevent the expansion of the lung, there is a total absence of gogophony or of any respiratory murmur on that side, whatever be the force with which inspiration is made, while on the opposite side the respiratory murmur is unusually audible.

When one side only is affected the patient generally lies on that side; when the effusion is double lie on his
back; or, which is the case when the effusion is considerable, he can breathe in the erect position only. The difficulty of breathing is generally greater in proportion to the rapidity with which the fluid is effused.

We have nothing to say respecting the treatment of hydrothorax, which is included in that of pleurisy and of general dropsy.

HYDRUS. The serpents of this genus have the posterior part of the body and the tail very much compressed and elevated vertically, so as to give them a facility of swimming adapted to their aquatic habits.

Cuvier places them with *Bungara*, or *Bungar*us (Daud.; *Pseudo-boa*, Oppel) as constituting a tribe of serpents whose jaws are organized and armed nearly as in the non-venomous serpents; but which have the first of their maxillary teeth larger than the others, and pierced for conducting the poison, as in the venomous serpents with isolated fangs.

Daudin thus subdivides these water-serpents, which are said to be very common in certain parts of the Indian Sea.

Hydrophis.

The species of this genus have, like *Tortrix* and *Erpeton*, a row of scales a little larger than the rest under the belly. Their head is small, not convex, but obtuse and furnished with plates.

Locality.—Species have been found in the salt-water canals of Bengal, and others further in the Indian Sea.

The Pelamides.

These have large plates on the head, but their occiput has a swollen appearance, by reason of the length of the pedicles of their lower jaw, which is very dilatable, and all the scales of their body are equal, small, and disposed like an hexagonal pavement. Cuvier remarks that the species most known (*Anguis palustris*, Linn.; *Hydrus bicolor*, Schm.) is black above and yellow below. Though venomous, it is, he says, eaten at Tahiti.

HYDRUS (constellation), the Water-snake, commonly called the Southern Snake, a constellation of Lacaille. It is situated between the south pole and the bright star in Eridanus (Achernar).

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HYERES, or HIERES, a town in the department of Var, in France, near the coast, about 9 or 10 miles east of Toulon, celebrated for the beauty of the district in which it is situated, and the warmth of the climate, which exceeds that of any other part of France. The gardens in the immediate neighbourhood of the town abound with standard orange and lemon trees; the grounds a little more distant are planted with olive-trees, which here attain their full size, and with vines. The neighbourhood produces much corn, and there are many meadows. The oranges of Hyères are considered to be of inferior quality. The town, which is resorted to by visitors, especially valtudinarians, is on the slope of a hill; the streets are steep, narrow, and incon-
VENIENT; but many of the houses are handsome, having been built for visitors. The population of Hyères
in 1831 was 8270 for the town, or 10,142 for the whole commune. Hyères was the birthplace of Massillon.
Of the most interesting spots are five islands known as the Islands of Hyères: they lie nearly in a line from east
to west, in the following order: L’Esquillade, a mere rock, seldom
noticed; ile du Titan or Levant; Portera, or Portercro;
Bagnou, or Bagnaouex, very small; and Benquereloues.
They are all very small (Porquerolles and Bagnaouex are only 1/2 or 3
wide, and Titan, are the largest), and are mere steep barren
rocks. They have some fortifications on them, and a
small garrison is kept there. The English took posses-
sion of them during the war, but abandoned them as use-
less. These islands were once noted for their oranges.
HYGINUS, CAIUS JULIUS (written also Higinus, Hygenus, Jignus, or Iginus), a freedman of Augustus
Cæsar, and a celebrated grammarian, was, according to
some, a native of Spain, but according to others, a native
of Alexandria. He was placed by Augustus over the library
on the Palatine hill, and also gave instruction to numerous
pupils.
His works, which are numerous, are frequently quoted
by the ancients with great respect. The principal appear
to have been:— De Urbibus Italicis;* De Troianis Famili-
is;* De Claris Viris;* De Proprietatibus Doorum; De
Divinis;* De Satyris;* A Commentary on Virgil; and a
treatise on agriculture.
The works mentioned above have all been lost; those
which are extant, and are sacrifed to Hyginus, were prob-
able written by another individual of the same name.
These are:—1. Poeticum Astronomicum, libri iv;* Fer-
rara, 1475; 2. Fabularum Liber, Basel, 1535. Another
collection of 234 fables is also attributed to Hyginus; 3.
part of a treatise on the Castræ of the Romans, founded by St Nilus
versus at the end of his edition of Vegetius, 1667, and
by Scheel, together with the treatise of Polybius ‘On the
Roman Camp,’ Astana, 1669; 4. De Limitibus Consituentibus,
editions of 1683, 1758, 1771 and by Goosius in the ‘Reges
Agrarum Aquitanae,’ 1674.
HYDRO-METER (γραύς, moist, and μήτρης, measure).
In physical experiments it sometimes becomes necessary to
measure the amount of aqueous vapour contained in
the atmosphere or other gas under examination. To
attain this object several instruments called hygrometers
have been invented, and are known by the names of
their authors, as De Luc’s, De Sausaure’s, &c. These for
the most part rest upon one common principle, the diminution
of bulk which takes place in organic substances consequent
upon the abstraction of moisture. Thus De Luc employed
a thin slip of whalebone, the contractions of which indicated
the extent of the abstraction; and De Saussure used
a human hair, by means of which he constructed a far
more delicate instrument; but all of them have been supre-
seded by the hygrometer invented by Mr. Daniell, the
principle of which is founded on the chemistry of drying
and by the same gentleman in the 8th volume of the
Quarterly Journal of Science. It consists of two thin
glass balls one inch and a quarter in diameter, connected
by a glass tube about seven inches in length. The tube is
bent in two places at right angles so as to form three arms
of unequal length, the longest of which contains a small
thermometer, whose bulb descends into the lower of the
two glass balls, This ball, after being filled about two-
thirds with ether, is placed over a spirit-lamp until the
vapour of the ether has expelled the contained air through
a capillary tube which is left open for the purpose, and
afterwards hermetically sealed. The other ball is then
covered with a specimen of the substance; and adjusted is placed upon a stand, to which is attached
a small thermometer indicating the temperature of
the external air. When about to be used a small portion of
ether is added to the tube, and the sublimation of the
ether lowers the temperature of the glass ball, and thereby oc-
cur a rapid condensation of the ethereal vapour contained
within the instrument. The condensation of the vapour
with the tube abdicates its function of evaporation from
the surface of the ether in the lower ball, whereby the
temperature of the included ether is continually reduced
until a deposit of moisture from the surrounding atmosphere
is formed, and finally a deposit upon the surface of the glass.
At this instant the inner thermometer, which always indicates
the temperature of the ether, is observed, and thus the
dew point, or that at which the precipitation of atmospheric
moisture takes place, is determined with considerable
accuracy. Having ascertained the dew point, and likewise
the temperature of the external air, the actual quantity of
moisture contained in a cubic foot of air will readily be
found from the formula.

\[ \text{Weight in grains} = \frac{5656.2}{448 + t} \times p. \]

where \( t \) denotes the temperature of the external air, and \( p \)
the elasticity of aqueous vapour at the temperature indicated
by the interior thermometer. The value of \( p \) for every
degree of temperature can be found from the equation of
the expansive force of steam. (Manchester Memoirs, v. 559.)

HYLA. [POAC. vol. x., pp. 487, etc., 496.]

HYLACTES, a genus of birds established by Captain
Phillip Parker King, R.N., for a form allied to Megapodius,
with the following:

**Generic Character.** — Bill subelongated, rather thin, with
a submarginate apex; *nostril* basal, longitudinal, the
membrane subumbonescent, and covered with hairs down the
middle; *wings* very short, rounded; *tail* quill longest.

**Tail** subelongated, graduated. Feet strong; tarsi rather
longer elongated, scutellated in front; *tarsus* and *claws*
elongated, the latter rather strong and subcompressed; *hallux*
very strong.

Examples, *Hylopsis Tarnii."

Locality, the Island of Chili and Port Otway, in the
Bay of Petasus. (Zool. Proc., 1839—31.)

HYLOSAURUS, Dr. Mantell’s name for the extinct
Saurian discovered by him in the forest of Tilgate, and
therefore termed the Forest Lizard. The remains upon
which this genus was characterized were embedded in a block of
stone 41 feet by 2 feet, and consisted principally of bones of
the trunk. A chain of five cervical and five dorsal verte-
bræ with corresponding ribs, and four detached vertebrae,
were visible; as were the coracoids and omolates of both
shoulders. This peculiarity was a departure from the
mentioned parts, which, in the opinion of Dr. Mantell,
rewarded the separation of this Saurian from all recent
and fossil genera; for the *Hylosaurus* had the omolates of a
crocodile with the coracoids of a lizard. There was also a
still more extraordinary osteological structure, consisting of
a series of spiny bony apophyses, which varied from 3
to 17 inches in length, and from 1 to 7 inches in width.
These maintained a certain parallelism with the vertebal
column, as if they had occupied a line along the back.
Dr. Mantell suggested that these processes might be the remains
of a dermal fringe or serration, with which, as in some re-
cent species of Saurians, the back of the Forest Lizard
might be provided; he, at the same time, noticed many
anatomical peculiarities which led him to hesitate in
determining positively that these parts had formed such
appendages. He next entered upon a careful examination
of the fore-part, and from the dissection of thirty-three
Corps, &c. of the verte-
bræ. Dr. Mantell also discovered many dermal bones,
which served to support the large scales, in the stone: he
finally proposed the genus as depending for its characters on
the peculiarity of the sternal apparatus and the spinous pro-
cesses. The paper in which the remains of this large ex-
tinct Saurian were described was read before the Geological
Society of London, in December, 1832.

Dr. Buckley (who, in his 'Bridgewater Treatise,' justly
speaks of Dr. Mantell with the highest admiration) is the
author of a very interesting and valuable work on the
Waifden freshwater formation, in which deposits, of a
period intermediate between the oolitic and cretaceous series,
*Hylosaurus* was found is of opinion that this extinct
Saurian remained in a state of perfect preservation in its
most peculiar character as consisting of the remains of
the series of long, flat, and pointed bones, which, Dr. Buckley
thinks, seem to have formed an enormous dermal fringe
like the hounds of the back of the modern Iguana.
(See also Dr. Mantell’s ‘Geology of the South-East of Eng-
land,’ 1838.)

We hope soon to see this interesting specimen, together
with that of Mr. Mantell’s noble collection, in our Na-
tional Museum.

HYLO’BATES (from ὑλόσαρας, wood-walker, or one
that goes through woods), Illiger’s name for the long-armed
Ape, or Gibbous. The general characters of these Apes as
to dentition and affinities agree with those of the Orangutan,
but there is some modification of the dental sytusa in the
Gibbons, which have also longer anterior extremities and have posterior callousities, though they have no tail. The vermiform appendix of the cecum is also shorter. Dental formula—Incisors $4 \times 4$; Canines $2 \times 2$; Molars $10 \times 10 = 32$.

Habitat, &c.—The forests are the haunts of these cheiro-peds, and they are rarely seen at a distance from them. Gregarious, but shy and timid, they keep up a howling concert, resembling in this respect in some degree the Howling Monkeys of America, and having some of them guttural sacs like that tribe. In the forest the activity of certain species is great, and they make way on the trees with their long arms and lengthened feet most rapidly; but when surprised on open plain ground they are altogether as helpless. Other species (the Siamang, for instance) appear to be more sluggish; but those make good use of their acute eyes and ears, and are generally off before the enemy approaches near enough for a capture.

In confinement they are gentle, and seem capable of great attachment to those who are attentive to them. Dr. Burchell gives a most interesting account of three individuals of the species called the Hooolock (Hylobates Hooolock), which he had an opportunity of observing in that state. One of them, a male, showed a most amiable and docile disposition, and a young female, which died early, was equally gentle and peaceable. The Siamang kept by Mr. George Bennet gives a lively description of the affectionate manners of another of these apes towards those who made its captivity light by their kindness. We select, as an example of this form, the Wow Wow, or Active Gibbon (Hylobates agilis).

Description.—Forehead very low; orbicular arches very projecting; face blackish-blue in the male, brown in the female; in the former a white band above the eyes, which unites with the whitish whiskers. Hair of the body fine, except about the neck, where it is longer and inclined to be woolly and curled; upper part chocolate-brown; back and fore part of the thighs yellowish-brown, but the colour varies a good deal according to sex and age, the young being paler than the adults and aged, and the very young a uniform yellowish-white. Height about 2 feet 7 or 8 inches. No gulletary sac.

Habit.—Very agile as soon as they reach the forest, when they set out on a long journey, swinging, leaping, and throwing themselves from tree to tree with great rapidity. Notwithstanding the wants of the gulletary sac, they howl in a manner very nearly resembling the Siamang, which has one.

In captivity they are not very lively, as might be expected, from the impossibility of their exerting that freedom of motion on which their vivacity in a state of nature so much depends; but though timid they are soon reassured, take pleasure in being caressed, and become familiar and even playful.

Locality. Forests of Sumatra, where the species is named Ungapati.
The Stenonyx of the Malay, Simia sydclytus of Sir Stanford Raffles’s Catalogue of a Zoological Collection made in Sumatra (Linn. Trans., xiii, 241), Phileceus sydclytus of Desmarest, Hylobates sydclytus of P. Cuvier, has a peculiar formation of the hands or feet of the lower extremities, the index and middle fingers being united as far as the middle of the second phalanx. This peculiarity would seem to indicate a generic distinction, notwithstanding the similarity of the teeth and skull to those of the rest of this tribe. These Sumatran Apes, sluggish and timid as they are, exhibit strong maternal affection; for though, if any of the troop are wounded, the rest abondon and leave them to their fate, the mother will remain with her little one if it is hurt, and will suffer herself to be captured rather than abandon it. The females are also generally very affectionate, according to the accounts given by M. Diard and Duvaucel.

**Fossil Gibbons (3).**

M. Hermann Von Meyer, in his interesting *Palmoligies*, remarks that the Quadrumanus (Afex) had never been found fossil; nor had they when he wrote. His work was published in 1832; but since that time the fossil remains of monkeys have been found in the north of India, in the same formation with the Steuthotherum, &c. Fossil monkey bones have also been found in the strata below Calcutta. They were brought up while boring for water.

M. Larret discovered in the tertiary formations of Simorre, Sansan, Aueh, &c., in the department of Gers, in the southwest of France (Gascony), among the remains of several other animals, Apes (Sinques), of a group having some relation, according to M. de Blainville, to that of the Gibbons, but not true Gibbons that might be compared to the Synoedactyle Gibbon (Simang) of Sumatra. (Comptes Rendus, 1837.)

The fossil bones discovered by M. Larret are stated to belong to no less than thirty species of mammiferous animals, including Dinotherium, and were found in two deposits, viz. in the sands and sandstone of the upper tertiary formation of Simorre, Touron, Lombez, &c., and in the lacustrine deposit of Sansan. There were also the remains of two species of birds of a genus not yet determined, a species of Ema, and some species of Coluber and Rana; as well as mollusks (Planorbus, Helix, &c.), and a conchifer bearing a great resemblance to Unio margaritifera. The monkey-jaw appears to have been found at Sansan.

**Hyemococera.** Latreille’s name for a genus of macrocrous crustaceous belonging to the tribe of Alpheus in the family of the Sulcogus or shrimp, according to the system of M. Milne Edwards, who places it between Atys and Alpheus; observing however that the unique specimen from which Latreille established and characterized the genus was found in the Asiatic seas, and formed a part of the collection of the museum; but M. Milne Edwards adds that the specimen appears to have been lost, for he had never seen it. [Shrimp]

**Hyemoptera.** One of the orders into which insects are divided. Hyemoptera insects possess four membranous wings, of which the anterior pair are the larger; they have all the usual parts of the mouth well developed, that is to say, they possess labrum, labium, mandibles, maxillae, and two pairs of palpi; besides the ordinary compound eyes, they are furnished with three ocelli, or simple eyes, which are usually situated on the vertex of the head. Their tarsi are five-jointed. The females are provided with an ovipositor, consisting chiefly of three elongated slender processes, of which two serve as a sheath to the third. This ovipositor, in many species, is so arranged that it can not only perform an ordinary function, but serve as a weapon of defence, and is the part which in bees and wasps is called the sting; in these insects it is barbed at the apex. The antennae are generally bilornate or sessile. The mesothorax and metathorax are well developed; the prothorax is narrow.

Insects of the order Hymenoptera undergo what is termed complete metamorphosis, i.e., the larva is unlike the perfect insect, and the pupa does not possess the power of locomotion. The larvae of some of these insects very much resemble those of the order Lepidoptera (Butterflies and Moths), but differ in the number of their legs, &c. These feed upon plants. (Secundifera). The bees, wasps, &c., generally speaking are destitute of legs, and do not possess a distinct head, and these are for the most part fed by the parent insect, &c., as in the case of Bees and Wasps, by the neuters. In the pupa, all the parts of the perfect insect are visible, since they are enclosed only in a delicate semi-transparent membrane.

In the imago or perfect state most Hymenopterous insects live upon flowers, or at least often frequent them, some for the purpose of gathering honey, and others find them a convenient resort wherein they may prey upon the less powerful species of their own class.

The comparatively simple structure of the wings will serve to distinguish insects of the present order from those of the order Neuroptera, where the wing is divided by minute nervures into an infinite number of little cells resembling network; whereas, in the species of the order Hymenoptera, the basal portion of the wings is furnished with longitudinal nervures only, and the apical portion is divided into comparatively few cells, and these nervures and cells are so uniform in species nearly related to each other by affinity, that the absence of some, or even a slight difference in their form, has afforded good characters for the definition of groups. It is to Jurine that we are indebted for this discovery and a very successful application of it. We may remark that the modifications of the marginal and submarginal cells and their nervures are those which have been chiefly employed by this author in characterizing the various groups. The following figures (from Mr. Shuckard’s work on ‘Fossilary Hymenoptera’) represent one of the anterior wings of an Hymenopterous insect, in which all the nervures and cells are present.
The order Hymenoptera is divided by Latreille into two great sections, to which he applies the names of Terebran-
"hia and Aculeata. In the species belonging to the first of
these sections the female sex possesses a distinct ovipos-
itor, whereas in the second the ovipositor is replaced by a
sting. Many of the ants however form an exception, since
they do not possess a sting, and defend themselves by
ejecting an acrid fluid. In the Aculeata the antennae are
always long, and there are a male and twelve in the females.
The palpi are generally filiform; the maxillary, often the larger, have six joints, and the labial are four-jointed. The abdomen is composed of seven joints in the males, and six in the females. These two characters have always been considered as of gen-
eral application, and are consequently of great service in
forming the posterior margin; abdomen conical; labrum distinct. Of this family three genera are characterized by Latreille:—
Bembex, Monedula, and Stenus. Family 6, Laridris
[Laridae]: The larvae of all the genera of this family have
seven, 8, Carabid. In the insects of this family the head
is generally very large, nearly square when viewed from
above; the antennae are often thick near or at the apex,
and the abdomen is oval. It contains the following genera:
—Trypoxylon, Gorytes, Crabro, Stigmas, Cela, Diodon-
tus, Ceratophora, Passalaeus, Pemphredon, Cenomus,
Melitinis, Alyson, Pien, Archips, Mines, Cerceris, and
Hymenoptera, FOSSORIAL. This group, to
which Latreille applies the name Fossorae, and the char-
acteristics of which are given in the article Hymenoptera,
is divided into eight families:—1. Scolitades [Scoliidae]; 2.
Sphecides [Sphecidae]; 5. Bembidion, containing those
species in which the prothorax is transverse and narrow,
elongated laterally, and extending to the base of the an-
terior wings: length of the antennae near the rim of the
head, which viewed from above, broader than long, the sutures of the
families 8, 9, Carabid. In the insects of this family the head
is generally very large, nearly square when viewed from
above; the antennae are often thick near or at the apex,
and the abdomen is oval. It contains the following genera:
—Trypoxylon, Gorytes, Crabro, Stigmas, Cela, Diodon-
tus, Ceratophora, Passalaeus, Pemphredon, Cenomus,
Melitinis, Alyson, Pien, Archips, Mines, Cerceris, and
Hymenosa. Dr. Leach's name for a genus of brachyurous crustacea. [Pinnotheria.]
Hymettus. [Attica.]
Hymenoptera. [U Preview praise and adoration, in honour of a Deity, and by the Hebrews, as well as by the Greeks, accompanied on some musical instrument. The Te Deum and Benedictus are, in our liturgy, both called hymns: the Te Deum is sung on Easter morning, the Benedictus
by St. Ambrose; but, since St. Hilary, bishop of Poitiers, says that he was the first who composed hymns for the church. To Prun-
dentius is ascribed most of those which appear in the Ro-
man breviary. The hymn should be a song of joy, not of lamentation, as is too often the case in the case of the
Old Father. Such was the opinion of St. Isidore, who gave to the song of complaint and sorrow the name of threnos, from threnos
(Spöt), 'lamentation.'

The term is now applied to any short religious poem sung in
places of public worship, not being a version of a psalm,
or taken directly from any of the canonical books of Scrip-
tures.

Hysocyamus, a genus of plants belonging to the natural order Solanaceae, among which it is distinguished by
having an irregular corolla slit on one side, a 5-toothed
permanent calyx, and a capsule opening by a transverse lid.
It is to one of the species of this genus, Hysocyamus, that
the name of Henbane is given. Common Henbane is a
biennial, hairy, clamy, branched, fettled plant, from 1 to 2
feet high, growing in waste and uncultivated places. It
has oblong, soft, silky, coarsely tomentose, narrow
flowers traversing with livid purple veins, and a large
spiny calyx. When in fruit, the whole of the upper part
of the plant is occupied by the large spreading spiny calyces
arranged in one series of spirals.

Hysocyamus Niger (Henbane), an indigenous herbaceous annual or biennial plant of which the leaves and
seeds are official. The leaves should be collected when
the plant is flowering. The lower leaves are large and have
short petioles; the upper are smaller and sessile; they are more
or less deeply sinuate, pinnatifid, or toothed, soft to the
touch, hairy, slightly viscid, and of a greyish green colour.
Odour disagreeable, stupidity; taste herbaceous, nauseous,
Somewhat acrid. Both odour and taste are much dimin-
ished by drying, which should be quickly performed, and the
leaves preserved in well-closed vessels, in a cool dry
place; 100 parts of fresh leaves dry into 14, and 10 pounds
of fresh herb dry into 1 pound of the well-dried leaves
of unpurified, unannealed, unpurified, or, more correctly,
applied to the leaves, and render them useless. The
virtues are dependent on the presence of Hysocyamin, which
however is more easily obtained from the seeds.
The seeds are small, flattened, kidney-shaped, with minute
dots and indurated. They contain the so-called kali, or
black colour. When bruised they evolve an odour of henbane.
Taste oily, bitter; by expression they yield a fat oil, and
also furnish a very powerful extract, as well as Hysocyamin.
This alkaloid is said to contain some fat matter, with a
slightly viscid, but it more generally occurs in a colour-
less transparent soft viscid mass. When properly dried it

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* It must not be imagined that these sections constitute several genera:
but it can be said in their favour is, that they are coincident for the arrange-
ment of the species.

P. C., No. 775
is devoid of odour, but when moist, and particularly in an impure and coloured condition, the odour is highly disagreeable, stupefying, and tobacco-like. Its action, even in very small quantity, is extremely narcotic and fatal, like nicotine. It kills more slowly than conia, and scarcely causes convulsions. Applied externally to the eye, even in very minute quantity, it causes great and enduring dilatation of the pupil. Cats to which it has been given have been observed to gnash the teeth and foam at the mouth.

Hyoscyamus, when taken by a person in health, produces a disorder of the nervous system, inducing symptoms greatly resembling hysteria, if the dose be moderate; but if large, it causes all the phenomena of narcotic poisoning, such as result from other solanaceous plants, particularly congestion of the vessels of the brain with coma. Administered in medicinal doses to persons with disturbance of the nervous system, it lessens the irritability, quiets the circulation, and when morbid wakefulness exists, disposes to sleep. It possesses a superiority over opium in many instances, as it does not constipate the bowels, but rather acts as a mild laxative. This circumstance often renders it a valuable agent in allaying pains and other distressing symptoms incidental to females in particular states of their system. Tincture or a well prepared extract is a good form of exhibition; but probably some of the salts of hyoscyamin are found to be the most eligible mode of administration, or a tincture of the seeds may be used.

In case of accidental poisoning, the stomach-pump should be used, or an emetic of sulphate of zinc be given; if the brain should appear much oppressed, venesection may also be resorted to.

**HYPATIA. [HEON.]**

**HYPERBOLA.** In connection with this article see **CONIC SECTIONS, ELLIPSE, PARABOLA.**

The hyperbola is one of the curves known by the name of conic sections. It is in the application of mathematics the least useful of the three; indeed so very rarely does the necessity of using it occur, that it may be a question whether the study of it should form a part of the course of practical mathematics. But there are in pure analysis so many analogies which are illustrated by distinctions existing between the properties of the ellipse and hyperbola, that the student who aspires to more than elementary knowledge cannot dispense with the comparison of the two curves.

The two branches passing through A and M form a complete hyperbola, derived from the cone, or from the general equation of the second degree. [CONIC SECTIONS.] There is a pair of straight lines passing through the center C, namely, 1/CL and KCK, which are asymptotes to the curve. There are two foci (as in the ellipse) S and H, the position of which may be thus found when the principal axis AM and the asymptotes are given: from A draw AV perpendicular to the axis; then CS and CH are both equal to CV.

The difference of the focal distances HP and SP is always equal to the axis major AM: in the branch passing through A, HP is greater than SP, and vice versa. The tangent PT always bisects the angle SPH; and PN, the ordinate perpendicular to the axis, being drawn, CA is always a mean proportional between CT and CN. There is also a directrix, as in the ellipse, found by taking on the line CS, CK a third proportional to CS and CA, and drawing through K a perpendicular to the axis; and as in the ellipse, SP always bears the same proportion to PR, namely, that of CS to CA. And CS divided by CA is called the eccentricity, the distinction between the ellipse and hyperbola being that in the former the eccentricity is less than unity, and in the latter greater. The double ordinate drawn through S or H is called the latus rectum of the hyperbola, and its half the semi-latus rectum. Thus far the resemblance between the ellipse and hyperbola is very visible; at the same time it is obvious that there is nothing in the latter which answers to the minor axis of the ellipses, or to conjugate semidiameters. But if another hyperbola be described in the manner immediately to be pointed out, a figure will be obtained which will enable us to point out properties answering in all respects to those of the ellipse. Complete the rectangle CAVB, and describe another hyperbola of which CB is the semi-axis, and the same lines as before the asymptotes. This hyperbola is said to be conjugate to the former one; and its foci $S'$ and $H'$ are at the same distance from the common centre as S and H.

In the ellipse, CA was called the major semi-axis, as being greater than CB, the minor semi-axis. Let the words major and minor refer to the importance of the several axes, and not to their magnitude. Then CA is called the major semi-axis (or the semi-major axis) of the hyperbola passing through A and M, and CB its semi-minor axis. Conversely, CB is the semi-major axis of the hyperbola passing through B and P, and CA is its semi-minor axis. Generally the major axis of an hyperbola is that which cuts it, and the minor axis that which cuts the conjugate hyperbola.

As in the ellipse, the square on the ordinate PN is to the rectangle of MN and NA (which is the excess of the square of CN over that on CA) in the proportion of the square on CB to the square on CA. If CD be drawn parallel to the tangent PT, D is said to be conjugate to P, and the semi-diameter CD to the semi-conjugate diameter CP. If the parallelogram CDKP be completed, the point K will always fall on the asymptote, and the other diagonal DP will be parallel to the other asymptote. And CP, any semidiameter falling in the acute angle of the asymptotes, always exceeds its semiconjugate CD; and the excess of the square on CP over that on CD is equal to the excess of the square on CA over that on CB. The area of the parallelogram CDKP always remains of one magnitude, namely, equal to CAVB. The rectangle of CW and WP always remains the same, namely, equal to the square on half the line joining A and B. Any part of a tangent KL, intercepted between the two asymptotes, is bisected by P, the point of contact; and if PE be drawn parallel to KL, the interceptions EP and EF' are equal, and the rectangle of EF and EF' is always equal to the square on PK or PL. And the rectangle of the focal distances HP and SP is always equal to the square of the semiconjugate diameter CP.

Any ordinate XZ drawn parallel to a tangent GL is bisected by the diameter CG drawn through the point of contact. And the square on YX is to the rectangle of DY and YG (or the difference of the squares on CY and CG) in the proportion of the square on CP to the square on CD.

A perpendicular let fall from a focus S upon a tangent PT meets the tangent in a point of the circle whose centre is C and radius CA.
If any number of hyperbolas be drawn having the same centre C and the same major axis CA, and ordinates NP, and the same, the same absolute CN, the tangents at P, P', &c., will all meet the axis CA in the same point T: and any two such ordinates PN, P'N, will always be to one another in the proportion of the minor axes of the hyperbolas to which they belong.

If we were not so often to consider the hyperbola in connection with the ellipse, perhaps the following way of describing it would be the most simple.

Let CA be the semi-axis major, and CN one of the asymptotes: and while the line NU moves parallel to AV, let it move upon that line in such a way that the square on NP shall always be less than the square on NU by the square on AV. Then P will trace out one branch of the hyperbola. But if at the same time the square on RN exceed the square on NP by the square on AV, the point R will trace out a branch of the conjugate hyperbola.

For a remarkable property of the area of an hyperbola see Logarithms.

Among ellipses there is one sort which is conspicuous, namely, the ellipse in which the major and minor axes are equal, or the circle. The corresponding hyperbola, namely, that in which the major and minor axes are equal, is called the equilateral hyperbola; and though not so remarkable a curve as the circle, yet presents some peculiar simplicity of properties. Its asymptotes are at right angles to one another, and the hyperbola and its conjugate are similar and equal. Any semidiameter CP is equal to its semi-conjugate CD, and PD is at right angles to CW. Its excentricity is $\sqrt{2}$ or 1:414..., and the square on CN always exceeds the square on NP by the square on CA.

For a remarkable analogy between the circle and the equilateral hyperbola, see the 'Library of Useful Knowledge: Differential Calculus,' p. 120.

In the preceding article it will be observed that we have called the two branches passing through A and M one hyperbola. These are frequently called two opposite hyperbolae; but they form in fact only one curve, defined by one equation.

Hyperbole (hý'pérbo-lê, from ἡπερ over, above, βάλλω to throw) means literally an over-casting; in its common sense, a going beyond the truth in describing an object, not by the introduction of qualities which do not belong to it, but by the exaggeration of those which do. For example, it may be hyperbolical to say that the complexion of a fair woman is whiter than snow; but to say so of a brown woman is either irony or simple falsehood. Poets in all nations have affected this mode of speech; but it is peculiarly characteristic of the Oriental nations, both in prose and verse.

Hyperica (hý'pér-ik'â), a natural order of Polygamous Exogenous plants, with an imbricated calyx, polydelluous stamens, and a many-celled, many-seeded ovary, with several styles, which are usually quite distinct. The leaves are often marked with pellucid dots, and there is few many species, in addition, a number of black dots which occupy some part, usually the margin, of both leaves and flowers. In all cases the latter belong exclusively to the Xanthic series of colour.

The species inhabit various parts of the world, both within and without the tropics; they are especially common in the Southern States of the North American Union. Many are objects of ornament, but they are little cultivated because they have frequently a disagreeable hircine colour. They are generally xerographic, and in some cases, as in the genus Vismia, yield a substance so much resembling Gomphologe as to have acquired in commerce the name of American Gomphologe.

Hypericum perforatum.

1. a larger expanded; 2. a petiole; 3. a ripe fruit; 4. a longitudinal section of a seed.

Hyperides or HYPERIDES (hý'pé-re-íd'îz, or hý'pe-re-íd'ê) a, an Athenian orator, a contemporary of Demosthenes, and one of the ten from whose writings the Lexicon of Harpocrates was formed. According to Arrian, Hyperides was one of the orators whom Alexander demanded of the Athenians after the destruction of Thebes: but the list which the author of the 'Life of Demosthenes' (attributed to Plutarch) gives as the most trust-worthy does not contain the name of Hyperides. He was engaged in the Lamian war, which immediately followed the death of Alexander (n.c. 323), and he spoke a funeral oration over those who fell in the battle, which was highly commended by antiquity. A considerable fragment of this oration is preserved by Stobaeus (Serm. 153). In the year n.c. 322, Hyperides, with Demosthenes and others, having fled from Athens, was condemned to death, and the sentence was carried into effect by Antipater. (Arrian, 'History of Alexander's Successors,' Photius, c. 92.) These two great orators, who had been in their lifetime both friends and enemies, died in the same year. There is no extant oration of Hyperides. The critics of antiquity unite in the highest eulogiums of Hyperides as an orator. Dionysus of Halicarnassus, in his remarks on Dinarchus (c. 5, &c.), characterizes his style as marked by excellences of the highest order. For some further remarks on Hyperides, see Rubenken's 'Historia Critica Oratorum Graecorum' (c. 153, &c.).

Hypersthene (Labrador hornblende) occurs crystalline and massive. Primary form a rhombic prism, cleavage parallel to the lateral planes, and to both diagonals; fracture uneven; hardness 6; scratches glass, and is scratched by quartz; colour on the metallic-looking surface reddish, in other directions greyish or greenish-black; streak greenish-grey; lustre metallic in reflected direction, on the cross-fracture vitreous; in some varieties translucent on the edges; opaque; specific gravity 3·389; massive varieties amorphous. Before the blowpipe alone, undergoes to change; on charcoal fuses into a greenish-grey globule; with borax fuses easily. Occurs at Labrador, and in the island of St. Paul.

Analysis by Klaproth—

<table>
<thead>
<tr>
<th>Substance</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Silica</td>
<td>54·25</td>
</tr>
<tr>
<td>Magnesia</td>
<td>14·69</td>
</tr>
<tr>
<td>Alumina</td>
<td>2·25</td>
</tr>
<tr>
<td>Lime</td>
<td>1·50</td>
</tr>
<tr>
<td>Oxide of iron</td>
<td>24·50</td>
</tr>
<tr>
<td>Water</td>
<td>1·70</td>
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</tbody>
</table>

Hypersthene rock. This is among the rarer varieties of those igneous aggregates which by many geologists are grouped together under the title of Trap. Dr.
MacCulloch, who first noticed Hypersthene rocks in Skyre and Arndamurchan, describes three varieties:

Hypersthene with compact felspar, or with common felspar; with common felspar; with glassy felspar.

In largeness of grain it varies from large-grained granite to hornblende-basalt; or it may be as fine as granite: felspar is of various colours. It passes to common greenstone.

In Skyre it forms the Cuckullin Mountains; part of the mountain of Carrock Fell in Cumberland is also formed of it; a dyke of Hypersthene stretches from the lake of Radnorshire; it occurs also in Cornwall. In the Vale of Neave has pointed out the passage from Hypersthene sienite to granite.

HYPERTROPHY (from sive, above, and prope, nutrition), a term in medicine signifying the enlargement of a part of the body from excessive nutrition. The hypertrophied organ contains no new solid or fluid substance, but one or more of its proper component tissues are in greater quantity than usual, the superabundance of the component parts being an increased number, weight, or bulk. It is always a condition of a part, namely, diminished bulk from defective nutrition, is termed atrophy. (ATROPHY.)

When hypertrophy attains such a degree as to interfere with the action of the organ in which it is seated, it constitutes an important and highly dangerous disease; such is frequently hyper trophy of the heart.

The immediate cause of the hypertrophied state is, as we have said, the habitual excessive action of the organ or tissue. And since all parts of the body are formed and nourished from the blood circulating in them, it is natural to suppose that the production of hypertrophy would be accompanied by an increase in quantity of the fluid in the organ.

It is necessary however not merely that the blood should be collected in it in larger quantity, but also that it should circulate rapidly through the minute vessels, so as to bring constantly fresh portions of a nutritive material into contact with the smallest component particles of the structure. This is illustrated by reference to the known exciting causes of hypertrophy which give rise primarily to this increased quantity and accelerated circulation of blood in the aorta. There are, it is safe to say, three principal causes of hypertrophy of which we cannot perceive any exciting cause: thus, in some persons the adipose tissue, or fat, in others the bones are more than ordinarily developed, without our being able to assign any other reason for it than that they were a predisposition in the constitution of the individual to such increased nutrition. But generally we can refer the hypertrophy either to excessive exercise of the part, or to the long-continued operation of a stimulus upon it. When any part is in a state of activity, a greater flow of blood takes place towards it than when it is at rest; and it is well known that a stimulus such as friction applied to a part, causes it to become more red from its vessels being more injected with blood. If such a state be long kept up, over-nourishment is the result. A popular example of hypertrophy from increased exercise is afforded by the muscularity of the arm of the blacksmith, or those of the legs of the operos-dancer. The heart also frequently becomes hypertrophied from this cause; for instance, in cases where an increased action of its muscular walls is rendered necessary by an obstacle to the passage of the blood which it propels into the body. Hypertrophy from the second cause, the long-continued operation of a stimulus, is seen in the thickened state of parts of the skin which have been subjected to friction. Hypertrophy frequently follows the simple stimulus; with the deposition of new matter of a different nature from the original tissue, the stimulus having excited inflammatory action as well as increased nutrition.

The treatment of hypertrophy consists in the removal of the exciting cause, if this can be effected; the part should be kept at rest as much as possible, all irritation prevented, and the supply of blood diminished. These means can hardly be applied in the greater proportion of cases; it is generally combined with the deposition of new matter of a different nature from the original tissue, the stimulus having excited inflammatory action as well as increased nutrition. (For further information on the subject of hypertrophy the reader may consult Andrade’s Pathological Anatomy, and Dr. Cursell’s Illustration of the Elementary Forms of Disease.)

HYPOCAUSTUM. [BATH.]

HYPOCHONDRIASIS. Hypochondriasis is a state of extreme sensibility of the nervous system, which leads patients to believe themselves worse than they really are, to detail their sufferings with exaggeration, to individualize all the physical actions which annoy them, and consider them the symptoms of as many different diseases as they can form. Allied to this extreme sensibility there is a mental exaltation, which causes the patients to pay the most minute attention to what passes within themselves. The hypochondriac of course knows all the details of his animal and organic life; he relates the manner in which his digestion is effected; he numbers the minutes of his sleep; he describes his sensations, his passions, the succession of his ideas; and dilates on every thing that concerns himself with a copiousness that nothing can arrest. The story which he tells you to-day he will relate again to-morrow, and at all times whenever he can find you willing to listen to his various sufferings.

We have witnessed the case of a gentleman, who was so engaged in attention to himself as to occupy the intervals of the visits of his physician in writing a journal of his sensations. This journal was, at every visit of the physician, produced for his perusal. During a period of several years this gentleman was, without any adequate reason, almost daily in dread of immediate death, and was continually upbraiding his medical attendant and charging him with the greatest cruelty in coming so seldom to see a man in such imminent danger.

As we do not in general see in hypochondriacs any loss of flesh or any appearances of disease corresponding to the supposed weaknesses in the nutritive action of the organ or tissue, we are not aware how to take them for visionaries; and such, in most instances, they really are. M. Leuret relates the case of a hypochondriac, who, one day, among other symptoms which he complained of, was shaded by a great deal of fever, which he said had been slow only and with difficulty, and to show what an extreme he was reduced he lifted the limb with an appearance of great effort. Well! what can you wish more? Inquired M. Leuret. ‘Sounds clearly enough, Mr. In spite,’ said the hypochondriac, ‘to do this;’ and at the same time he expressed his desire for freedom and force. M. Leuret could not restrain his laughter; and his patient, on perceiving the mistake that he had made, laughed also most heartily.

The sufferings of hypochondriasis have been called imaginary, and, if it is meant that they are a product of the imagination, the appellation is just; but the appellation of ‘imaginary’ is false if it is pretended that they are not really felt. Of all patients, those whose diseases are imaginary probably suffer the most. In many cases however these persons are affected with a real disease, and the term hypochondriasis is applicable to them only in consequence of their having their attention constantly fixed on their complaints, and of their experiencing a degree of fear and sadness which their condition does not warrant. Hypochondriasis is frequently witnessed in young men of studious habits, whose attention is constantly fixed on the most trifling imperfections of health; and, too much prolonged. There is a class of students who, from the nature of their studies, are frequently affected with it—we allude to students in medicine. The descriptions which they read and hear of diseases, and the continual observation of the sick, affect their imaginations. They learn that incurable diseases often arise in the most insidious manner. They apply to themselves the lessons they have just learned; but as these lessons are very incomplete, their application is false, and they discover in themselves a number of diseases of which there is no real existence. There are few physicians who, in recalling to their minds the period of their first studies, and the sick whom they first visited on the wards, recall with perturbation the quietude which they experienced respecting their own health. Persons in the habit of reading medical books run the same risk as medical students, and are similarly affected.

Another very fertile source of hypochondriasis is luxury, and the want of occupation and exercise. The hypochondriasis produced by this cause is the most obstinate of all, for it is at times almost inseparable from such intentness of the physician. Happy are those who are the possession of a competence, earned by the labour of each day, preserves from such a malady. Poverty itself, with all its privations, is attended with less misery than the riches of the hypochondriasis. Hypochondriasis occasionally results from other causes, such as misfortunes, the excesses to which young men are addicted, and the prolonged and injurious use of medicines.
The treatment of hypochondrias must of course vary in some degree with the case. We must endeavour to allay the groundless fears of hypochondrias, and by a change in their mode of life, and by diverting their attention, to break the habit which they have formed of continually brooding over themselves. The first step would have an entire confidence in his physician. Confidence begets tranquillity, and banishes all those symptoms that originate in fear.

If hypochondrias result from overstudy, a relaxation followed by exercise, and the introduction of society, with a country life, will prove the most efficacious remedies.

If it is occasioned by idleness and luxury, a solid and permanent cure can rarely be obtained except by a life of occupation. The field sports of this country are admirably adapted to the fulfillment of these conditions. Instances have been recorded of patients having been freed from the hypochondrias to which they had been long a prey by the loss of their fortunes, or by some calamity which roused them from their state of apathy and rendered exertion imperative.

In all cases a remedy must be sought for in the banishment of their groundless fears, in a change in their mode of life, and in scenes that withdraw them from the continual contemplation of themselves.

HYPOGENE, a term in geology implying 'nether-formed' (from sub and gēne, which signifies 'birth' or 'formation'), proposed by Mr. Lyell as a substitute for the word primary. Mr. Lyell affirms that 'the popular nomenclature of geology, in referring to the rocks of the tertiary, is not accurate,' but that 'in a great degree founded on a false theory; inasmuch as some granites and granitic schists are of origin posterior to many secondary rocks. In other words, some primary formations are shown to be newer than many secondary groups—a manifest contradiction in terms.'

As far as granite is concerned, this remark is entirely true: its origin is proved to be independent of any particular epoch, though it has been long thrown into the midst of the primary formations. As applied to granite, Mr. Lyell's emendation is exactly equivalent to the term Plutonic used in Brongniart's classification; but when the term Hypogene is used to include the primary stratified rocks, a particular hypothesis of their origin is tacitly assumed, which many geologists think not sufficiently established.

It is assumed in this hypothesis that the primary strata have an acquired the present mineral aspect, not through any circumstances peculiar to their original formation, and supposed to be characteristic of the physical agencies exerted in the earlier areas of the world, but through the subsequent changes of the strata and the strata themselves, and under those circumstances where the Plutonic rocks are generated. The term primary implies only that the rocks so named are the earliest we can trace in the crust of our planet; and as geological classification is mainly founded on succession of time, and the relative antiquity of strata can be determined as a fact, it seems unlikely that the well-known designations of primary, secondary, and tertiary strata will be abandoned, though, as expressing the subterranean origin of certain properties and conditions of mineral masses, the word Hypogene appears very suitable.

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HYPOTHESIS (from hypotesis), a collection of purulent matter in the interior chamber of the eye. The principal symptoms are redness, a puffy appearance of the eye, and the appearance of a white spot which is visible through the cornea, and has its upper edge horizontal, and its lower edge, which is bounded by the margin of the cornea, crescentic. The affection is almost always occasioned by inflammation of part or of the whole of the tissues of the eye, and, like all other such cases, requires active antiphlogistic treatment.

The term HYPOGENE or HYPOTHESIS (from hypotesis, subbending), is a term which has always been applied since the time of Euclid to the side of a right-angled triangle which subtends, or is opposite to, the right angle.

The property of the hypotenuse of a right-angled triangle being one of the most important elementary propositions in the whole of mathematics, it will be worth while to devote some space to its consideration. We shall proceed to give some demonstrations, derived from different principles.

The property in question, in a limited form, is this: that the square on the hypotenuse is equal to the sum of the squares on the sides. The introduction of the square however, in preference to any other figure, arises from the fact of the property of the hypotenuse with respect to the square being demonstrated before that with respect to any other figure. The general proposition is this: if three similar figures (that is, figures of the same shape, but differing only in size) be described upon the three sides of a right-angled triangle, the content of that which is described upon the hypotenuse will be equal to the sum of the contents of the figures described upon the sides. Thus, all semicircles being similar figures, let AXCB, AYC, and CZB, be the semicircles described on the hypotenuse and sides of the triangle ACB, right-angled at C: then AYC and CZB are together equal to AXCB. Hence was obtained the first instance in which a curvilineal species was reduced to an equivalent rectilineal one. Take away the segments AXC and CVB from both sides of the preceding equation, and the remainders of the smaller semicircles, namely, the sum of YX and ZV, are together equal to the remainder of the semicircle, namely, AXC. This proposition is attributed to Hypocrates. [GEOMETRY.]:

As soon however as the proposition is demonstrated with respect to squares, all the rest follows easily, after the doctrine of proportion has been established. It is the property of similar figures described on two lines to be in the same proportion as the squares on those lines; if then the squares on two lines be together equal to that on a third, then any two similar figures described on the first two lines are together equal to the corresponding figure described on the third.

We shall now sketch four different demonstrations of this fundamental proposition, desiring it to be remembered that we suppose the reader to have already become acquainted with it in an elementary course of geometry.

1. Let CD (the preceding figure) be drawn perpendicular to AB. Suppose that (after the manner of some writers on geometry) the theory of proportion and of similar triangles is established before anything is proved relatively to the areas of figures. Then it is easily shown that ACD and CDB are triangles similar to one another, and to the whole ACB. Now in such a system of geometry, it can easily be shown, without the aid of our theorem, that any two similar figures, described on two straight lines, are to one another in the proportion of the squares on those lines. Consequently, AC and AD, the triangles described on AB, AC, BC, are to one another as the squares on AB, AC, BC. But the first triangle is evidently equal to the sum of the other two; consequently, the square on AB is equal to the sum of the squares on AC and CB. This demonstration may be objectionable in a geometrical point of view, but it contains one of the most useful modes of illustrating the proposition to a person unacquainted with geometry. Let such a one be made to remark the very visible fact, that two similar figures described on two straight lines are always of the same relative magnitude, each to the square described on the same line: he will then, seeing that the right-angled triangles similar to itself, each having one of the sides for its hypotenuse, be able to see that the square on the hypotenuse is equal to the sum of the squares on the sides.

2. The next method shall be ocular demonstration, made by cutting the square on the hypotenuse into the squares
Let ABC be the triangle, right-angled at C. On AB describe the square ADEB, and on AC and CB the squares AFGC and CHKB. From E draw EL perpendicular to BM, and from D draw DQ perpendicular to AC. It is easily proved that the triangles ABC, BLE, DQA, are equal in all respects: whence (1) the square on AC must pass through D, since DQ = AC; (2) EL = BC = BK. Hence, by the parallels, the triangles NKB and MEL are altogether equal, so that EM = BN, whence MD = NA, and, by the parallels, DGM and AHN are altogether equal. And AFD is in all respects equal to BLE. Out of the square ADEB take BLF, and remove to AFD; remeasure MLE to NKB, and AHN to DGM. Then the square ADEB will be formed into the two squares AFGC and CHKB.

3. The next demonstration is derived from the Hindu treatises on algebra: not that it is actually found there, for the Hindu works demonstrate nothing; but attached to the statement of the proposition, in the margin of some copies, is the following diagram, which is no doubt that belonging to the demonstration, which is as follows—Let ACB be the triangle, and describe the square ABDE on the hypotenuse. Draw DH perpendicular to AC, and EG perpendicular to DH, and produce BC to meet EG in F. Then the square is made up of the four equal triangles ACB, BFE, EGD, DHA, and of the smaller square GFCH, which is the square on HC, the difference of AC and CB. But the four triangles make up twice the rectangle of AC and CB, and twice the rectangle on two lines, together with the square on their difference, is the sum of their squares: whence the square on AB is the sum of the squares on AC and CB. Judging by the general character of Hindu mathematics, it must be supposed that their demonstration was arithmetical, supposing the sides of the triangle to be represented by numbers, and using the equation

\[(a-b)^2 + 2ab = a^2 + b^2.\]

The following is the method of obtaining right-angled triangles, of which the sides shall be whole numbers. Take any two whole numbers whatsoever, 1 and 6, of which 1 is the greater; then if \(x^2 - y^2\) and \(2xy\) be the two sides of a right-angled triangle, the hypotenuse is \(x^2 + y^2\). For instance, let \(x = 11, y = 7\); then \(x^2 - y^2 = 120, 2xy = 154,\) and \(x^2 + y^2 = 170\): whence 170 being sides of a right-angled triangle, its hypotenuse is 170. It is a remarkable property of any three numbers which represent the sides of a right-angled triangle, that one of them must be divisible by 5.

4. The last demonstration which we shall give is one which we propose to any other, because it shows the property in question to be but one simple and prominent case of a property of great beauty and generality, common to all triangles. This property was first noted by Pythagoras, and it shows that any parallelograms whatever being described upon the two sides of a triangle, a third parallelogram, equal to their sum, can immediately be drawn upon the third side.

Let ABC be a triangle, on two sides of which, AC and CB, let any parallelograms AFGC and CHKB be described. Produce FG and KH to meet in Z, and join ZC, and produce it to W. Through A and B draw AD and BE parallel to ZW, whence it follows that ADZC and CZBE are parallelograms, and, by equality of bases and altitudes, severally equal to AFGC and CHKB. And AD and BE are equal and parallel to ZC, and therefore to one another; whence AD is a parallelogram made up of the parallelograms ADWV and BWVE, which, by equality of bases and altitudes, are severally equal to ADZC and BCZE, that is, to AFGC and CHKB. Hence the parallelogram on the side AB is equal to the sum of those on the sides AC and CB.

Now let the triangle be right-angled at C, and let the parallelograms on AC and CB be squares, and repeat the preceding construction. Then GCZH is a rectangle, and GZC is in all respects equal to ABC, whence ZC = AB, and whence AD and BE are equal to AB, and the parallelogram DEAB is equilateral. But the angle DAC is equal to ZCH, which is equal to CBA, the triangles CZH and BAC being altogether equal. But CBA and CAB are together equal to a right angle; whence DAC and CAB are the same, or DAB is a right angle. Consequently, ADEB is an equilateral parallelogram, right angled at A, or it is a square; and the parallelogram ADEB, that is, the square on AB, is equal to the sum of the parallelograms AFGC and CHKB, that is, to the sum of the squares on AC and CB.

HYPOTHESIS (in opposition, sub-postitio, supposition), literally, the act of placing one thing under another, that the latter may stand upon and be supported by the former; metaphorically, the assignment of any cause or reason why an observed event or phenomenon should have happened. For instance, the sun would disappear if it were deprived of its power of giving light, and also if an opaque body came between us and it: either of these circumstances would cause what we term a total eclipse, and either is therefore sufficient, as an hypothesis, to explain a total eclipse.

In the article CAUSAE (in natural philosophy) will be found the discussion of several considerations connected with the use of hypotheses; and in the article ATTRACTION...
an instance of the important distinction between an hypothesis asserted because it is true, and one assumed because it is sufficient to explain observed phenomena. We suppose these articles to be known to the reader.

The following mode of argument is known in logic by the name of a hypothetical syllogism:—If A exist, Z exists; but A does not exist, therefore Z does not exist. Or, establish the absolute truth of an hypothesis, and the phenomena which necessarily follow may be asserted even without experiment. But this we are seldom in a condition to do. The premises are not often found true, and if A exist, let Z necessarily follow; Z has appeared, were we then entitled to say that A exists? By no means; for when we prove that Z necessarily follows from A, we do not therefore show that Z follows from nothing but A. But we can establish the following:—If A exist, Z follows; if B exist, Z follows; if C exist, Z follows; and Z cannot happen in any other way: then from the arrival of Z we are entitled to assume that one of the three, A, B, or C, must necessarily exist, perhaps two, and perhaps all three. At the same time, if the existence of the consequence can be denied, the hypothesis is overthrown. If A exist, Z follows; but Z does not happen; then it is perfectly certain that A does not exist. The following summary of the four cases may be more worthy of our reader's consideration than many of them will suspect:

1. When A is B, Y is Z: Therefore Y is Z.
   But A is B.

2. When A is B, Y is Z: Nothing can be concluded: Y is not B.
   But A is not B.

3. When A is B, Y is Z: Therefore A is not B.
   But Y is not Z.

4. When A is B, Y is Z: Nothing can be concluded: A is not B.
   But Y is Z.

The establishment of an hypothesis in natural philosophy may be considered as a process of which the following are the heads:—

1. The phenomenon observed is Z, and it is shown to be a necessary consequence either of A, B, or C, which seem natural and probable; also of D, E, &c., which seem altogether out of the question.

2. All the necessary consequences which can be shown to follow A, B, & C, are deduced as far as can be done; and if all their consequences really happen, then there is no choice between A, B, and C; but if Z, a necessary consequence, say of C, should be found not to happen, then C cannot exist, and the choice can only lie between A and B.

3. Let A appear the more probable of the two, then A is assumed to be the cause of Z until something to the contrary appears. If A and B should be inconsistent with one another, then if one be assumed it must be to the exclusion of the other; but if both may be true, then the phenomenon Z may possibly be partly due to one and partly to the other. An hypothesis thus assumed is obviously no more than a probable truth; and the existence of sects embracing different hypotheses is thus rendered not only natural, but even desirable. The consequence of such division is an armour of investigation which would not otherwise be felt, in order to find out experiments or to make deductions decisive of the points in dispute. The rivalry between the emulatory and undutiful hypothesis on the nature of light has much increased our knowledge of that agent. But if at the same time it should seem that the idea which a reader entertains of physical science must be lowered by his learning to take such a view of a hypothetical foundation as that which has here been given, it should also be remembered that the existence of a natural truth is no thing but expose the uncertainty of human knowledge in general, at the same time that it reads a lesson to the cultivators of other branches of learning. The hypothesis of attraction, for instance, though established on stronger grounds of probability than conclusions in connexion with which the word hypothesis is never mentioned, is always remembered as being an hypothesis. At the same time the word hypothesis, like that of theory, has been frequently applied in a disparaging sense to spe-

culations in which suppositions have been made for the purpose of drawing conclusions, and not, as in physics, with the view of supplying probable antecedents to conclusions which are already drawn from experiment. A notion is to be supported; it would be too obvious a fallacy to make the mere assertion of it an argument in its own favour, and thus some antecedent proposition, from which the one in question will follow, is assumed or attempted to be proved. To prove D, assume A, taking care that it shall be easy to show that from A follows B, from B follows C, and from C follows D. This is a use of hypothesis the direct converse of that which is made in physics, where D is supposed to be known and admitted, and it is asked which among all the As from which it might follow, is that from which it must probably does follow. [Caus.]

HYP'USPETES. [LANIADÆ.] HYP'SIPRYM'NUS. [KANGAROO.] HYP'UDÁBUS, the more correct mode of writing Hipu dus; but the latter form is generally used by the French zoologists.

HYRAX, the generic name for a form of quadrupeds of small size, but of great interest, in consequence of the peculiarity of their organization, which has led the more modern zoologists to assign them a place among the Pachydermá, though their external appearance, when curiously examined, would seem to point out their relationship to the Rodentá, among which they have been erroneously classed.

**Organization.**

**Dental Formula.** Incisors $\frac{2}{4}$, canines $0$, molars $7 + 7 = 14$.

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Cuvier observes that there is no quadruped which proves more eloquently than Hyrax the necessity of having recourse to anatomy for the determination of the true relations of animals. To that great zoologist we are indebted for the fact that the quadruped under consideration is a true Pachyderm, and, notwithstanding the sameness of its proportions, must be regarded as intermediate between the Rhinoceros and the Tapir. The resemblances which the Hyrax bears to the former of these may be traced, according to Cuvier, as far as the osseous structure is concerned, in the general form of the trunk, in the ear-
place. The Hyrax has 21 ribs on each side, a number superior to that possessed by any other quadruped, the Unau excepted, which has 23; and those which, after Hyrax, have the most, belong precisely to the order of Pachyderms, in which Cuvier would arrange it. Thus, the Elephant and the Tapir have each 20; the Rhinoceros has 19; the Scleropithecus have 18. The greater part of the Rodents, on the contrary, have only 12 or 13; and the Beaver, which has the most, has only 15. As regards the lumbar vertebrae, the resemblance begins to be more distant, for the Rhinoceros has only 3, followed by 4 sacral and 21 or 22 caudal; while Hyrax has 8 lumbar, 7 sacral, and 5 coccygeal. The difference becomes more marked in the form of the pelvis; for the osso ilii are very wide in the Rhinoceros, and sufficiently narrow in the Hyrax; but the analogy reappears in the femora, which exhibit a very marked commencement of a third trochanter, and is continued in many respects in the formation of the feet. But it is in the bony structure of the head that the Hyrax departs from the conformation of the Rodents, and approaches the Pachyderms, particularly the Rhinoceros. It is true that as the nose of the Hyrax has no horn to support, the nasal bones have not received, as in the Rhinoceros, the thickness necessary for carrying a defensive organ; but the maxillary bones differ at once from those of the Rodents by the smallness of their extent, and the inferior size of the suborbital hole, which is generally very large in that order. In the number of the upper incisor teeth (2) the Hyrax resembles both the Rodents and Rhinoceros; but in the number of lower incisors is 4. The upper incisors of Hyrax are not formed, like those of the Rodents, in the shape of a quadrangular prism, or in that of a cylinder curved and terminated by a truncation or corner-edge. They are triangular and terminate in a point, recalling to the observer the canines of the Hippopotamus. The lower incisors are laid forward like those of the Hog; they are flat and dentilated in youth, but soon become worn by attrition against the upper incisors. The molars represent those of the Rhinoceros, both in number and form, so that, were it not for the size, they might be mistaken for each other.

The condyle of the lower jaw is very different from anything observable among the Rodents, in which it is compressed longitudinally. In the Hyrax it is compressed transversely, as in the Pachyderms, and in all the other Herbivora which are not Rodents, being applied be aides to a plane surface of the temporal bone, whereby a motion, more or less horizontal, from right to left, and from left to right, is permitted; and it is this that eminently distinguishes the articulation from that of all the Carnivora, where the condyle, although in truth transversal, enters into a deep hollow of the temporal bones, and permits of no other motion to the jaw than upwards and downwards. After alluding to the form of the condyle and the dentition in the Kangaroos and Phascolomys, Cuvier goes on to remark that one of the most constant characters among the Rodents is the not having, at a certain age, more than a single parietal bone without suture, with two frontal bones, directly contrary to what occurs in man. In Hyrax, as in the Pachyderms and Carnivora, there are two frontal and two parietal bones. The zygomatic arch is constructed differently from that of the Rodents, and more conformably with that of Rhinoceros. In the molar teeth the construction and direction is rather that of the Pachyderms than of the Rodents.

In Hyrax the number of toes (4 before and 3 behind) is precisely the same as in the Tapir. It is true, Cuvier observes, that some Rodents, and particularly the Carya bore (HYDROCHERUS), have the same number, and that the last phalanges of the latter approach the flattened form of those of the Pachyderms; but their more elongated and free toes announce the family to which they belong. The Hyrax has the toes united by the skin down to the nail, as in the Elephant and Rhinoceros, and even more than in the Tapir and Hippopotamus.

Such are only a few of the leading points of agreement and disagreement in the bony structure of Hyrax, as considered relatively to the Rodents and Pachyderms. Our limits will not permit us to follow Cuvier through the whole of the details which he so minutely enumerates in the 'Ossae mens Fossiles' in his usual masterly manner; and we must refer the reader to that work, with the remark that the general balance of resemblance, as far as the skeleton is concerned, is strongly in favour of the Pachydermic relationship of the animal.
In 1832 Mr. Owen read to a meeting of the Zoological Society of London an account of the anatomical structure of Hyrax Capensis, which, whilst it was confirmatory of the anatomical description of Dr. Waller and Dr. Pallas generally, occasioned some additional facts, which will be readily appreciated by those who will compare his observations with the original description of *Cavia Capensis*, in the "Societia et Miscellanea Zool. Acad. Petrop." vol. ii. p. 441, 1789, and the description of *Hyrax Capensis* in the "Osseous Fossiles," and in the "Decas Mammalium" of Hemprich and Ehrenberg, he excused himself for occupying the time of the meeting with the trivial and obvious animal. As these descriptions were given by the most accomplished anatomist and zoologist of his age, insamuch as no other original account of the structure of this animal has appeared since the time when the Cape Hyrax was first brought to the attention of naturalists, at which time the description of some parts, the digestive organs for instance, which appear in several places of the "Loçons d'Anatomie Comparée," that Cuvier had not, at the period of his preparing that work for the press, himself dissected the Hyrax. The account of Mr. Owen is for a full grown male, belonging to Thomas Bell, Esq., F.R.S., who had lived in the gardens of the Society through the greater part of the summer, and died in the winter repository there. The length (skull to extremity of the upper incisors) of the animal was 1 foot 2½ inches. The total account (Zool. Proc., 1832) is well worthy of the attention of the comparative anatomist, but we shall chiefly select those points which bear a direct relation to the physiology of the system. The "decem" was not so loosely connected with the back part of the abdomen as in most of the Rodents; but it had throughout its course one entire investment of peritoneum, of its common calibre, and a single one, without any partition, in many Rodents. The coecum seemed at first sight to have a great analogy to that of the Hare and other Rodents, being ascended, and distended with a blackish pulpy mucus, and covered externally with a skin, the same colour as the coat of the Terrier, its magnitude arising more from its breadth than its length. The dilated part of the colon was bent in a sigmoid form, and the remainder was convoluted on a broad axis. The Coeca are minutely described by Mr. Owen, who then makes the following observations:—"In looking through the section of an immense formation of the intestinal canal, we shall find the Hyrax standing almost alone in this respect; among the Mammalia, it is only in a few of the oedoeate species that the double coecum is to be met with, as in the "Dioecus," "Zapdiv" of Linn.; whilst in Birds, although the double coecum more generally prevails, yet an additional single coecum, anterior to these, has only been found in a few species. The species is distinguished by the small number of coecum; but, with respect to function, the cases are similarly divided: the single anterior coecum of *Hyrax* evidently performs an important part in digestion; while in the "Dioecus" it exhibits merely a trace of a structure peculiar to embryonic life. I should consider however the double coecum of *Hyrax* as indicating an affinity to the group, *i.e.* which intervenes, in the system of Cuvier, between the order it was originally placed in, and the one to which that great naturalist has transferred it. And it is interesting to find that while the "fasciculorum" number of *Hyrax* so far simulates that of a Rodent, as to have deceived the older naturalists, and to have concealed from them those ưuing indications of its alliance with the Pachydermata which the osseous system exhibits; yet that Nature, as in confirmation of her abhorrence to the saltus, had left in the internal structure of this singular animal an impression borrowed from the type of the Edentata."

Mr. Owen further remarked that although the stomach of one of the Rodents, as the common Rat, and of the Edentata, as the Mouse, exhibits a similar peculiarity, yet it is among the Pachydermata that this structure is most prevalent. In the Hyrax two-thirds of the stomach, on the cardiac side, are lined with a thick white and wrinkled endo- peritoneum.

The liver had the same form and number of lobes as described by Pallas. The middle lobe had the usual two lobes, into the left of which the coronary ligament enters; but the right contained no gall-bladder, which in *Hyrax*, as in some of the Rodents and many of the Pachydermata, is deficient. Mr. Owen observed that a compensation for this defect was however in some measure apparent in this animal; for the liver immediately on leaving the lobes of the liver, dilated into three globular receptacles, the united capacities of which would have equalled a moderate sized gall-bladder. Mr. Owen also observed that by the insertion of the ureters is described with a note of admiration, and Mr. Owen stated that he was not aware that a parallel structure has since been discovered in any mammalian animals. Mr. Pallas argues that the insertion of the ureters open; they enter between the muscular fibres at the back part of the fundus, at the angles, and not in the region at which the ducts enter the *hymen* or summit of the bladder that the ureters open; they enter between the muscular fibres at the back part of the fundus, at the angles, and not in the region at which the ducts enter the human *hymen*; but they run obliquely downwards and forwards for two lines before they terminate, leaving however a full inch of space between them and the orifice of the urethra. For what purpose this structure is designed in the *Hyrax*, or whether the urine undergoes any singular process in consequence of it, Mr. Owen could not conjecture, but he alluded to the alleged medicinal qualities of this secretion mentioned below (p. 419) as arising from the pus rhabdos under the guard of the reader to consult the other details in Mr. Owen's interesting observation. We shall therefore conclude our abridgment of it with the professor's closing remark. The chief peculiarity observed in the muscular system was a modification of the digastric muscle, which was in the lower jaw, many times more powerfully developed than in the upper part of the sternum, instead of the *occiput* or temporal bone; and was inserted into the whole ramus and angle of the lower jaw; it was of remarkable strength, being as large as a deep into the sternum, which is also evident from its muscle which occasions the peculiar fulness of the neck in the *Hyrax*."

In 1833 Mr. Martin read to the same society his notes of the dissection of the same curious animal on the preceding day to the society by Mr. Rudston Read. The anatomical details are given with minuteness and accuracy, but, as Mr. Martin himself remarks, the notes contain nothing new, except that the head being 5 inches, that of the head being 5 inches. The reader will find this dissection given at large in the *Proceedings of the Zoological Society* for 1835.

**History.**

Kolbe appears to be the first modern author who has noticed the *Hyrax* of M. de Buffon; and he mentions *Marmot*, a name adopted by Voüs and Buffon, the latter of whom also applies it to the term *Damas*, of which we shall presently have to speak. Blumenbach left it among the Rodents of the first order, and in his usual untrustworthy and impressionable description of it, placed it under the genus Cavia, observing however that it differed remarkably from the conegers with which he arranged it. Linnaeus gave the form the same place in his system, under the name of *Cavia Capensis*. Pennant does not mention the animal in his *Synopsis*; but in his *History of Quadrupeds* he figures it as the *Bristly Cat*, with the synonyms of *Apus* *Arborum Israel*, *Pros. Alp. Erypt*; *Damus Israel*, *Buff.* *Askhoko*, *Bruce*; *Hyrax Syriacus*, Gmel. and Schreb. Hermann however was the first who established the genus and gave it the name of *Hyrax*. Pennant also notices the species under the monotypy of *Capra Cynocephala*, Pallas. Gmelin makes *Hyrax* the last genus of the *Girra*, and records two species, viz. *Hyrax Capensis* and *H. Syriacus*. We have seen the place assigned to it by Mr. Dr. His deficiency was *Hyrax* under the order *Bullius*, between *Elasmotherium*, and *Dicotyles*; he gives three species, *Hyrax Capensis*, *H. Syriacus*, and *H. Rudolphi*, Schreb. (Lipura Hudsonia of Ihering); the latter is now a *Hyrax*. Mr. Gray places the genus in his system under *Rhinoceroses*, and under the family *Elephantidae*, and this last under the order of *Cynodontes*, observing that *Hyrax* is allied to *Cynodon*, and giving the name of *Rhinoceros* and *Lipura* and *Elasmotherium*. Mr. Swainson (classification of Quadrupeds, 1835) places *Hyrax Syriacus*, "the Rock Rabbit," next to *Rhinoceroses*, and, after quoting Cuvier, remarks that there

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is an obvious relation of some sort between this singular genus, of which three species are now known, and the Oreas; but whether of analogy or affinity it is impossible to determine: for the present we place it as the gliriform type of the Pachydermus, upon the sole authority of what M. Cuvier has called it."

The habitat of the Cape Hyrax appears to us to be one of the richest and best. It was read, before a meeting of the Zoological Society of London, and well illustrates the manners of the animal both in a state of nature and a state of captivity. Mr. Read states that it is found at the Cape of Good Hope, inhabiting the hollows and crevices of rocks, both on the summits and sides of hills, as well as near the sea-shore, even a little above high-water mark. It appears to live in families, and is remarkably shy in its wild state. In winter it is fond of coming out of its hole, and sunning itself on the lee-side of a rock, and in summer of enjoying the breeze on the top; but in both instances, as well as when it feeds, a sentinel is on the lookout (generally an old male), which gives notice, usually by a shrill prolonged cry, of the approach of danger or even the least movement of any suspicious object. It lives on the young shoots of shrubs, the tops of flowers, herbs and grass, particularly of all those which are aromatic; which occasions the necessity of pruning the plant as soon as killed, in order to make it fit for eating. The stomachs of those shot by Mr. Hennah were always found at the Cape of Good Hope, inhabiting the hollows and crevices, of rocks, under the bed-clothes at his back, and, lying quiet, enjoy the warmth. The one brought home by Mr. Hennah, when allowed to run unconfined about the room, was inclined to be sociable, but was restless and inquisitive, climbing up and examining every person or thing in the cabin, and staring at any noise, which caused it instantly to run and hide itself. But from confinement it became savage and snarling, and tried to bite when any thing was put near it. Both wild and in restraint it is remarkably clean in its habits, always frequenting and depositing its dung in one place. From its faintly crying in its sleep we may conclude that it dreams. I have also heard it chewing its food by night, when every thing has been quiet, and after going into its sleeping apartment. In its food it was pleased with variety, eating first a few leaves of one plant and then another, and gradually picking salt when given to it. In its passage home its food was Indian corn bran, bread, raw potato, and onion, with a small quantity of water, which, in drinking it partly lapped and partly sucked up, it was very sensible of; and when it was near the bars of its cage it readily acknowledged the little warmth given out by turning its side and sitting still to receive the full benefit of the rays of heat. I am inclined to think the female does not produce more than two young ones at a time, from having observed in several
instantaneous but two following the old ones. Its name at the Cape is the Dassie, which is, I believe, the Dutch for a 'bogey'. In Mr. Steedman's 'Wanderings' the Dassie, or Hyaena, is stated to be an extremely quick and active little animal, skipping along the shelving ledges of the overhanging cliffs, and darting with incredible swiftness into the holes and crevices of the rocks, by which it frequently eludes the grasp of its pursuers. It is said to be preyed upon by the Lions, Hyaenas, and some of the birds of prey of the Cape. The Cape Chanel near the town of Simon's Town is called Aquila culinaezaa resorts exclusively to high rugged mountains, where it preys upon Hyaena capensis, the Dassie of the Cape colonists.

Using information, Mr. Read says that the flesh of the Cape Hyaena is very like that of a rabbit in flavour. Hemmrich states that both the natives of Arabia and the boors of the Cape regard the urine of the Hyaena as medicinal.

The term Bish (Shaphan, or Saphan) is to be found in the following parts of the Bible—Lev, viii. 10; Deut, iv. 7; Pas. iv. 18; Prov, xxx. 26. In our English translation now in use this word is rendered 'oney', and 'conies' in all the passages quoted; and so it is in Robert Barker's Bible (1615). In our Hebrew version, as given by Scheuchzer, Shaphan is translated (Levit. xxi. 5) 'cuneicus,' and in the Vulgate, as given by the same author, 'Chorogoria.' In Psalms, iv. 16, the Tigurine version given is 'Saphan,' and in the Alphabetic Hebrew, 'Saphanum maris' (Alpine mce). The vulgate is given—Monte execeive cervis: petra refrigium herinaeae (Hedgehogs). In Proverbs, xxx. 26, the Tigurine version is printed 'Cuneicus,' and in the English translation, 'cuneicus,' with the following note to Cuneicus: 'Quidem murem montanum esse putant, et videtur his quadrare.' The vulgate is printed 'Lepusculus,' plebe invaris in montanum fulvum suum collocant, with the following note to Cuneicus: 'Quidem murem montanum esse putant, et videtur his quadrare.'

It seems that we have seen the Hyaena has been termed Damas by the French zoologists. Dr. Shaw speaks of the Damas Israel as 'a vast species of Mount Libanus, though common in other places of this country' (Palestine). It is hardy, will feed on refuse, and will content itself with the least morsel of food, and will dart with incalculable speed in pursuit of the rabbit, and with the like uncaring posture and disposition of the fore-fore; but it is of a browner colour, with smaller eyes and a head more pointed. The fore-flies likewise are shorter and broader, and the hares are nearly as long in proportion as those of the jerbo. Though this animal is known to burrow sometimes in the ground, yet, as its usual residence and refuge is in the holes and crevices of the rocks, we have so far a more presumptive reason for the Saphan or Sapha, as it may be called, may be the Saphan of the Scriptures as the Jerboa. I cannot, therefore, learn why it was called Damas Israel, i.e. Israel's Lamb, as those words are interpreted. Though there is error in this description of the animal (as the casual reader, and now the casual server, there can be no doubt that Dr. Shaw, in the passage quoted, alluded to the Hyaena: the words Damas Israel are probably mistaken for Ganam or Ganum Israel, as we have just seen to be the case with the Biblical quotation of Hammurabi, cuneico non dissimile quod agrum fiorum Israel nuncupat.' (Pros. Alp. Egypt.)

Dr. Harris states that Jerome, cited by Bochart, says that the דַּם שַׁפָּן, theHyaena, and a bear (the latter, Dr. Harris supposes, in the clumsiness of its feet), whence in Palestine it is called הָעַרְוֹד, (Aretomy, or all the places quoted. This term, compounded of חָרֹד, a bear, and עַר, a bear, is used by some to mean the Hyaena, and in the text of the LXX., in the description of the Syrian Hyaena, as we have seen. He adds—'In Ambrata this animal is called Ashko, which, I apprehend, is de- nounced by the same term to be bear-like, which, like small thorns, grow about his back, and which in Ambrata are called Asokh. In Arabia and Syria it is called Israel's Sheep, or Ganam Israel; for what reason I know not, unless gruntingly from the frequenting the rocks of Horeb and Sinai, where the children of Israel made their forty years' pilgrimage, perhaps this name obtains only among the Arabians. I apprehend is known by that of Saphan in the Hebrew, and is the animal erroneously called by our translators the 'bogey' or coney.' Of this opinion are Pennant, Cuvier, and others among the zoologists; and though M. Leston, in the introduction to his 'Manuel,' speaks of the rabbit (lapin,) which is supposed to be the Shaphan of the Hebrews, although it is more probable that it was the Rat of Pharaoh (rat de Pharaon)—on what grounds he does not state—as a prohibited animal (Levit. xiii. Deut.), there can be little doubt that the Shaphan, the 'feebly folk' that 'yet make their houses in the rock,' belonged to the genus Hyaena.

HYRCANUS, one of the Asmonean rulers of Judea, succeeded his father Simon in the high priesthood, a.d. 127. He was the son of the high priest Judas and Mattathias, who were treacherously murdered at a feast by Ptolemy the son-in-law of Simon; and it was with great difficulty that Hyrcanus, who was not with them when the murder was committed, escaped with his life. During the first year of his reign (a.c. 134) Jerusalem was besieged by Antiochus Sidetes; and after a long siege Hyrcanus was obliged to submit. The walls of Jerusalem were destroyed, and a tribute imposed upon the city. Hyrcanus afterwards accompanied Antiochus in his expedition against the Parthians; but returned to Jerusalem before the defeat of the Syrian army. After the defeat and death of Antiochus, a.c. 130, Hyrcanus took several cities belonging to the Samarian kingdom, which he completely restored to his independence. He strengthened his power by an alliance with the Romans; and extended his dominions by the conquest of the Idumaeans, whom he compelled to submit to circumcision. He was also the author of the LXX. version of the Old Testament. He was a man of wide culture, and he was the first of the Asmonean princes who assumed the royal title.
The First Books of the Maccabees, with Notes and Illustrations, by Dr. Cotton; Josephus's Jewish Antiquities; Prideaux's Connection; Jahn's Hebrew Commonwealth.

HYRCANUS II. [ASMONAENSIS.]

HYRIA, Lamarche's name for a genus of Unioidea, a family of bivalves, Naugades of that author.

HYSTASPES. [DARIUS.]

HYSTE/RIA (from vireo, the womb) is, in general language, understood to signify those paroxysms which frequently occur, and which are connected with convulsions, a sense of choking, and involuntary laughing or crying. But the term is used in medicine as a general expression to include a vast number of other symptoms known to physiologists, all dependent on a peculiarly susceptible state of the nervous system.

We will first consider the different forms of hysterical affection.

The hysterical fit or paroxysm need scarcely be described, except for the purpose of pointing out how it may be distinguished from fits of other kinds; and this is a matter of no little importance, not only as regards the treatment required and the temporary alarm of the friends, but also with relation to the happiness and prospects of the patient. Hence it appears that in France, at least, young females labouring under mere hysteria have been separated from their families and society, and placed in confinement under the idea that it was a case of epilepsy, a disease which is not thought to be hereditary, but is too often incurable, and leads to loss of intellect.

The hysterical paroxysm generally commences with the sensation of a ball in some part of the abdomen, or on one side, which raises a peculiar feeling to the throat, where it induces a sense of suffocation.

A temporary state of loss of sense and voluntary power succeeds, in which the patient either lies motionless, or is agitated with violent struggles of the limbs; the breast is struck against the bed or floor, and the hair or the breasts are grasped and torn with the hands. Frequently the patient tries to bite herself or the bystanders. The involuntary artificial movement of the bladder uncommonly takes place during the fit. In the absence of convulsions there is often immediate laughter, crying, or singing, and the paroxysm is frequently terminated suddenly by a burst of tears. More usually the patient lies quietly for some time after the convulsions cease, and when she recovers complains of headache. Frequently she proves that consciousness has not been entirely lost, by repeating what has been said by those around her. The attack of epilepsy differs from that of hysteria in not being preceded by any sensation of a ball rising to the throat; the epileptic patient falls suddenly to the ground, and is immediately convulsed; the eyes are distorted, and the tongue protruded and bitten. In hysteria the former are generally transient, and the face is flushed; whereas in epilepsy it is often of a ghastly pallor.

The epileptic fit is in many cases ushered in by a short cry, but the paroxysm of hysteria is generally accompanied by crying, or a simple sob; or it may precede the paroxysm, or at its termination, as in hysteria.

Lastly, the loss of consciousness is complete in epilepsy, generally not so in hysteria. These are the principal points of difference.

It is well to remark in addition that hysteria is almost confined to women, and that the paroxysm is generally preceded by some strong mental emotion; while epilepsy is most frequent in men, and more usually attacks the patient during the night, or between the states of sleep and waking. Repeated attacks of epilepsy leave imprinted on the countenance a peculiar dull expression which is not seen in the hysterical.

Hysterical females are very liable from the slightest causes to hurried respiration, sighing, sobbing, and palpitation; the irregular and hurried breathing may become occasionally so aggravated as to resemble asthma, from which it is to be distinguished by its occurring in young persons, and by its being accompanied by other hysterical symptoms, and a peculiarly irritable susceptible state of mind.

Merey from a disturbed action of the nerves, and quite without any structural or organic disease, females frequently become disturbed by more or less infrequent sensations fixed in one spot or shifting from one part to another. Violent pain in the head, as if a nail were driven into it, is very common in hysterical symptom.

Another frequent seat of the uneasiness is in the right side, just below the breast, and this pain is often attended with palpitation of the heart, and the patient is unable to

lie on that side. Sometimes excreting pain occupies the whole abdomen. In each case it is provided that the hysterical affection (whether it be of the head, chest, or abdomen, or of one of the large joints), cannot exist, since other symptoms essential to constitute it are absent. The pain of hysteria too, besides being frequently transitory and fixed in its seat, has generally the peculiarity of being aggravated by the slightest touch of the skin, which is not the case with pain arising from inflammation or other organic source of disease, and which affects the nervous nature will perhaps be present, or a true hysterical paroxysm may supervene. It is important to know that symptoms of almost every disease may be simulated by hysteria; and in the case of those who are thoroughly acquainted with the sufferer, is unattended with danger. It is when real disease is present, and complicated with nervous or hysterical symptoms, that it requires the greatest acuteness of the physician to discern what proportion of the symptoms is of the latter kind, and what due to the more important affection.

Hysteria sometimes assumes the form of different paralytic affections: the power of moving the arm, or the voice, may be lost; or the brain may be the object of the paroxysm, in which case it may be supposed that the throat, preventing swallowing, not unfrequently occur in the hysterical state. Then again certain disorders of the senses and mental faculties and feelings occur as the consequence of the state of mind, and may be referred to hysteria. Such are somnambulism, some kinds of transitory monomania, and those peculiar perversions of the mind manifested in the desire to feel various sensations. That it is not merely the body, but the mind, that is affected in the irritable state of mind, the knowledge that the mind has been acted on in a way calculated to excite the affections, and the presence of other phenomena decided hysterical, will assist in detecting the true nature of all these cases.

There is certainly a peculiar state of the system which predisposes to the affections which we have thus cursorily described, for the causes by which they are excited have nothing peculiar in themselves. All the phenomena indicate a disordered state of nervous system, and the exciting causes are such as act either through the medium of the body or the mind on that system. The susceptible state of the nervous system which predisposes to rise to the various hysterical phenomena, is without doubt, frequently connected with, or kept up by the excited condition of the uterine system and the sexual feelings, with no such condition of the uterus. Hysteria therefore affects the nervous system of females so much sympathize. This conclusion is confirmed by the fact of hysteria occurring in a great proportion of cases between the age of puberty and marriage, that at which the organs of generation are the most active. The uterus is in a state of greater activity than before and after it; and by the circumstance of its being at the commencement and termination of that period, when the uterine organs are undergoing the greatest changes, and the feelings of the mind connected with them most disturbed, that the affections of hysteria are most frequent and violent. It is from its supposed connection with particular states of the uterus that the attacks have derived their name.

Other facts however show that a predisposed state of nervous system is necessary, for vascular excitement and structural disease of the uterus may exist without giving rise to hysteria; and that other functions, as those of the digestive organs, being disordered, may act in a similar manner so as to aggravate the tendency to hysterical symptoms, or even excite them. In some females, having the requisite nervous susceptibility, a mere phthisic state of the body, without the existence of any specified symptoms of hysteria; the opposite state, deficiency of blood in the body, will have the same effect: anything in fact which throws the system of such irritable females out of the natural state, whether it acts primarily on the body or mind, may give rise to nervous symptoms or hysteria. The most frequent exciting cause of the hysterical paroxysm is perhaps a sudden and intense emotion of the mind.

Treatment.-For the sufferer should be taken to prevent the patient receiving injury from her head or hands striking against the floor or hard bodies, and to
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VOLUME XI.

The nervous susceptibility which predisposes to hysteria is without doubt frequently innate or constitutional, but it is certainly in many cases acquired; and it is often to be attributed, in a great measure, to the education of young females. 'A luxurious and delicate mode of living and of rearing' (says Dr. Copland); 'a neglect of whatever promotes the powers of the constitution, especially of suitable exercise in the open air, and of early hours as to sleeping and rising; an over refined mode of education, and the excitement and expression of the imagination and of emotions; the neglect of the intellectual powers and moral sentiments; too great devotion to music, and the perusal of exciting novels; the various means by which the feelings are awakened and acute sensibility is promoted, whilst every manifestation of either is carefully concealed; and studied endeavours to dissemble desires which struggle to be expressed,—all serve, especially at a period when the powers of the mind and the conception of the body are approaching development, to produce that state of the nervous system, of which hysteria is one of the most frequent indications.' The prevention of hysteria cannot certainly be hoped for until the education of females is directed more towards strengthening their body and improving the tone of their mind, so as to enable them to bear disappointments, and to control, not merely conceal, their passions.

HYSTRIX. [Cinque Ports; Kent.]

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I.

I is a vowel which represents two very different sounds in different languages. In this country it denotes a rapid pronunciation of the diphthong ai. In French, Italian, and other tongues, it is sound identical with that of the English e. In the series of the vowels established by the experiments of Mr. Willis [Alphabet, p. 379], t, as denoting the letter sound, lies at one of the two extremes. It is the vowel in all languages that is naturally produced in the larynx. In English, it is a sound produced in the vocal tube, whereas the same organs are protruded to produce the sound represented at the other extremity by u.

The various forms which have been used to represent the letter e are seen in the article already quoted, pp. 389, 393. The character there given as used by the Phoenicians and early Greeks is somewhat complicated, and differs widely from the single stroke into which it eventually degenerated. In such a form it was the simplest of all the alphabetical characters, and was therefore well adapted to be the symbol of a small quantity. In this sense the terms jod and an iota are still retained, jod being the Hebrew, iota the Greek name for the character.

The letter is interchangeable as follows:—

1. With the diphthongs ai, oi, et. This may be seen most distinctly in the Latin language, where alai, requaro, pierio, nuo (where ne plus est vellis, desce, &c., were corrupted into alai, requaro, pierio, nuolius, detc.). In the same language when one t was followed by another t, it was uncommon to denote them by a single t, as tabicen, Chiusa, ablata (gen.), unctia, for tibicen, Chiusa, ablata, incisa. In such cases it was a common practice to give greater length to the letter, thus, cuivas.

2. The short i was interchangeable with nearly all the short vowels, more particularly in the penult syllables of polysyllabic words, which are very indistinctly pronounced. Thus the Greek μήδεν is in Latin in medio. In the same manner the Nomad races of North Africa are called by the Greeks Nomades, by the Romans Numidiae. Again, amopoulos and amplexus must have been originally ambonos, and would have been written in Greek with a termination -ονος. Lastly, in a large number of words a short u degenerated into an i: as maximus, decimus, recipero, maritimus, acribium (compare сримус), into maximus, decimus, recipero, maritimus, acribium. Even Cicero wrote all these words with a i, though our editions give an u.

3. A short e before r or m is not uncommonly in French changed into ai or a. Thus the Gallic town Iconium is the origin of the name Angoulême: sincere is in French raincere, &c.

4. In the same language the vowel e is changed into o very commonly, as stitc, sof; mi, mot; fides, foci; Legieris, Loire, &c., and this though the i in Latin be short.

5. 1 is often inserted in French or Spanish words before the vowel: mied, bien, viento, &c., from the Latin med, bene, venit.

6. The vowel i is often inserted after the vowels a, e, and u in the French language, particularly when a contraction has taken place, as miner, connorre, reduire, from amare, cognosce, reducere.

7. When the vowel i in the Latin language has a vowel after it, and is preceded by one of the consonants p, b, t; d; c; g; these vowels have often a sibilant in the place of the former consonant. Thus septurn is in French sechse; rabies, rage; ratio, raisom; mediunt, in Italian mezzo (compare the Greek μεσος). The double sound of e or g in our own language appears to have originated in this way.

8. A similar change occurs even in other cases, as simia, Fr. singa; vendemia, vendange; linea, linge.

IAMBICUS, a species of verse composed of a succession of iamphites or feet, composed both of Greek and Latin poets. According to Aristotle (De Poetica) the iambic measure was first employed in satirical poems, called iambos, which appear to have been represented or acted; since Pindar (De Rerum Vtili, vili. 17) forbids bores to be spectators of iambi and comedies. The iambic is the most common metre in the Greek tragic poets. We are informed by Aristotle (De Poetica) that "originally the trochaic tetrameter was made use of, as better suited to the satyr and satiatorial genius of the poem at that time, but when the dialogue was formed, nature itself pointed out the proper metre; for then the iambic is all metres the most colloquial; it is evident from this fact, that our common conversation frequently falls into iambic verse, seldom into hexameter, and only when we depart from the usual melody of speech."

In the following table a list is given of the feet which may be admitted in the iambic metre in the Greek tragic poets, which is usually called the tragic triemer scatatale, because it consists of three entire metres, or six feet.

```
1. 2. 3. 4. 5. 6.
```

The anapest in proper names is also introduced in every place of the verse except the last, with this general restriction, that the anapest should be contained in one word. The comic trimeter admits the same value of the time, and also a dactyl in the fifth place, and an anapest in common words in every place but the last.

Much of the beauty of the iambic trimeter depends upon the cæsura [Cæsura], which usually occurs in the middle of the third or the middle of the fourth foot, as for example:

```
οι μιν θλοντες [ ιεσδαινι τρις χρονον.
τερεσιο Παλαιον [ Πετρομυσιν.
```

One of these cæsuras may be considered as generally necessary; the cæsura in the middle of the third foot is much more common than that in the middle of the fourth. There is also frequently a cæsura in the middle of the second or the middle of the fifth foot. When a line is divided in the middle of a verse with the elision of a short vowel, or of the little words et, et, ei, ri, that division is called by prosodians the quadr-caesura, as, for example—

```
ωςαν εμφινοντος σει ανθρωπος μη.
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For an account of the other iambic metres employed by the Greek and Latin poets see Hermann, 'Elementa Doctrinæ Metricæ.'

In English poetry the iambic metre is very common, as for example:

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On Limdon, where the sea's was low,
All bloodless 'ts 'th extr'den snow,
And dock as winter's w'the bow, &c.
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IAMBILCHUS (Iambichus Chalcidonius), a celebrated neo-Platonist of the fourth century A.D., was born at Chalcis in Coloscyria, and is distinguished by his birth-place from another of the same name and of the same school and censury, born at Apamea in Syria, of whom however little is known. From his admirers and disciples Iamblichus received the flattering titles of "most divine teacher" and "won derful" (δικαλεῖσσες διοικητης, Ναυμαχη), and enjoyed a reputation among his contemporaries which cast into the shade the fame of his teacher Porphyry, whom nevertheless he was far from equalling either in extent of learning or in powers of mind. The literary career of Iamblichus extends from the reign of Constantine the Great to that of Julian the Apostate. He seems and indeed was, not only on account of his general adherence to and defence of the old national religion, but particularly for his "Life of Pythagoras." (Iamblichus de vita Pythagorici liber, Gr. et Lat. Illustratus a L. Klister. Accedit Malchus sive Porphyrius de vita Pythag. &c., &c., Amstelodami, 1740, 4to; the same by Kiesling, Leipzig, 1815, 2, Th. 8vo.) In this work Iamblichus ascribed to the Italian philosopher miraculous power and actual acts which might not surpass, the signs and wonders on which the Christians not only founded the divine authority of their eres, but still laid claim to. (Hebenstreit. Diss. de Iamblichii Philosophi Syri Ducis Doctrina ad Religionem Noxiof, Leipzig, 1740, 4to.) At this period indeed the philosophical systems of the East were exerting a corrupt influence not
only upon Christianity, but also upon philosophy; and a belief in magic and divination, in the action of the stars and planets, was universally prevalent, and found numerous and zealous adherents, as well among heathens as among Christians. An important element in the ecclesiastical, or rather syncretic, system of the neo-Platonic was a notion of pre-existence, according to which the souls of all creatures, after passing through certain states and periods of purification, return unto God, from whom they originally emanated, and afterwards falling away into their modern George, in accordance with the doctrine of the immortality of the soul. It was a consequence to believe that a life of asceticism and self-denial would enable one to attain to a state of intimate union with the Divine Being, which gives a supernatural elevation to the position of man, and is a matter of much contention. The embers of Pythagoreanism have been handed down to the present day, and it is to be considered that this is a strikingly beautiful appearance; and hence they are in many cases cultivated in gardens as objects of ornament, and placed in shrines, under the name of "pyramids," in all parts of the world, having been first procured from Canis. 

IBE'RIS is a genus of cruciferous or brassicaceous plants, consisting of annual, perennial, and slightly shrubby species, chiefly inhabiting Europe, and particularly the northern shores of the Mediterranean Sea. Two are found in the north of Europe, one in the north of Europe, and one in the north of Europe. They are remarkable, among other things, for their flowers growing in close corollas, and being more frequently developed on one side than the other, next the circumference of the corolla, which is sometimes used as a symbol. The epistle of Pythagoras to Anepo the priest contains many doubts concerning the Egyptian mysteries, which Iamblichus refutes by the authority of the writings of Hermes and the philosophy of Plato. The genuineness of this work has been justly doubted. (Meinem's 'Judicium de Libro qui de Myst. sanct. inscribitur,' in the fourth volume of the 'Comment. Soc. Scientiæ,' Gött., 1872, p. 30.)

Besides the works above noticed of Iamblichus, we have the following fragments from his others, from the Pythagorean school and doctrines:—Iamblichus, 'De Generali Mathematica Scientia.'

ICE. [Fossile.]

ICELAND (in the native language), a large island in the North Atlantic, extends from 63° 24' to 6° 30' N. lat., and from 13° 15' to 24° 40' W. long. Its shape resembles somewhat that of a heart, with the point looking towards the south. Cape Nord, at its north-west extremity, is about 200 miles from the east coast of Greenland; its area is vaguely reckoned at 40,000 square miles. The coasts of Iceland, especially the western part, are deeply indented with fiords, or inlets of the sea, which are the estuaries of the rivers which flow from the numerous mountains and glaciers of the interior. The island is crossed from west to east by ridges of rugged and irregular mountains, which run nearer to the south than to the north coast, the longer direction. The rivers flow from north to south. In Norður-Gæs in Gæs in Iceland, 1764, 3to.; and 'Theologumena in Philos.,' Part IV, 1403, 4to., of which the treatise is a part of the later and more famous work.

ICESTONE. [SHALE.]
plains. The glaciers present the same phenomena of progressive and sometimes retrograde motion as those of Switzerland, and they throw out before them their moraines of large fragments of rock. Vegetations of basaltic plants are seen in many places, as well as of tuft, and some mountains are covered with thick incrustations of sulphur.

There are numerous boiling springs, such as the Geyseres in the south-east district of the island, which throw up, at periodical intervals, columns of boiling water more than 10 feet in diameter and above 200 feet in height, preceded by a loud report like that of artillery: the Reykium and the springs near it, according to old mariners, are near the west coast, those of Reykiadal in the west district; and those of Reykiafver and Kragla in the north. There are also floods or bogs of boiling mud, numerous cones and craters of viridity or inactivity, the nearest to Hekla, and steam issuing from many spots. The whole island appears to be of volcanic formation, and there are still numerous volcanoes in full activity. In the year 1755 an eruption from the volcano of Katla, near the east coast, destroyed 50 farms. In 1783 a still more terrible eruption from the Skiedara and other volcanoes of the Klof Oök ridge covered several fertile districts with lava; the ashes and the effluvia corrupted the water and the atmosphere all around for a long distance, and killed the cattle of the part of the coast, and famine and pestilence followed, which in two years carried off 9000 people, and destroyed thousands of horses and cattle. The eruptions of Mount Hekla are frequent, violent or intermittent. The highest mountain in Iceland is believed to be the Snæfell Yökull, which rises in one of the western peninsulas near the village or factory of Stappen, and is reckoned to be 6862 feet high. Mount Heidmork is also high.

Formerly there were many forests in Iceland, but they have been destroyed through the waste and improvidence of the inhabitants. The trees that now exist appear to be the last generation. In 1733, 10000 trees and 100000 stumps of wood have become very scarce. It is alleged that the climate has become colder, and is less favourable to vegetation; and some attribute this increased severity of the climate to the accumulation of ice on the western coast of Greenland. Dr. Henderson however found the winter which he passed in Iceland to be as mild as the mildest which he had experienced in Southern Sweden or Denmark. It often happens in the spring that vast masses of floating ice drifted from the coast of Greenland are impelled by the wind and current against the western coast of Iceland, where they do considerable mischief and affect the temperature of the atmosphere. Polar bears are carried on these icebergs, and commit considerable depredations against cattle, and even attack men; they are however soon hunted down and destroyed. It appears that corn was once cultivated to a considerable extent, but the inhabitants find it more convenient to extend the rearing of cattle. Hay is the greatest want of Iceland. Those who live on the coast attend to fishing, which is very productive. In 1864 there were on the island 4751 farms, with 29,325 head of horned cattle, 218,818 sheep, and 26,354 horses. The common food of the people is butter, milk, and fish; fresh meat and rye bread are holiday fare. The lichen Islandicus, or Iceland moss, is a common article of food. Coffee, wine, and other luxuries are obtained in the factories on the coast, and are used by the wealthier class. The exports consist of cod and other dried fish, whale oil, salted mutton, eiderdown, and sulphur, which is abundant. Turf is the common fuel of the inhabitants; fossil was once supplied in greater or less quantity on the island, but they make little use of it. Iron and copper are also found, but are not worked for want of fuel. The reindeer, which were at first introduced from Norway, have increased greatly, and to have 100,000 of them in Iceland.

By the census of 1801 the population of Iceland amounted to 47,207 persons, but since then it has increased, and is probably now above 50,000. It is said to have been much greater in former times, and to have remained stationary 100,000, till the introduction of the Osmundia, Hekla, and other volcanoes. The increase has been caused by volcanic eruptions which have at various times reduced the numbers. In 1707 and 1708 no less than 16,000 persons were cut off by the small-pox. The Icelanders are generally of the same race as the Danes and Norvoose; they are tall, but not generally corpulent, with a florid complexion, flaxen hair, and an open frank countenance. The women are shorter and more in.
General Icelandie Instruction, which reckoned at one time no less than 12,000 subscribers. The head-quarters of the society were established at Leirargòrdum, whither the print-press from Holm has since been removed. In 1816 Professor Kask established at Copenhagen the 'Iceland Bokmens Legat,' or 'Icelandic Library Society,' with a branch in Iceland, which has published a number of useful works. Mr. J. Heath, an Englishman, printed at his own charge in 1828, at Copenhagen, a spirited Icelandic translation of Milton's 'Paradise Lost.' By Jon Thorlakson, an Icelandic poet, who is mentioned by Henderson in his Journal.

Elementary education, and even a certain degree of superior instruction, is very generally spread among the Icelanders. Children are educated by their parents, with the assistance of the parish clergyman. There is but one superior school in the island, at Bessastad, near the capital Reykjavik. There were formerly two schools at Holm and Skalholmt, where instruction was given in mathematics, geography, history, philosophy, and theology, but they have merged in the school or college of Bessastad. Most of the clergy have been educated in these schools, but a few visit Copenhagen to complete their studies.

Iceland is divided for administrative purposes into four large districts, or districts, north, east, south, and west. Of these the southern and western are the most inhabited. These districts are divided into syssel, or shire-lands, by a sylsessman being a magistrate and receiver of the king's taxes in each of them. There is a governor-general, called stafjártssmann, appointed by the king for five years, with a salary of about 300l sterling, who resides at Reykjavik.

He has under him two amtsman, or deputy-governors, one for the western, and the other for the north and eastern districts. Reykjavik is a town containing about 600 resident inhabitants, and is built on the south side of an inlet of the Faxeafjord, on the south-west coast of the island. It consists of two streets: one built only on one side, fronting the shore, and entirely occupied by merchants and tradespeople; the other, striking off at an angle with it, contains the houses of the bishop of Iceland, the Landfoged, or receiver-general, and other persons not engaged in trade. The house of the governor, the house of correction, and the church, stand by themselves at the back of the town. The houses, with two or three exceptions, are constructed of wood, after the Norwegian fashion, with a storehouse and a small garden attached to them. To the south-west of Reykjavik is the peninsula of Alftanes, adorned with the church and school of Bessastad, and a number of pretty cottages. Gardé, in the same neighbourhood, is the residence of the archdeacon of Iceland, and at Hafnarfjord there is a dry dock. The population of Reykjavik may be considered to be more Danish than Icelandic.

In the northern district there is a kind of town or village, called Eyjafjordur, and a factory, called Husavik, on the Skjalfandafljot, from which sulphur from the neighbouring mines is shipped. Holm has dwindled into insignificance. Other factories are scattered about the coast, especially in the west. These factories generally consist of one or two miserable huts, with large stores and sheds, all built as a shelter, and they are built at the most convenient places for shipping the produce of the district, and also for the fisheries, which constitute one of the principal resources of Iceland. (Henderson's Journal; Sir George Mackenzie's Travels.)

ICELAND MOSS is a lichen, properly speaking, a lichen (Cetraria Islandica), common in the mountainous districts of the north of Europe and North America. The thallus is foliaceous, spreading out on the ground; the surface and underside both being covered with whitish grey or olive; the shields (septula, or reproductive spots) marginal, orbicular, brown. It is devoid of odour, but possesses a very bitter taste: by mastication, or maceration in water, it dissolves into jelly.

It consists of a kind of starch, lichenic acid, and a bitter principle, which has been designated cetararin. By repeated washings in cold water the bitter principle can be removed; and this treatment, when carried to the point where none is as inadip as a solution of common starch: it then possesses all the nutritive properties of starch, and is used in Iceland to form bread and a kind of gruel. It may also be employed to impart a yellow dye to flax.

From its demulcent qualities it has been thought useful in consumption and other diseases, in which it is extensively employed as a decoction, either alone, or as a vehicle for other medicines. The bitter principle at the same time renders it tonic; and being eminently nutritious, it may be regarded as a dietetical as well as therapeutic agent. Various other lichens may be employed in a similar way particularly the Sticta pulmonace-a, or lungwort, which is often of great service in asthma.

ICELAND SPAR. [Calcaceous Spar.]

ICERN. [Britannia.]

ICHEIMON (Mammalogy), the name applied by Lacépède, Geoffroy, and others to a genus of digitigrade carnivorous quadrupeds allied to the civets. It is the Mangust of Olivier and others, Herpestes of Illiger and others, Mangouste of the French.

Generic Character. Feet short, with five demiplatimately toes, armed with claws which are slightly retractile. Tongue furnished with horny papille. Ears small. A voluminous, simple pouch, which does not contain odoriferous matter, and at the bottom of which the vent is pierced. Body very much elongated; tail long, strong at its base. Hairs of the fur annulated. Dental formula:—Incisors 6 & 6; Canines 6 & 6; 1:1; Molars 5 & 5 = 40.

Teeth of Icheimon.

The above cut (F. Cuvier) exhibits the dentition, generally, of the Civets, Icheimouns, Gennets, and Paradoxuri; for, though there are particular differences which will be noticed under the article Viverridae, they are not sufficient, in the opinion of M. F. Cuvier, to demand separate illustrations of the dental system of those groups.

Mr. Bennett, at a meeting of the Zoological Society (1835), noticed some peculiarities in the dentary system of these animals. In Herpestes fasciatus and Herpestes Gambianus by found the following arrangement:—Incisors 5; 1:1; Molars 5:5.

The incisors were small, there is a simple, and regular; the canines of moderate size; the first two false molars of the normal form; the third carnassier of rather small size compared with its analogue in genera more decidedly carnivorous; and the last two, in both jaws, took the same position. The dentary false incisors of Icheimon by M. F. Cuvier, was, Mr. Bennett observes, wanting in both these species; nor could its absence be owing to the age of the specimens examined, as he remarks, for he tells
us that some were evidently young animals though arrived at a ripe age. He further confirms the situation of the teeth respectively, in the reciprocal position of the jaws, the first inferior false molar filling up the entire vacant space between the corresponding superior tooth and the canine of the same side. This system, M. Guerin, differs considerably from that ascribed to Herpestes by M. F. Cuvier (Dentis des Mammiferes, i. 99), but agrees in all respects with the description of M. Desmarest. The following however is equally foreign to the accounts of both these authors, and, were not all the other characters so perfectly accordant with those of Herpestes, would decidedly indicate a new genus. Indeed, so stands in my notes, under the name of Mungos, but with a note of interpolation, as I have only been able to examine a single specimen.

Mungos viitcillatis. (Herpestes viitcillatis, Benn.) Teeth, 6: 11 6
6: 1 1 6 6
The incisors and canines have nothing remarkable in form or number. The first false molar in either jaw is tuberculous; the second and third consist of one large conical fang in the centre, and a smaller tubercle on each side of it; then follows the carnassier, and after it two tubercules in the upper and three in the lower jaw. The first of these in the upper jaw is large and triangular; the second short and broad, its bilateral dimensions more than doubling its longitudinal; the three of the lower jaw, singular, simple, and remote from each other, and of cylindrical form. This is a system of dentition which, as far as I am aware, is altogether peculiar, and if undoubtedly confirmed by the examination of other specimens, will undoubtedly form the type of a new genus. Perhaps further and more rigid examination may even detect different species from the different localities, as specimens have arrived for the Society from Travancore and Bombay, and one from Madras, at the British Museum.

Geographical Distribution of the genus.—Asia and Africa. Our limits do not allow us to particularize all the localities, but we may notice that Mr. Hodgson mentions Herpestes griseus as occurring in the lower region of Nepali (Zool. Procr., 1840); and Dr. Andrews, Smith, who describes a new species of Herpestes badius, says that the first specimen was killed near Old Latakoo, and that several others were seen between that and Kurichane, which lies about 120 miles more to the eastward. In addition to this, and another new species which Dr. Smith says he shall figure hereafter, he states that five others inhabit the south of Africa, namely, Herpestes Pharaonis, Desm.; H. griseus, Desm.; H. urinatior, Smith; H. ammophila, Smith; and H. abbas, Smith. He adds that, before long, there is every reason to expect that additional species will be added to the preceding, as the Bechuanas described several little quadrupeds clearly differing in the nature and character of their habits, belonging either to this genus or Cynictis of Grypus. (Illustrations of the Zoology of South Africa, No. II., now in the course of publication.)

In death the habits of this genus, to which several new species have of late been added, will be collected in the course of this article, especially in that part of it which treats of Ichneumon Pharaonis. Dr. A. Smith, in the work above quoted, says that Herpestes badius appeared restricted to sandy districts abounding in bushwood, and in these was occasionally seen running from one cape to another. He states that it is extremely shy, and flies on the approach of man to its hiding-places with great rapidity. Notwithstanding the above, it is not uncommon in the stomachs of those which were procured by the Expedition; but Dr. Smith adds, that if the natives are to be believed, H. badius feeds with avidity also upon lizards, snakes, mice, and other small quadrupeds. It is pretty certain that the skill of the Ichneumon in seizing serpents by the throat, so as to avoid injury. The poet, who names it Pharian, describes its attack on the Egyptian nap elegantly and at length (iv. 724).

Arrangement and Natural History.

Linnæus, in his last edition of the 'Systema Naturae,' gives one species of Ichneumon under the name of Viterra Ichneumon, his genus Viterra being placed between the Caja (Falsiphalanae) and the Vespula (Vesparum). It stands as the first species of the genus, and the very next noticed, on the side with a query, whether it may not be a distinct species. The first of these varieties is evidently the celebrated Egyptian Ichneumon, Johnnemon Pharaonis of Godfrey, Herpetos Pharaonis of Desmarest. The same Mr. Godfrey gives three species, viz. Viterra Ichneumon (the Egyptian), V. Mungo, and, apparently, V. cofara. Pennant places it among the 'Weasels.'

Cuvier gives the form (Lee Mangeuste) a position between Paradoxurus and Ryzana (the Sirentes). Mr. Gray arranges the Ichneumon (Herpestes, Illig.) under the Foliden, in his fourth subfamily Viperina, between Viterra, Cus, and Crotalus, E. Cuv.

Dr. Fischer gives the name of Mungoata, between Mephitis and Crossarchus; he enumerates nine species.

M. Lessieux, in his 'Manuel,' arranges it under the name of Ichneumon, between Genetta and Crossarchus.

Mr. Swainson's 'Viperina,' Musk Waasla (Viperina), form the first subfamily of his genus Mustelidae. Herpestes, which is placed between Cynictis and Viterra, Linn., is the second genus of that subfamily.

The species are not few. M. Lessieux and Mr. Swainson mention eight, and there is reason for supposing that there are more. We select as an example Ichneumon Pharaonis, Viterra Ichneumon, Linn., of Linnæus.

Description.—Put a mixture of chestnut-brown and yellow, each hair being annulated with those two colours; feet and muzzle black or deep chestnut; tail terminated by a tuft of long hairs.

This appears to have been one of the sacred animals of the ancient Egyptians; and we read in Herodotus (ii. 67) that the Ichneumon (lycaon) which the best critics consider to be synonymous with Ichneumon, were, as well as dogs, 'preserved and treated as representatives.' There seems to be no doubt that it is the Ichneumon (lycaon) of Aristotle (Hist. Anim. ix. 6; vi. 20; vi. 35), Diodorus Siculus, Strabo, Philo, and others; and as little as it is the Ichneumon of Pliny. Aristotle (ix. 6) relates that the Ichneumon sees the serpent called the Asp or Aspic (dorsic), he does not attack it till he has called to his assistance other Ichneumons, and in order to defend themselves from the venemous sting of the Asp, but that the snake, then armed with mud by rolling on the earth after having dipped themselves in the water. Pliny (Hist. Nat. viii. 24) gives a somewhat similar account. Diodorus and Strabo relate a much more marvellous feat, nor is Pliny slow to lend his aid in spreading the wonderful tale, how, when the crocodile is led asleep with opened jaws, the Ichneumon darts like a weapon down his throat and gnaws its entrails ('eriditum' Hist. Nat. viii. 24). It may be thought hardly worth while to refute such a fable, for it is not necessary to doubt its truth, and it may not be amiss to turn to Somnini’s observations on this point, more especially as they contain some interesting remarks on the habits of the animal. 'Much,' says Somnini, who had the opportunity of observing these animals which the Egyptians have domesticated, 'has been written concerning it, and much of this writing has been fabulous. It was one of the animals held sacred in ancient Egypt. Horses were rendered to it, its death being maintained with the greatest solicitude during life; funds were set apart for its support; they served up to it, as to cats, bread steeped in milk, or fish of the Nile cut down into morsels; and it was generally forbidden to kill any of the race. Object of the worship of a celebrated people, the pretended protector of the most singular country in the world against a scourge the most grievous to an agricultural nation, a champion unknown in our climates,—what a field for the production of the marvellous? Accordingly it has not been spared. The greater part of travellers have seen the mangleus without examining it; and with their minds prepared to believe anything the Egyptians and the moderns have spread respecting it, they have successively copied their relations.' Somnini then, after a compliment to Buffon, and a statement that he had had it in his power to observe the mangleus in its native country and in its state of liberty, proceeds as follows: 'The relations to the disposition of familiarity, the mangleus are not altogether domestic in Egypt. Not only do they now rear none in their habitations, but the inhabitants have not even the collection that their descendants reveal any. Most probably those which Belon and Prosper Alpin assert that they had domesticated were merely a few individuals presented rather as objects of curiosity than for any useful purpose; for if they hunt away rats and mice, they likewise seize upon the poultry, and this appetite would more than
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overbalance the good which they could do in purging the houses of noxious animals, which cats would destroy more certainly and with less inconvenience. Having some resemblance in their habits to wassels and polecats, they feed upon rats, birds, and reptiles. They ramble about the habitations of man, and even steal into them, in order to surprise the poultry and devour their eggs. It is this natural fondness for eggs which prompts them frequently to scratch up the sand with the intention of discovering those which contain their young and to murder them, or in many cases to prevent, in reality, the excessive propagation of these detestable animals. But it is absolutely impossible to abstain from laughing, and not without reason, when we read of the depredations in the extensive range of the crocodiles, of their sliding down into their bays, and not returning till they have eaten through their entails. If some mangoustes have been seen springing with fury on little crocodiles presented to them, it was the effect of their appetite for every species of reptiles, and not at all that of a particular hatred, of a law of nature, in virtue of which they would have been specially commissioned to check the multiplication of these amphibious animals, as many people have imagined. It had been equally reasonable to say that nature placed mangoustes on earth merely to prevent the too great propagation of chickens, to which they are far more hostile in reality than to crocodiles. And why not assert that men have not mistaken in subscribing such intentions to nature respecting mangoustes as this—is more than half of the northern part of Egypt, that is to say, in that part comprised between the Mediterranean Sea and the Nile, where they are very common, there is no place where there are no crocodiles; whilst they are more rare in Upper Egypt, where the crocodiles are, in their turn, more numerous. The mangoustes are nowhere more multiplied than in Lower Egypt, which, better cultivated, more inhabited, more humid, and more shaded, presents also more abundantly the means of supplying them with prey and with food, and, I again repeat it, crocodiles never appear there.

That Belon saw this Ichneumon in Egypt there can be no doubt. That accurate observer, in the 'Portraits,' gives a figure of it superscribed 'Portrait de l'Ichneumon, que les Egyptians nomment Rat de Pharaon.' Beneath is the following quotation:

"Voy le portrait du Rat de Pharaon, qui chasse aux Rats, comme fait le mille : il est demeurant fort carnibale brute ; il est autrement nommé Ichneumon.""}

Hasselschult mentions the Vierria Ichneumon, the Ichneumon as the met with in Upper and Lower Egypt, living, during the inundation of the Nile, in the fields and near the villages, but, in the dry season, as dwelling in the fields and near the banks of the river. He says that it creeps slowly along, as if ready to seize its prey, and that it feeds on insects, particularly the bulbs of onions, kind of crocodiles. The ichneumon, that night, when it frequents the villages. He states that in Upper Egypt it searches for the eggs of the crocodile, which lie hid in the sand on the shore, and eats them, preventing by that means the increase of that dangerous animal. 'The Ichneumon,' he continues, 'may easily be tamed, and frequently goes about the houses like a cat. Mr. Barton, who has been the English consul nineteen years in Egypt, has kept a tame one for several years. It makes a growing noise, and barks when it is very angry. The Ambians call it Nema. The French in Egypt, who give everything they don't know names of their own making, have called this Ichneumon Mus de Pharaon. Alpin and Bawden followed, and called it Mus Pharaonis (the Mouse of Pharaoh). The resemblance it has to a mouse (mus terrestris) in regard to the colour and hair might have induced ignorant people who know nothing of natural history to call it a mouse; but I cannot conceive why they should call it Pharaoh's Mouse. The Egyptians were too intelligent in the time of Pharaoh to call it a mouse, having knowledge enough to give true names to those which signify the natural bodies; nor is it at this day called Pharaoh by the Arabs, which is the name for mouse, but they call it Nema. What is related concerning its entering the jaws of the crocodile is fabulous.' Hasselschult travelled during the years 1749-

50-51 S: Sonnini's travels commenced m 1777, and terminated in 1780. In the Arabic used in the neighbourhood of Tangier, whence two specimens were sent by Mr. Drummond Hay to the Zoological Society of London Herpetes Pharaonis is called Serro.

Mr. Bennett, in his account of a specimen of Herpetes griseus kept in the Tower, says that on one occasion it killed no fewer than a dozen full-grown rats, which were disposed to it in a room sixteen feet square, in less than a minute and a half.

The story of the Ichneumon Mungo, or Mungo, Vierria Mungo of Gmelin, having recourse to the plant Homopoda (a plant) or Muscicapa, as an antidote to the poison with which they are armed, is, in the encounters with them, will be found in the 'Americana Exoticm' of Kémpfer, who says (p. 574) that he had one of these animals which slept with him and followed him about like a dog through the city and fields.

ICHNEUMON. (Entomology.) [PUPITORA.]

ICHTHYOLOGY (from ichthys, a fish, and logos, a discourse.) [FISH.] In the article Fish, where mention is made of the scales, it is said that M. Louis Agassiz has proposed a new classification of fishes, which is founded upon the structure and form of the scales. The object of the present article is to give a brief outline of the views of that naturalist, such in fact as will be found in his 'Recherches sur les Poissons Fisicaux.'[2] M. Agassiz has divided the Fishes into four orders, each of which contains a large and famous skeleton; in each there are genera of species which have spiral rays in the dorsal fin, and other genera where all the rays of the dorsal fin are soft. There are likewise in each order both apodal and abdominal genera; and in two of the orders there are in addition certain species in which the ventral fins are thoracic, and others in which they are jugular. The four orders are named by M. Agassiz, Placoides, Ganoides, Cheloniidae, and Cyclooids.

The name Placoids was applied to the first of these orders on account of the irregularity which the solid tegumentary parts of the scales exhibit. These consists of layers of corneous or ossaceous substances disposed one upon the other and covered by a thick coat of enamel, and consequently resemble teeth in their structure. This order contains the following families: Lepidotes, all the species of which are fossil; the Stauridae, which are also fossil, with the exception of two genera, Lepidotes and Polypterus; the Pycnodontidae, likewise fossil; the Stereodermae, Gymnodontidae, Sauridae, and Sturiones.

In the third order, Cheloniidae, the scales consist of laminae whose posterior and free margin is pectinated. A structure very evident in the cheloniids and flat-fishes (Placoides) which M. Agassiz thinks ought to be placed close together. In this order are also arranged the Percidae, Plecoconothae, Sciaenidae, Sparidae, Scorpaenidae, and Aulostomidae.

Order four, Cyclooids. The families which belong to this order have the scales formed of simple laminae, with the posterior margin smooth. The scales of the lateral line are formed like the others, but instead of flat laminae they consist of disks placed one within the other, of which the returning portion, which is applied against the disc of the scale, forms the tube through which flows the mucus of secretion which covers the fish. This tube is sometimes bifurcate, or even ramified. The Labridae, Mugilidae, Athetina, Scisbomidae, Gadidae, Gobidae, Muranidae, Lucitoideae, Salmonidae, Clupeidae, and Cyprinidae.
ICHTHYOSAURUS, literally Fish-Lizard (Greek: θηραδος), the generic name given by Mr. König to the extinct fossil animal noticed by the late Sir Everard Home, under the appellation of Protosaurus, and by Wagler under the name of Grypus.

Organization.

We are indebted to Mr. De la Beche and the Rev. W. D. Conybeare principally for pointing out and illustrating the structure of this extraordinary creature; and that at a time when the materials were far more scanty than they are at the present day. Dr. Jäger, Mr. Hawkins, Dr. Buckland, Sir Philip de Malpas Grey Egerston, and Mr. Owen, have all contributed to throw light on the organization of a being that has long ceased to exist; and the anatomy and animal economy of this tyrant of the seas of former ages is now nearly as well known as that of the porpoise which revels in the ocean that washes the shores of our existing continents and islands.

"If," writes Dr. Buckland, in his "Bridgewater Treatise," "we examine these creatures with a view to their capabilities of locomotion, and the means of offence and defence which their extraordinary structure afforded to them, we shall find combinations of form and mechanical contrivances which are now dispersed through various classes and orders of existing animals, but are no longer united in the same genus. Thus, in the same individual, the whole of the above is combined with the teeth of a crocodile, the head of a lizard with the vertebrae of a fish, and the sternum of an Ornithorhynchus with the paddles of a whale. The general outline of an Ichthyosaurus must have most nearly resembled the modern porpoise and grampus. It had four broad feet or paddles, and terminated behind in a long and powerful tail. Some of the largest of these reptiles must have exceeded thirty feet in length. We shall now endeavour to give a sketch of the organization of these Ichthyosaurians.

Skeleton.—The osteology of the head agrees in many points with that of the crocodile, but the orbit of the eye is much larger, and the nostril is not, as in that genus, placed near the point of the snout, but near the anterior angle of the orbit, as in some other lizards. The teeth, which in some cases amount to a hundred and eighty, are not incased in deep and distinct sockets as in the crocodiles, though the rudiments of an alveolar separation may be traced in the small ridges between the teeth running along the furrow of the maxillary bone in which they are set. The succession of teeth is managed much after the same manner as that which obtains in the crocodiles [Crocodylus, vol. viii., p. 162.], the young tooth budding up at the base of the old tooth, where, as it grows, its lateral pressure sets the absorbers at work; the base of the old tooth is thus partially removed, and, as the new tooth advances, is finally displaced to make room for its more efficient successor. The elongated jaws in which these instruments of destruction are ranged are made up, as in many of the crocodiles and the other lizards, of many thin bony plates, so as to produce a union of lightness, elasticity, and strength. It is obvious," says Dr. Buckland, in the interesting work above quoted, "that an under jaw so slender and so much elongated as that of a Crocodile or Ichthyosaur, and employed in seizing and retaining the large and powerful animals which formed their prey, would have been comparatively weak and liable to fracture if composed of a single bone. Each side of the lower jaw was therefore made up of six separate pieces, set together in a manner which will be best understood by a reference to the figures. This contrivance in the lower jaw to combine the greatest elasticity and strength with the smallest weight of materials, is similar to that adopted in binding together several parallel plates of elastic wood or steel to make a crossbow; and also in setting together thin plates of steel in the springs of carriages. As in the carriage-spring or compound-bow, so also in the compound-jaw of the Ichthyosaur, the plates are most numerous and strong at the parts where the greatest strength is required to be exerted; and are thinner and fewer towards the extremities, where the service to be performed is least severe. Those who have witnessed the shock given to the head of a crocodile by the act of snapping together its thin long jaws, must have seen how liable to fracture the lower jaw would be if it consisted of one bone only on each side: a similar inconvenience would have attended the same simplicity of structure in the jaw of the Ichthyosaur. In each case therefore the splicing and bracing together of six thin flat bones of unequal length and of varying thickness, on both sides of the lower jaw, affords a compensation for the weakness and risk of fracture that would otherwise have attended the elongation of the snout. Mr. Conybeare points out a further beautiful contrivance in the lower jaw of the Ichthyosaur, a structure which may be compared to the cross-bracings lately introduced in naval architecture.

Hitherto the structure of the skeleton of Ichthyosaurus is, as we have seen, saurian; but now we come to a part of its bony frame, and a very principal part, which is formed on the ichthyoid or fishy type. The vertebral column, consisting of more than one hundred vertebrae, each of which is hollow and fashioned after the manner of those of fishes, to facilitate the progress of the animal through the watery medium in which it existed, is constructed for a swimming.
not a walking animal; and the saurid type is here departed from in favour of a conformation demanded by the habits of the animal. A peculiarity in this part of the structure is noticed by Sir R. Home, the annular part of the vertebra being neither consolidated with its body, as in quadrupeds, nor connected by a suture, as in crocodiles; but remaining always distinct, and articulating by a peculiar joint, resembling a compressed oval ball and socket-joint. Mr. Conybeare observes, in addition, that this mode of articulation co-operates with the cup-shaped form of the intervertebral joints in giving flexibility to the vertebral column and assisting its vibratory motions; for had these parts been consolidated, as in quadrupeds, their articulating processes must have locked the whole column together, so as to render such a motion of its parts impossible; but by means of this joint every part yields to that motion. (Buckland’s *Bricklayer’s Treatise*, and the illustrations there collected.)

Sir Philip Egerton, in his paper *On Certain Peculiarities in the Cervical Vertebrae of the Ichthyosaurus*, hitherto unnoticed (Geol. Trans., June, 1836), has demonstrated that the first and second cervical vertebrae (in some species at least) are ankylosed; and he further notices a very remarkable feature which at once distinguishes these vertebrae from the other bones of the spinal column. He shows that on the surface of each bone there exists an unusual enlargement in the form of a solid wedge-shaped process, placed transversely to the smaller diameter of the vertebra. By this arrangement four triangular planes are produced. The first and largest is based upon the lower anterior margin of the atlantal socket, having its apex directed downwards and backwards until it meets the apex of a similarly shaped though smaller plate projecting downwards and forwards from the posterior margin of the atlas. The third, of like shape and size with the second, extends from the anterior margin of the axis, and joins the apex of the former, which inclines from the posterior portion of the same bone. This fourth plane is considerably smaller than the others, and corresponds in size with a fifth, placed on the anterior border of the third cervical vertebra. When therefore the three anterior vertebrae are in their natural position, the arrangement of the five planes is as follows:—the first and largest occupies the lower front of the atlas; the second and third, by the union of their bases, produce a triangular

socket on the under surface of the atlas and axis; and a second smaller socket is formed between the axis and the third vertebra by a similar disposition of the fourth and fifth planes. Sir Philip adds that the second bone of the series is frequently found with the atlas and axis, and is not uncommonly fixed in its position by ankylosis. The third bone he states to be of rare occurrence, in consequence of its diminutive size, and he thinks that in some species it is probably altogether wanting. He designates these bones as Subvertebral Wedge-Pieces. The reader will find in the same interesting memoir very valuable observations on the structure and articulation of the cervical vertebrae, the combined result of which, and of the reduction of the intervertebral cavities, must, as Sir Philip remarks, have been a considerable increase of power in this part of the spinal column; and he further states that proceeding from the lumbar vertebrae towards the head, the column attains its minimum diameter about the fifth cervical vertebra, from which point to the occiput, it increases in size very rapidly.

The ribe appear to be constructed more upon the saurid type, for they are continuous along the vertebral column from the head to the pelvis; they are slender and mostly bifurcated at the end. and many of them are united in front across the chest. Intermediate bones, analogous to the sternum and intermediate costal cartilages in the crocodiles and the sterno-costal area in Plesiosaurus, united the ribs of the right side to those of the left. Dr. Buckland is of opinion that this structure was probably subservient to the purpose of introducing into the bodies an unusual quantity of air, the animal being by these means enabled to remain long beneath the water without rising to the surface for the purpose of breathing.

In the *sternum* we find a combination of bones admirably adapted for resistance. Of this part of the bony framework Mr. Conybeare says, *The form of the sternum arch and the broad surfaces of the clavicles is such as to impart great strength to the chest, enabling the animal to bear the most disturbed waters, and affording an extensive surface for the attachment of powerful muscles to assist in moving the anterior extremities*; and Dr. Buckland remarks that the bones composing this arch are combined nearly in the same manner as in the Ophichthys of New Holland, which seeks its food at the bottom of lakes and rivers, and is obliged, like the Ichthyosaurus, to be continually rising to the surface to breathe air. To this sternum arch the *anterior paddles* are attached, while nearly two times larger than the posterior paddles, and in this part of the structure the actean type appears to have been followed. The short and stout humerus is followed by the bones of the fore-arm; and these are succeeded by numerous regularly disposed polyzous, exceeding, in some species, the number of one hundred, which form the paddle or fin.

In form these bones differ both from the phalanges of lizards and whales.
Ichthyosaurus communis. (Dr. Buckland.) Scale 6 inches.

Royal College of Surgeons, London, read before the Geological Society of London, March 21, 1838, the author commenced his observations by referring to the skeleton of the existing cetacean, and pointing out how slight is the indication afforded by the caudal vertebrae of the large terminal fin, which forms, in that class, so important an organ of locomotion; and the improbability that its presence would have been suspected, had the cetacean been known only by their fossil remains, in consequence of the fin having consisted entirely of decomposable and unsatisfiable material.

He stated that the depressed flattened shape of the terminal vertebra, which gives the only indication of the horizontal fin—and which character is not present in all the cetacean—is not recognisable in the skeletons of the Ichthyosauroi and Plesiosauri; but he proceeds to describe a condition of the tail in the skeletons of the Ichthyosaurus which, he conceives, affords an indication of a structure in the extinct animal analogous to the tabunyan fin of the cetacean, and which has not been suspected by the authors of the conjecturally-restored figures of the Ichthyosaurus already published. The condition alluded to is described as an aluput bend of the tail, about one-third of its whole length distant from the end, and at the thirtieth caudal vertebra in the Ichthyosaurus communis; the broken portion continuing, beyond the dislocation, as straight as in the part which is intact. But there is no appearance of a modification of structure in the dislocated vertebrae, indicative of the tail having possessed more mobility at that point than at any other, and as the dislocation has take place at the same point in a few specimens examined by the author, he conceives that it must be due to some cause operating in a peculiar manner on the dead carcass of the Ichthyosaurus, in consequence of some peculiarity of external form, while it floated on the surface of the sea.

A broad tabunyan fin, composed of dense but decomposable material, he observed, might have been attached to the terminal portion of the tail; and such a fin, either by its weight, or by presenting an extended surface to the beating air, might have been attractive to the animal, or strength sufficient to tug at, without tearing it off; occasion, when decomposition of the connecting ligaments had sufficiently advanced, a dislocation of the vertebrae immediately proximate to its point of attachment. The two portions of the tail, with the rest of the skeleton, would continue to be held together by the dense exterior integument, until the rupture of the perioste of the abdomen, at some yielding point, had set free the gases generated by putrefaction; and the skeleton, having undergone certain partial dislocations, from the decomposition of the more yielding ligaments, would subside to the bottom, and become imbedded in the sedimentary deposits, exhibiting the fracture of the tail alluded to.

With respect to the relative position of this conjectured caudal tabunyan fin of the Ichthyosaurus, Mr. Owen could not perceive any indication of its horizontality in the forms of the vertebrae which he supposed to have supported it; and he regards the superintendence of posterior paddles in these air-breathing marine animals as a compensation for the absence of that form of fin which is so essential in the cetacean, for the purpose of bringing the head to the surface of the sea to inhale the air. On the other hand, a vertical caudal fin seems especially required by the short-necked and stiff-necked Ichthyosaurus, in order to produce, with sufficient rapidity, the lateral movements of the head, which would be needed by those predatory inhabitants of the antient deep; while in the Plesiosaurus such a fin would be unnecessary, in consequence of the length and mobility of the neck, and Mr. Owen concluded by stating, that in those skeletons of Plesiosauri in which the tail is perfect it is straight, and presents no indication of the partial fracture or bend which is so common in the tails of Ichthyosaurus.

Figures of the tails of five specimens of Ichthyosaurus, belonging to the species Ich. communis, Ich. tenerastra, and Ich. intermedius, now in London, accompanied the Note; the subject of which was also illustrated by a sixth skeleton of an Ichthyosaurus on the Table, the property of Sir John Mordaunt, Bart. (Geol. Proc. 1838.)

Mr. Owen informs us that he has since procured detached terminal caudal vertebrae of the Ichthyosaurus, and finds them compressed or flattened from side to side, in a remarkable degree; a circumstance, he observes, confirming the accuracy of the conjecture of the verticality of the caudal fin, and the best proof perhaps of its actual presence in the living animal.

Senses.—That the Ichthyosaurus enjoyed the sense of smelling in a considerable degree can hardly be doubted from the structure and position of the nostrils, nor is there any reason for supposing that they were not gifted with the sense of taste; but their power of vision must have been great, and indeed Dr. Buckland justly speaks of the enormous magnitude of the eye as very much exceeding that of any living animal, and as being the most extraordinary feature of the head. He alludes to a skull of Ichthyosaurus playfordensis preserved in the possession of Mr. Johnson at Bristol, and remarks that in this specimen the longer diameter of the orbital cavity measures fourteen inches. The eye has, as Mr. Conybeare remarks, its sclerotic composed of a bony or rather cartilaginous substance, subdivided into thirteen plates, as will be seen in the cut (p. 430), where two of these plates are represented separately. Mr. Conybeare, in the passage to which we have referred, goes on to state that he had then before him the eye of a middle-sized lizard from Germany, which has a similar structure exactly resembling those of the plates were more numerous: this, he states, was pointed out to him by the late Mr. Miller, and he adds that the chameleon, iguana, and tupinambes have similar osseous lamina, as has the tortoise, but that in this latter animal they form, as in birds, the anterior disk. This conformation was highly important to the adjustment of an organ whose functions were demanded both above and below the surface of the water. [Bruc. vol. iv, p. 426.] The sense of hearing appears to have been sufficiently developed, and that of touch was probably about upon a par with the sensations of the modern cetaceans.

Digestive Organs.—An enormous expansion of the jaws, which were so constructed as to bear the shock of the most violent collision, and were furnished with a constant succession of teeth, formed an organ of seizure well fitted to the voracity of an animal that not only preyed upon fishes and other marine animals, but, like the ravenous pike of our fresh-waters, fed upon its own congeners and even species. The prey was transmitted into a stomach which must have been nearly coextensive with the cavity of the body, and the contents were then enabled to pass through an intestinal canal which appears to have resembled, as Dr. Buckland observes, the spiral intestines of some of the swiftest and most voracious of our modern fishes.

The evidence upon which this assertion is made is to be found in various specimens, like that in the Oxford Museum, from the lias at Lyme Regis, and figured by Dr. Buckland in his 'Bridgewater Treatise' (pl. 14), which shows a large cavity for the reception of the food, but which, chiefly referrible to the Pholidophorus limbatis, intermingled with coprolite throughout the entire region of the ribs, and in the more matured coprolites themselves. Dr. Buckland, to whom we are indebted for the history of these curious bodies, says, speaking of the
intestinal canal of the Ichthyosaurus. *Besides the spiral structure and consequent shortness of the small intestine, we have additional evidence to show even the form of the minute vessels and folds of the mucous membrane by which it was lined. This evidence consists in a series of vascular impressions and corrugations on the surface of the coprolite, which it could only have received during its passage through the windings of this flat tube. If we attempt to discover a final cause for these curious provisions in the bowels of these marine reptile inhabitants of the seas of a former world, we shall find it to be the same that explains the existence of a similar structure in the modern voracious tribes of sharks and dog-fishes. As the peculiar voracity of all these animals required the stomach to be both large and long, there would remain but little space for the smaller viscera; these are therefore reduced, as we have seen, nearly to the state of a flattened tube, coiled like a screw around itself; their bulk is thus materially diminished, whilst the amount of absorbing surface remains almost the same as if they had been circular. Had a large expansion of intestines been superadded to the enormous stomach and lungs of the Ichthyosaurus, the consequent enlargement of the body would have diminished the power of progressive motion, to the great detriment of an animal which depended on its speed for the capture of its prey. The above facts, which we have elicited from the coprolite remains of the Ichthyosaurus, afford a new and curious contribution to our knowledge both of the anatomy and habits of the extinct inhabitants of our planet. We have found evidence which enables us to point out the existence of beneficial arrangements and compensations, even in those perishable yet important parts which formed their organs of digestion. We have ascertained the nature of their food and the form and structure of their intestinal canal; and have traced the digestive organs through three distinct stages of descent, from a large and long stomach, through the spiral coils of a compressed ileum, to their termination in a cloaca, from which the coprolites descended into the mud of the nascent seas. In this line they have been interred during countless ages, until summoned from its deep recesses by the labours of the geologist to give evidence of events that passed at the bottom of the ancient seas, in ages long preceding the existence of man. (Bridgewater Treatise).

ICHTHYOSAURUS (Rippl), one of the many names (as Antpuchus, Von Meyer; Solenodon and Tellimenes, Schlotheim; Trigonellites, Parkinson; Leplolites, Germain) which have been given to the pair of shelly bodies found in many of the oolite rocks, and not unfrequently in the mouths of ammonites at Solenlofen, so as to prove their connexion with the fossil shell inhabited that by.

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Rippl and Voltz they were conceived to form an operculum. The two valves meet on a straight toothless hinge-line, their free edges forming the remaining two sides of a triangular round aperture. The interior surface is transversely fibrous; its inner surface concentrically striated with lines of growth. (Parkinson's Org. Rem., pl. xiii., figs. 2, 10, 12.)

ICOLMILL [IGNA.]
ICON/NUM. [AISIA MINOR.]
ICONONZO. Bridge of. [GRANADA, p. 353.]
ICOSAHEDRON. [SOLIDS, REGULAR.]
ICOSAHEDRIC. [SOLIDS, REGULAR.]

Icterus. [Sturnim.] icterus, a name given by M. Valenciennes to the Ben-turonga, a genus of plantigrade mammals which M. F. Cuvier had previously referred to the genus Paradoxurus. It is the Articitis of Temminck. M. F. Cuvier, in his Dons des Mammiferes, states that he published, under the name of Paradoxurus allabrons, in the 5th vol. of the Histoire Naturelle du Mammiferes, a species of that genus which had been sent to him by Calcutta by M. Alfred Duvacel; and that he conjectured, from the external characters and the general physiognomy, that the animal which he supposed belonged to this genus Para-
doxurus. Having subsequently examined the teeth (an examination which he states he owed to M. Valenciennes, who had found the skin and the head of the animal in the cabinet of Brussels, and had obtained them through the complaisance of the Director, M. Drapier), M. F. Cuvier states that there is much resemblance in the dentition to that of Paradoxurus. Ictides belongs, he thinks, to the family of Civets, which is characterized by a tubercular molar tooth in the lower jaw, and the two similar molars in the upper jaw, and he thinks that it is 'sans contredit' most approximated to Paradoxurus, though it approaches Procyon nearer than that genus, that is to say, the teeth of Ictides show an increase of thickness, and have become more tuberculous. He places it between the Civets, &c., and the Soricates.

Cuvier, who gives Ictides a position between Allurus [Pand] and the Chrysochloris [Pand], says that it still bears some resemblance to Procyon in its dentition; but he remarks that the three last molars of the upper jaw are much smaller and less tuberculous, and that this is especially true of the last of all in each jaw, which is very small and nearly simple.

Mr. Gray places Ictides as the last genus of his subfamily Procyonina, the fourth of his family Ictides, following Parado-
xurus and immediately preceding his fifth subfamily Canina. M. Lesson thinks that the genus approaches nearer to

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Preliminary to *Fennicurus*, but he arranges it between *Ailurus* and *Paradadoxus*.

Mr. Swainson, adopting Temmink's name, which, if it appeared first with a generic description, ought to be retained, makes the form the first genus of his family *Didelphidae* or *Opossums*, observing that it is not marsupial.

Generic Character.—Head rather short, muzzle pointed, ears, which are small, tufted with long hairs; tail long, hairy, prehensile; feet with five toes on each foot.

Dental Formula: Ineinos, $\frac{5}{6}$; Canines, $\frac{1}{1}$; Molars, $\frac{5}{5} = 16$.

Tooth of *Ictides* (F. Cuvier). One-sixth larger than nature.

The author of the 'Analytical Notice of Books' (Zool. Journ., vol. ii.) says, when reviewing the *Histoire Naturelle des Mammiferes*, Nos. XLII.—L, that between the Viverrine family and that which is composed of the racoons and bears there had existed a considerable gap, which is now in a great measure filled up by the newly discovered forms, the *Benturog* and the *Panda*. The external appearance, he remarks, of the *Ictides* corresponds in some degree with both that of the civet and racoons, having the plantigrade motion of the latter and the slender snout of the former. It is indeed completely plantigrade, and has on each foot five toes armed with strong compressed claws, apparently adapted for climbing. *Its* tail, the thickness of which at its commencement is almost monstrous, is prehensile beneath, without being terminated by a naked skin, like that of *Ailurus*, but resembling entirely the tail of the *Sajous*. The eye, like that of the domestic cat, has the pupil vertically elongated; the habits of the *Ictides* are consequently nocturnal. The ears are small and rounded; and the nostrils are surrounded by a muzzle, which is divided into two portions by a deep sulcus. The hairs are long and thick, and a peculiar character is given to the physiognomy by the moustaches, which are very voluminous on the lips, the eyes, and the cheeks, and by the pencil of long and numerous hairs which terminates the ears. The cry is intermediate between those of a cat and a dog.'

*Geographical Distribution of the Genus.—India.*

Three species are recorded: we select *Ictides albofrons*. *Description.*—W ith grey hairs long, silky, black at the base, and white in their extreme third, shorter on the head and limbs; sides of the snout, forehead, pencils of the ears (which are edged with white) black; upper part of snout and forehead white; iris yellow; belly grey, with shorter hairs than those of the upper parts of the body. Size, that of a very large domestic cat. In another specimen the sides of the snout, and the tail, its extremity excepted, were gray.

*Locality.—Bootan, Nepal (Kâchâr: though they occasionally occur in the central region of Nepal. (Hodgson)).* *Habits, Food, &c.—Sir Thomas Stamford Raffles* describes the gait of this *Benturog* as low and couching, the body being long and heavy, and the legs short. The tail, thick at its insertion, gradually tapers to the extremity, where it curls upwards. In climbing trees the animal is assisted by this tail, which is strong. One that was kept alive many years by Major Farquhar partook both of animal and vegetable food. Slow in motion, and timid in disposition, the animal sleeps much during the day; the night is the season of its comparative activity.

IDA. [CANDIA.]

IDA. [TROAD.]

IDEA (ίδεα, from the root ιδω, to see), in its widest and now generally received acceptation, is employed to indicate every representation of outward objects through the senses, and whatever is the immediate object of thought. In many other terms of mental philosophy, it is derived from the most eminent of the senses, that of vision. In the Platonic philosophy, the word idea possessed a higher import, and, signified, primarily, the archetypes of all created things as they subsist in the divine intellect; and, secondly, the conceptions of the human understanding, by means of which the essence of a thing is conceived. According to another, though a more questionable definition, the Plato conceives that our certain absolute realities, which are regarded as real because they are capable of becoming objects of true knowledge. Plato's own definition is very extensive: 'an idea may be attributed to whatever, as a plurality, may be indicated by the same name' (ίδεα γενομένη τε και τινών εἰς μίαν τούτον ἡ ίδεα). For in Plato's loose phraseology the terms ίδεα and ίδα are employed in different in the same sense. This being remembered, there is little objection to Plutarch's historical account of these ideas, which we here give in the English of Holland. *Idea is a bodiless substance, which of itself has no substance, but given a form and figure to a mind and becometh the cause that bringeth them into show and evidence. Socrates and Plato supposed that these be substances separate and distinct from matter, howbeit subsisting in the thoughts and imaginations of God, that is to say, of mind and understanding. Aristotle also, speaking of the names and ideas, howbeit not separate from matter, as being patterns of all that God hath made. The Stoics, such at least were of the school of Zeno, have delivered that our thoughts and conceptions are the ideas.' (Plutarch, ch. 3, fol. 666; *Opinions of Philosophers.*)

Those ideas by means of which perception is obtained were commonly supposed to be really images or resemblances of the external objects. By the Stoics, however they were held to be inimical, while Epicurus and his followers made them to partake of the matter as well as of the form of their originals (tenus rurum simulacra). (See *Cic. ad Att. Ep. ii.* 5.) The word *species*, by which, Cicero tells us, it was usually rendered in Latin (Top. 7), although he himself proposed 'form,' which has been in later times adopted by Kant and his followers to designate that essential element in the perception of our outward objects which is independent of matter, and which the mind presents to itself in accordance with its own laws. These species the schoolmen divided into sensible and intelligible, of which we shall here extract Hobbes's clear and succinct account. 'The philosophy schools teach us that for the cause of vision the thing seen sendeth forth on every side a visible species, (in English) a visible show, apparence, or aspect, or a being seen, the receiving of which into the eye is the cause of our understanding also the thing understood sendeth forth an
Intelligible species, that is, an intelligible being seen, which coming into the understanding makes it understand.' (Of Man, part i, c. 1.)

The term idea was again introduced into philosophy by Des Cartes, with whom and his followers it is nearly synonymous with the species of the schoolmen. According to Locke, 'Ideas are whatever is the object of the understanding within it, whatever the mind can be employed about thinking.' (Letter to the Bishop of Worcester, vol. iv., p. 376.) In this large sense the word is generally employed by English and French writers, and also by the Germans before the time of Kant, for the father of the critical philosophy ascribes to idea a higher but limited signification. By idea Kant eminently designated every conception formed by the reason (as distinct from the understanding), and raised above all sense-data, as an intuitive notion: empirical, which have an element drawn from experience, for instance, organization, a state, a church; and 2nd, pure, which are totally free from all that is sensible or empirical, such as liberty, immortality, holiness, felicity, deity. Another division of the Kantian ideas is into theoretical and practical, according to a similar division of the reason itself. Thus the idea of truth is a theoretical, that of morality a practical idea.

(Trendelenburg, De Id. Platonica; Richter, De Id. Fis.; Dugald Stewart's Philos. Essays, Appendix ii.; Ritter's History of Philosophy; Boyer Collard's Leçons, in the 3rd vol. of Jouffroy's Oeuvres de Reid; and Kant's Kritik der reinen Vernunft.)

IDEALISM has two uses, philosophical and critical. In the former it signifies, 1. whatever belongs or relates to ideas generally. It is in this sense that the word is employed in the sense of 'ideas' in the works of Reid and Priestley. According to this theory, the understanding does not perceive external objects themselves by means of the sensorius organs, but the organs of sight and touch transmit to the mind certain ideas of Leibnitz's notion of sensibilia, which it perceives within itself. Locke, who received the term idea from Des Cartes, seems unconsciously to have adopted, with the use of the word, the scholastic doctrine which regards the exception of sensible objects from the primary qualities of bodies are resemblances of them, but that those produced by secondary qualities are no resemblances at all. From this explanation of the means of perception Locke has, on the one hand, been represented as the origin of modern Idealism; while on the other, in consequence of the superior value which he evidently gives to the testimony of sensation, his authority has been claimed by the opposite school of Idealism, as founded by the disciples of Reid and Priestley. The second sense of the word is more limited, being confined to a peculiar class of ideas created by and solely subsisting in the imagination. Connected with this especial signification is its various forms of expression. In the ideal of the Idea signifies a something which, although not existing in the reality of sensible things, subsists actually in thought— the joint creation of the reason and the imagination, the archetype and pattern of supreme and perfect beauty. Although unreal in nature, this ideal is not unnatural; it is the absolute sum and unity of those scattered beauties which nature, with a lavish but impartial hand, has scattered among her myriad phenomena. This type of faultless beauty is indeed unapproachable by the artist; yet the more perfect the ideal which kindles his enthusiasm and animates his fancy, the higher will his efforts tend, the nobler will be the energy of his art, and the nearer his approximation. An ideal of the sublime is impossible, for sublime objects are singular in their nature, and as there can be no science of singulars ('singularium nulla est scientia,' Bodin), so too there can be no ideal of the sublime. The statue of Jupiter, the perfect ideal of beauty, is the ideal of the sublime, but as it observes all those rules of beauty from which the Greek artists never deviated, in spite of its colossal dimensions, the sense of proportion is minute, the emotion exciting, and there is wanting that feeling of the inadequacy of our sentiments which is awoken by vastness and immensity in objects, and which constitutes the emotion of sublimity.

IDEALISM, the designation of many and different systems of thought, is a name commonly applied to a conception in principle from which they originate. This principle is the opposition of the ideal and the real, that is, of ideas and things—the contrariety of mind and body, or of spirit and matter.

1. As the essence of the mental lies in free activity and vital motion, as opposed to the invariable mechanism and inertness of the corporeal, the name of Idealism is rightly applied to those systems of physiology which make the primal substance and original of all things to be certain forces invisibly working throughout the universe. It is the absolute power of the dynamical philosophers of the Ionian school, Thales, Anaximenes, Diogenes of Apollonia, and Heraclitus. The fundamental position of their several doctrines was the assumption of a living energy which is depressed itself and undergoes continuous alteration both of form and quantity—a transmutation which is the cause of all generation in nature. For water, the primary substance of Thales, was not the simple element, but water pregnant with vitality; the infinite air of Anaximenes was the abode of this living energy; and the intellectual primary of Diogenes was not merely the atmospheric air, but a warm and perfect breath of life which pervades and ensouls the universe. While however in these philosophers the philosophical idea is more or less mixed up with divers sensible conceptions, Heraclitus seems clearly conscious of speaking figuratively of the primary substance. With him a universal and absolute life is the cause of all phenomena, and it is indeed of the utmost importance, manifested in the vitality of fire and the rational soul, which is like fire, while in other phenomena it is inherent, although not so obvious and immediately cognizable. In this class of philosophers belong more particularly the Pythagoreans and Leibnitz. The former explained matter to be a system of forces; while, according to the latter, all beings are of the same nature. Activity and simplicity are the essential characters of all, and are so many forces or causes which work in the terms mentioned. These forces are the perception, or of reflecting within themselves, as in a mirror, the universe. These images however of perception cannot become the objects of knowledge, unless in these monads, which possess in their own private essence the means by which they are enabled to distinguish and see in themselves these images. It is therefore this faculty of apprehension which constitutes the difference between the so-called matter and spirit, and it determines in what degree, and in what manner, there are corresponding orders of intelligences. Lastly, we must include in this class, if anywhere among the idealists, the system of Spinoza, who asserts the identity of matter and spirit, making them to be but different aspects of one and the same substance; and it is this system, more than any other, which philosophy may be regarded as the complement of that of the Jewish philosopher.

2. Another species of Idealism considers the real as simply ideal, and maintains that our representations of a material world correspond to nothing actually existing, but that by contemplating these as objective, we transmute the merely ideal into the real. The fundamental axiom of this idealism is the priority of the idea to the form, as 'ideae prior, reale posterior.' Accordingly, the real only exists so far as it is necessarily conceived by us, so that the external world is purely a creation of our conceptions, or, in other words, the real is a product of the ideal. To this class is referred the Platonic attempt to account for the existence of the sensible world by his ideas alone, without recourse to any other nature alien and foreign to them. By some, even the Aristotelian philosophy is designated as ideal in this sense, at least so far as regards its fundamental principle. This they make to be the assumption of a universal mundane intelligence ('not'), which, as the principle of all things is a force ('arché'), self-active, all-perfect, and therefore the final cause of all things. The manifold manifestations of this arché are forms before and beside which matter exists only potentially, while the forms are determined and distinguished by privation ('materia, ater, afermous'). But the most perfect of idealists, Leibnitz, limited his idealism to merely the form, but also the matter, of the conception of external things out of the mind itself, or, in his terminology, out of the 'ego' (Ich).

3. A third system of Idealism proceeds to the absolute denial of all material existences. This species of Idealism was impossible among the antients, who did not oppose mind so sharply to matter as to deny the possibility of their interaction, but tacitly supposed their similarity, opposing only their ultimate difference. The notion of corporeity, and the incorporation of corporeity only in principle from which they originate, is the characteristic of Idealism. Bishop Berkeley is the author, although Des Cartes gave occasion to it by his position, that nothing extended
can enter the unextended soul, and Locke afforded, by his doctrine of ideas, the arguments for its support. The system of Berkeley is briefly this: matter does not exist independently of our sensations, but conceptions of a material world are produced by the operation of the deity upon our understanding, and the material world exists only in the divine intellect, who awakes in us certain sensuous conceptions in a definite order, which order is what we call the color of the natural.

4. The last species of idealism is more philosophical, and, without denying or asserting the existence of a material world, is content with confessing an ignorance of its nature. It is not to a knowledge of itself, but is content with employing the ideas which the mind forms, according to the laws of its own nature, upon the occasion of the excitement of its sensuous organs, without determining whether these ideas correspond or not with the existing conditions, whatever they may be. To this class belong Malebranche and Kant. According to the former, mind and matter cannot act upon each other, and the sensations of the mind are so many occasional causes operating by a constant miracle of divine agency. (Deo in Machina.) According to the latter, all that we know of outward objects is that they furnish the material part of our conceptions, to which the mind furnishes the form agreeably to its own natural laws; and the things themselves, which he calls phenomena, we absolutely know nothing, but note only the modes under which they appear to us.

PHILOLOGY (the science of ideas or mind) is the term by which the later disciples of Condillac, under the Directory and the Empire, have designated the history and evolution of human ideas considered as so many successive modes of certain original or transformed sensations. Proceeding from this exclusive and partial view, nothing strikes us more than the logical simplicity of the writings of this school, the subtlety of its abstraction, the boldness of its generalisations, or its analytical dexterity in reducing an idea to its simplest expression. The most celebrated of these philosophical school are Carabas as its physiologist, Garat and Volney as its moralists, while its metaphysical aspect is ably exhibited in the "Idéologie" of Destutt de Tracy. We should also add, although it has been opened by Royer Collard and his disciples, Cousin, and Jussiffy. (See Damiron, Histoire de Philosophie en France au XIXe siècle.)

IDENTITY designates in philosophical language the sameness of a substance under every possible variety of circumstances. In this sense it is employed in the phrase personal identity, where it signifies the invariable sameness of the same individual, or ego. In this ordinary sense it notes a merely relative identity, which may also be called logical or abstract. Thus, in logic, whatever things are subjects of the same attribute or collection of attributes are considered the same; e.g. dog and lion are the same relatively to the common notion Quadruped, under which they are both contained. Again, in physics, a tree may be asserted to be the same in relation to all the rights of property, notwithstanding the physical change it undergoes from the constant segregation of old and aggregation of new particles. Lastly, it is only in this logical use of the term that we can be said in memory to be conscious of the identity of the material spiritual, if they were absolutely identical it would be impossible to distinguish between the first appearance and the recurrence of an idea. (Anclion.)

According to Butler it is impossible to define the idea of personal identity, but it is easily ascertained; for a comparison of one's self in any two moments of our existence requires immediately the idea, and at the same time the identity of ourselves. (Essay on Personal Identity.) Reid's view is worthy of remembrance, but it happened a year ago, without a conviction, as strong as memory can give, that the same identical person who now remembers that event did then exist. (Essays, ch. vii.) To the objection, being conscious cannot be the same in any two moments, and that therefore, as consciousness constitutes personality, there cannot be any identity of person, Butler answers, that consciousness presupposes and consequently cannot constitute personal identity, and that the object perceived may be the same notwithstanding that the perceptions by which it is discerned are distinct and different. Locke's opinion on this subject appears to have been undecided. 'The identity of the same man consists,' he says, 'in nothing but a participation of the same life, by constantly fleeting particles of matter in succession vitally united to the same organised body.' But personal identity he defines to be the sameness of a rational being. (Locke, On the Understanding, p. 5, c. xxvii, s. 6.)

With respect to identical propositions, it is rightly observed 'that the proposition: a is a is of a different nature from the proposition: we can have of any thing is of such propositions as in the schools are called identical.' (Sir Kenelm Digby, On Man's Soul, c. i., p. 28.) For in deductive reasoning the proposition and assumption which make the major and minor premises of the regular syllogism are only logical transmutations of the identical position in physics, that the whole is equal to its parts. Things which are logically identical may be conceived to be so many parts constituting a whole (genus); and the proposition 'de omni et nullo' is rightly expanded thus: whatever belongs, or not, to a constituted whole, does or does not belong to all its constituent parts. In the same manner all mathematical propositions are identical; and the fundamental proposition: every whole consists of certain determinate and limited parts, so that the procedure to a knowledge of the parts is easy.

By the system of absolute identity is meant the doctrine which teaches the oneness of the subject and object (spirit and matter) as merely different aspects of one substance.

IDÉES. [Kalendar.]

IDIA, Lamouroux's name for a genus of recent Polycracy, allied to the Ctenosphyras and the Oligoconodons.

IDMONEA, a genus of Polycrasis, described by Lamourous as closing the group of Millipede. It is ramosa, the branches triquetal in section, cellulosiferous on two faces, and prominent in one, which has its use. From the solite of St. Peter (Exposition des Polypiers). A recent species has been found at Japan: and two fossil in the calcaire grossier (Brom).

IDOCRASE, Vesuvian, Pyramidal Garnet, &c. This mineral occurs crystalised and massive; the crystals are either hollow or imbedded in the pyramidal prism. Cleavage parallel to the primary planes, distinct, and less so parallel to the diagonal of the prism. Fracture uneven, slightly conchoidal, or rather undulated. Hardness 6 &. Scratches glassy. Many varieties, with various shades of brown, black, grey, blue, green, and yellow. Streak white. Lustre vitreous-translucid. Transparent and transparent. Refraction double. Specific gravity 2.98 to 2.94. By the blosewarp is fusible with ebulbo into a yellowish transparent globule, and with borax gives a glass tinged green with oxide of iron.

The massive varieties are amorphous; the structure is fibrous, granular, or conchoidal.

Idocrase is met with both in primitive and volcanic countries. It occurs in the masses ejected from Vesuvius; the crystals are sometimes of large dimensions.

It was found originally in the neighbourhood of Vesuvius, and since in many other parts of the world. Different varieties have been called by different names; thus Cypree is cupreous or blue idocrase; Loboite, greenish yellow. Egerian, found near Eger, in Bohemia, is of a liver-brown colour.

Analysis

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<tr>
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**Trace:**

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<tbody>
<tr>
<td>Manganese</td>
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[Variegated Siberia. Mag.]
IDYIA, Raphæus's appellation for a genus of crustaceans, to which Desmarest alludes, among other such genera, as knowing nothing of them beyond the names. 

IDYLL (Greek, ἱδυλλίον; Lat. Idyllium or Idyllium) is a poem descriptive chiefly of the customs and appearances of external objects, or of characters, manners, and sentiments; or of these in conjunction with the appearances of nature. The epitaph, the inscription, the sonnet, and most of the epistles of poets writing in their own person belong to this class. (Preface to Wordsworth's Poems.) In Greek the bucolic poems of Theocritus are called idylls; and all bucolic poetry (Bucolica) may be included under this name; though the anoints did not, any more than our own, see the name as specifically applied. This may be seen by referring to the 'Idylls' of Ausonius. In English poetry, the 'Seasons' of Thomson, Shenstone's 'Schoolmistress,' the 'Cotter's Sabbath Night' of Burns, the 'Allegro' and 'Penseroso' of Milton, &c. It 'is pitable,' Goldsmith's 'Deserted Village,' &c. belong to this class.

IEREA, the generic name of a fossil Polyplacophor from the blue clays of the Vaches Noires (Calvados), described by Lamarque, is doubtless of its affinities, but ranks it among his Polyplacaria actinaria. Bronn places it among the Seaphoda.

IGLAU. [MORAVIA.]

IGNATIUS, one of the earliest of the apostolic fathers. [APOSTOLIC FATHERS.] Antioc was a great seat and centre of Christianity from the very earliest times. St. Paul resided there many years, and brought the Christian communions into regular order. He was one of the earliest successors to St. Paul (if not the next) in the presidency over this church, or in the office of minister, superintendent, bishop, or by whatever name the connexion which the Apostles and their successors enjoyed with the church bore to the churches may be designated. His connexion with the church at Antioc began as early as a.d. 67, that is, before Jerusalem was destroyed, and while still there were innumerable sprinklings of living who remembered our Saviour and the circumstances of his life, teachings, and death. This is inferred from what is related of him, that he had been forty years connected with that church when, in a.d. 107, the emperor Trajan 'sent one of his officers and a tribunal to see a man wise and respectable as Trajan instituting a violent persecution against the Christians. Of course Ignatius, occupying the most prominent station, would be among the first to suffer from it. They first tried to induce him to abandon his opinions and his charges, but the old man was inflexible. The issue was that he was sent to Rome, and there put to death in a very cruel manner, being thrown to the lions in a public spectacle. The mind of the emperor was shocked at the time, and the sensation was how much better are these times than those which are past, how valuable the public institutions of modern times, and how important the diffusion of moral and political truths in every nation. A people, therefore, that have such a writer as Ignatius was gathered by a few friends and followers, and, in the spirit which prevailed so generally in the early ages of the church, removed to Antioch, and preserved there as sacred relics. It seems scarcely to have occurred to the Reformers when they set themselves to defame and destroy the relics of saints and other holy men enshrined in the ancient churches of Christendom, that they were abolishing one of the most valuable evidences of the reality of many facts in the early history of Christianity.

However better remains of St. Ignatius are preserved to us: four short epistles addressed to the Romans, the Philadelphians, the Smyrnians, and to Polycarp. There is also a relation of his martyrdom by some who were present. This is the relation from which the facts of his history are chiefly, if not wholly, drawn. An English translation of it, as also of his four epistles, may be found in Archbishop Wake's Genuine Epistles of the Apostolic Fathers, London, 1869.

IGNATIUS LOYOLA. [JESUITS.]

IGNITION. [HEAT.]

IGUANA. [L. iguana.]

IGUAZU. [L. Iguaçu.]

IGUTZ. [L. Iguta.]

IDRA. [Illyria.]

IDRIAH. [Hearken, p. 397.]

IDUMEA ('Edu'me-ah), usually called EDOM (גָּדוֹם) in the Old Testament, included, in the time of Christ, a considerable portion of the southern part of Palestine, and extended on the south-west as far as the Lake Serbonis (Pliny, Nat. Hist., v. 14); but in the writings of the Old Testament, belong to the southern mountains of the old Edom, which is the mountainous district in the north of Arabia which extended from the south of the Dead Sea to the bay of Elath in the Red Sea. (1 Kings, ii. 6; 2 Chron., viii. 17.) The Edomites, who were of the same stock as the Moabites (Gen. xxxvi. 9, 43), originally dwelt on Mount Seir (Gen. xxxii. 33; Ex. xxxix. 15), in the neighborhood of the Moabites (Judg. xi. 18; Is. xi. 14). They were governed by kings from the earliest times (Gen. xxxvi. 32; Num. xxi. 14); and had appeared to have possessed considerable power when the Israelites invaded Canaan (Num. xx. 14-21; xxi. 4; Judg. xi. 17). They were defeated by Saul (1 Sam. xiv. 47); and were made tributaries of the Jews during David (2 Sam. viii. 14). The conquest of Edom was of great importance to the Jews, since it enabled Solomon, by obtaining possession of the ports of Elath and Ezion Geber on the Red Sea, to participate in the advantages of the trade with India.

After the division of the Jewish kingdom during the reign of Rehoboam, the Edomites continued subject to Judah till the reign of Joram, when they were obtained, and became subject to Israel. (2 Kings, vii. 20-22.) They were subdued again during the reigns of Amaniah (2 Kings, xvi. 7; 2 Chron., xxvi. 11) and Uzziah, called also Azariah (2 Kings, xx. 22; 2 Chron., xxvi. 22); but after the death of the Babylonian empire, they again mentioned as an independent people, who had obtained possession of the southern part of Judea as far north as Hebron. (1 Macc., v. 65.) They appear to have united about this period with the Babylonians (2 Kings, xxxi. 32; 2 Macc. x. 12; xii. 32), till they were entirely subdued by John Hyrcanus, who compelled them to submit to circumcision, and to observe the Jewish law. (Josephus, Antiq. xiii. 9, sec. 1.) From this time they were regarded as a part of the Jewish nation, and were governed by a prefect appointed by the Asmonian princes of Judea. (Josephus, Antiq. xiv. 1, sec. 3.) One of these governors, Antipater, a native of Idumea, was appointed to the government of Judea (Joseph, Antiq., xiv. 8, sec. 5); and was succeeded by his son, the celebrated Herod, who afterwards became king of the whole kingdom, and put an end to the dynasty of the Asmonian princes.

The Idumæans marched to the assistance of Jerusalem when it was besieged by Titus, and entered the city; they did not however continue till it was taken, but returned to their own country laden with plunder. (Joseph, Bell. Jud. iv. 4; vi. 8, sec. 1.) We have no further mention of the Idumæans in history. Origin, in his 'Commentary upon Job,' informs us that the name of Idumæa did not exist in his day; and that the inhabitants of the country were called Arabam, and spoke the Syrian language.

Pliny is the only author who applies the name of Idumæa to the country west of the Jordan. The whole of Judea was frequently called Idumæa under the Roman emperors. (Varr. Pol. de Nat. Rerum, iii. 12; Juvenal, viii. 160; Statius, Silv. i. 6, v. 2; Martial, ii. 2, x. 59; Valerius Flaccus, Argonaut. i. 12.)

The wisdom of the Edomites is celebrated in the Old Testament. (Jer. xxv. 21, Obad. 1, 2.)

IDYA, Oken's name for those Beroeae which are formed for the manner of Beroe oula. ('Clioorga, vol. vii. p. 164.)
The teeth of the Iguana vary according to the ages of individuals; and MM. Duméril and Bibron state that they are assured that fewer exist in young subjects than in adult individuals. The twelve or fourteen first maxillary teeth, both above and below, are nearly rounded, pointed, and white: a little anteriorly all the others are narrow and compressed, with an angular summit, which is very finely dentilibrated on its edges. They are not, Dr. Buckland observes, lodged in distinct sockets, like the teeth of crocodiles, but fixed along the internal surface of the dental bone, to which they adhere by one side of the bony substance of their root.

Teeth of Iguana.* (Dr. Buckland.)

There is a double row of small teeth on each side of the vault of the palate.

Habits, Food, &c.—MM. Duméril and Bibron state that the Iguanas are herbivorous, and indeed the structure of their teeth would lead to the conclusion that herbs form their staple. Never, says those learned zoologists, have we found any thing but leaves and flowers in the stomachs of those individuals which we have opened. Mr. Broderip saw a living Iguana about two feet long at Mr. Miller's nursery-gardens near Bristol. It had refused to eat insects and other kinds of animal food, until happening to be near some kidney-bean plants that were in the house of the gardeners, it began to eat them from that time forth supplied from these plants. Dr. Buckland, who quotes this, states, in addition, that in 1828, Captain Belcher found in the island of Isabella swarms of Iguanas that appeared to be omnivorous; they fed voraciously on the eggs of birds and the intestines of fowls and insects. The Iguanas live a great deal in trees, and will take to the water, swimming with ease. Mr. Broderip saw an Iguana enter and cross a small pond in the Zoological Gardens at the Regent's Park. The fore-feet were motionless during the passage of the animal across the water.

Geographical Distribution of the Genus.—Mexico, South America, and the Antilles.

Utility to Mankind.—Some of the species are considered as very delicate food.

There are only three species admitted by MM. Duméril and Bibron, and of these we select Iguana tuberculata as an example. A multitude of synonyms are collected by these zoologists, from which it appears that this species has been described by a great many names. Thus they point out that Spix, in his work on the Reptiles of Brazil, has, under the names of Iguana equatorialis, Iguana ceyla, Iguana brevipes, Iguana emarginata, and Iguana Carrerii, represented Iguana tuberculata of Laurenti, Iguana Indamarensis of Gaudin, The Common Iguana, at five different epochs.

The figures will give some idea of this animal, which is yellowish-green below, and above a green more or less deep, becoming sometimes bluish, and at others of a slate colour; in general there are on the sides of the body brown stripes or zigzags edged with yellow. The tail is surrounded with large brown rings, which alternate with others of green or yellowish. Length seldom exceeding five feet.

Locality, Great part of South America; the Antilles.

Utility.—This species is considered excellent for the table. Delicatissima and apetitissima are among the specific names that have been assigned to it. It is not how-

* Some of the young teeth are seen forcing their way upwards as no to cause absorption at the bases of the older teeth which were to replace.
ever deemed very wholesome, and is even considered injurious to those who have suffered from certain diseases.

Iguana (Wagler, Ophrynodes of Gray and Wiegmann in part), Operanolon (Dum. and Bib.), Plica of Gray in part, Hypsibates of Wagler in part), Ustrophus (Dum. and Bib.), Norops (Wagler), Lemosus (Wiegmann), Erythmobates (Cuvier, Tropidurus of Prince de Wied, of Wiegmann, and of Wagler in part, Ophius of Gray in part), Proctotreutes (Dum. and Bib.), Tropidurus (Letolatius) Wiegmann), Letolatius (Dum. and Bib.), Tropidurus (Dum. and Bib.), Tropidurus (Dum. and Bib.), Tropidurus (Dum. and Bib.), Tropidurus (Dum. and Bib.), Atractus (Daudin, Atractus of Mermor, Anolis of Cuvier, Atractus of Wagler, Draconusa of Wagler and Wiegmann, Ephesurus of Fitzinger).

These genera are divided into three tribes, viz. Anolians, Polychetians, Iguanians, Tropidolepidians, and Ophurians.

The Iguanians comprise the genera Corythophanes, Basiliscus, Alopocycles, Amblyrhynchus, Iguana, Metopoceros, Cyclura, Brachylophus, Euphias, and Ophrynodes.

Under the Acrodontes, the following genera are arranged by these Herpetologists: — Chloridae (Gray), Iguanites (Cuvier, Lophura of Gray, Wagler, and Wiegmann, for some species; Phrynisalis of Cuvier, Wagler, and Wiegmann, for others), Grammatophora (Kauf, Agama of Cuvier and Fitzinger, and of Mermor in part, Amphitopus of Wiegmann and of Wagler), Leptodactylus (Cuvier, Uromastix (Mermor, Stellion Biterus of Daudin in part, Fouettequeue of Cuvier, Mastigura of Fleming), Lophura (Dum., Gonyoscelus of Kaup, Gray, Wagler, and Wiegmann, Agama of Mermor in part), Agama (Daudin, Agama of Mermor, Fitzinger, and Cuvier in part, Tropidurus of Cuvier, Tropidurus of Fitzinger in part), Gymnophantes (Cuvier, Draco (Linnæus), Stellio (Daudin), Stixana (Cuvier, Semipholos of Wagler and Wiegmann), Lycocophanes (Mermor), Corythophanes (Gray), Otocoryx (Wiegmann), Phrynocephalus (Kauf).

Those genera are divided into four tribes, viz. Galo- tians, Agamians, Phrynocephalians, and Stellionians.

The reader will perceive that some of the most remarkable of these forms have already been noticed in this work; and as far as our limits will permit, we may perhaps call attention to others which may be specially deserving of notice. At present we shall merely observe, that M.M. Duméril and Bibron make the number of the species in the family, as modified by them, 146.

Organisation.

Skeleton.—The skull is always articulated by a single condyle situated below the great occipital foramen which opens a passage for the nervous chord. The configuration of the head presents great differences, dependent on the conformation of the bones of the cranium, the face, or jaws. The number of cervical vertebrae is most frequently six, and this region is generally short, but it is strong. There
are often articulated chelaeian apophyses, which are in reality the rudiments of ribs. The dorsal vertebrae, meaning by that term the vertebrae which carry the ribs, vary much in number in the different genera. The first lumbar vertebrae are like the dorsal, except that they are without the articular facets which characterize the latter. Generally there are but two pelvic vertebrae, which carry the ilium or pelvis. The ribs are, in general, slender, weak, rounded, and of the same form, though they vary in their curvature, according as the trunk is cylindrical, depressed, or compressed in the thoracic region. The first or anterior ribs are joined to the lateral parts of the sternum, or to a series of small bones which occupy the lower part of the breast, which are united to each other, and to the mesial portion nearly in the same manner as in the chelaeonians, for this disposition occurs in Polychoerus and Anolis. In the Draconis the posterior ribs are free and prolonged in the thickness of the skin of the sides, in order to sustain the soror natalis part of the body between the anterior and posterior limbs. All the species of the family have two pairs of limbs always apparent, and terminated by toes, the number of which varies but little. Their conformation and length have been described in a generic characteristics particularly in the case of Anolis, and some others which have offered some particularities, such as Stenura. The presence of a shoulder formed of two hombones and of a pelvis, separates these saurians from the serpents.

The general form of the body and the disposition of the skeleton scarcely vary, except in the proportions of the different parts, which are necessarily narrowed in the spinal column, especially in the tail and in the configuration of the vertebrae, the spinaus and transverse processes of which correspond to the external state of compression or depression. In the greater number of species, as in those Lepidurus, Butes iulus, Polychoerus, and Iguana, of the region of the back presents a well-defined projection, sustained by the series of spinaus apophyses which often form that crest which has caused M. Duméril and Bibron to name the family Eutitet. This position is most marked in Iguana and Agama; whilst in Stelio and Uromastix the dorsal spines of the project but little. The bodies of the vertebrae which constitute the tail are much shorter in these species in which the tail is not long, than the vertebrae of Anolis for instance, than in those which have it excessively prolonged. In these last, the Iguana and Anolis for example, there is another peculiarity, namely, that the bodies or central and cylindrical part of the caudal vertebrae, which are large and dilated at their extremities for articulation, have, at the same time, the mesial portion more slender and fragile, so that it is in this portion that fracture often takes place, which is followed by the obstruction and complete deformity which is the tail often in such cases. M. Rousseau (père) found in the skeletons of those saurians which had undergone mutilation of the tail a long cartilaginous cone in lieu of the last vertebra, and Curas has demonstrated, that this spinal chord is not renewed in this cartilaginous stem, which is produced in lieu of the caudal vertebrae.

Organs of Sensibility.—Seeing and hearing appear to be very well developed in this order; with regard to taste and smell, the former seems to be present in a very fair degree; touch moderate. The eyes of all the Iguanians are furnished with movable lids; the orbit in which they are placed varies in its extent and in conformity with the limits which the bones of the face allow. The greater part have a superciliary arch, which is sometimes tuberculate and very projecting, as in Ophryossa and Hipposa. M. Duméril and Bibron state, that up to the time when we wrote they thought that human observers had detected a linear pupil, though it is asserted that some are nocturnal. With the exception of some genera, Otopsitos and Phrynophosaurus in particular, in which the eyes do not appear, most of the Iguanians have an auditory canal, more or less elongated at its external orifices on a level with the surface of the head; sometimes, as in some species of Agama, it is only a simple slit, the entrance of which is prolonged by some points, and, as it were, spiny scales. The sense of smelling does not appear to be much developed in the Saurians generally, but in the family under consideration it appears to be at a very low rate, as the nostrils are placed almost in the air sinuses; the external orifices of the nostrils have but little breadth, and is surrounded by a large number of minute points, and as it were, spiny scales.
cropping vegetable substances. The family are generally nimble. The compressed and lengthened tail of many species is most useful as an instrument of progression when swimming across the inundated savannahs, and their crooked nails assist them in climbing trees and pursuing the smaller animals on which they occasionally prey.

Geographical Distribution of the Family.—The Iguanidae are all inhabitants of warm climates. The Pleurodon, with exception of Brachylophus, belong exclusively to the New World. The Acrodon, on the contrary are confined to Asia, Africa, Australasia, and, in a single instance, the south of Europe. All the Iguanidae hitherto noticed inhabit South America, with the exception of a Phrynosoma and a Propodopsia, which appear to be natives of North America.

Only one Iguanian belongs to Europe, the common Stellio, which is found also in Africa and Asia. In this last-mentioned part of the world there are 32 others, of which 25 belong to the East Indies. Among the four others may be reckoned the Brachylophus, which is the only one of the subfamily of Pleurodon which is excluded from America; and three Phrynosphaer, whose habitation seems to be limited to the north of Asia.

In Africa, besides the common Stellio, 12 other species of Iguanians occur, namely, one Phrynosphaer, three species of Uromastix, and eight Agama.

The four species which are referred to the genus Grammatophorus, an Uromastix, and the Chlamydosaurus. (Duméril and Bibron.)

Our limits do not allow of our stating in detail the views of the several zoologists who have treated of the genera collected by MM. Duméril and Bibron under this great family, and we must refer the reader to the works of Bell, De Blainville, Boë, Cuvier, Daudin, Fitzinger, Gray, Kraup, Laurent, Merrem, and the Prince de Neuwied, Spix, Wagler, Wiegmann, and others; and especially to the volume of MM. Duméril and Bibron, where the whole subject is thoroughly and luminously discussed, and whence this article is principally abridged.

Igua/Nodon, the name of an extinct gigantic reptile, whose remains were discovered by Dr. Mantell. In its characters this fossil Saurian closely approaches to the genus Iguana, and there can be no doubt that it was herbivorous, although not to the same extent that its kindred were. Dr. Buckland, who dilates on the admirable structure of these teeth, considered with relation to the demands made by the habits of the animal, observes how well they are adapted for cropping tough vegetable food, such as the Caulthosia and similar plants which are found buried with the Iguanodon. The teeth,' writes Dr. Buckland, *exhibit two kinds of provision to maintain sharp edges along the cutting surface, from their first production, until they were worn down to the very stubby. The first of these is a sharp and serrated edge, extending on each side downwards, from the point to the broadest portion of the body of the tooth. The second provision is one of compensation for the gradual destruction of this serrated edge, by substituting a plate of thin enamel, to maintain a cutting power in the anterior portion of the tooth, until its entire substance was consumed in service. Whilst the crown of the tooth was thus gradually diminishing above, a simultaneous absorption of the root went on below, caused by the pressure of a new tooth rising to replace the old one, until, by this continual consumption at both extremities, the middle portion of the older tooth was reduced to a hollow stump, which fell from the jaw to make room for a more efficient successor.' The young tooth somewhat resembled a serrated lancet. Dr. Buckland observes, that this serrature ceased at the broadest diameter of the tooth, that is, precisely at the line below which, had the serrations been continued, they would have had no effect in cutting. As these saw-like edges were gradually worn away, the cutting part of the smaller animals on to the enamel in front, which was traversed by alternate longitudinal ridges and furrows, the latter serving as ribs or buttresses to strengthen and prevent the enamel from scaling off, and forming together with the furrows, an edge slightly wavy, and disposed in series of minute groves, or filled chisels; hence the tooth became an instrument of greater power to cut tough vegetables under the action of the jaw, than if the enamel had been in a continuous straight line. By these contrivances, Dr. Mantell, in his History of Reptiles, p. 270, 371, have realized the wildest poetical fictions of the Dragons of old. In Dr. Mantell's museum is a large portion of the skeleton of one of these Saurians, from the quarries of Kentish-rag near Maidstone. Dr. Buckland remarks that the locality of this unique skeleton shows that the duration of this animal did not cease with the Wealden series, and he adds that the individual from which it was derived had probably been drifted to sea, as those which afforded the bones in the fresh-water deposits subjacent to this marine formation had been drifted into an estuary.

Geological Distribution.—The Wealden fresh-water formation of the South of England, intermediate between the marine colliio deposits of the Portland stone and those of Vol. XII.—2 L
Hugues had married, but were after a time reconciled to him. Peace and quietness were sub-
sequently obtained of the king the whole of the duchy of Bourgogne, of which he had previously held a part.

On the assassination of the duke of Normandie by the count of Flanders, Louis Outremier attempted to seize the
duchy of Bourgogne, for the prejudice of the duchy of Burgundy, Richard. Hugues at first engaged to assist Richard; but the king having offered him a share of the spoil, he accepted the offer, and joined in the invasion of Normandie. The attempt was unsuccessful, and Hugues was involved in new disputes with his sovereign, whom he got into his power, and re-
tained, until compelled to release him by Otton of Ger-
many, who came with an army to his rescue. The war was afterwards continued, and ended only when the quarrel was made up. Louis died the year after, and
Hugues assisted in raising his son Lothaire to the throne. Hugues however possessed the real power of the sovereignty
till his death, A.D. 956.

Hugues, surnamed Capet, son of Hugues Le Blanc, was young at his father's death, but by the protection of Richard
duke of Normandie and Brunon archbishop of Cologne he succeeded in obtaining from the king the investiture of
his inheritance, comprehending the duchy of France, the counties of Paris and Orléans, and the abbey which his ancestors had possessed. He became in effect ruler of the country, and exercised his power in a way to give general
satisfaction. The nobles of France received, with a race of powerful nobles, who acted an important part in the history of France. In the year 861 Charles the leau bestowed upon his kinsman Robert I, called Robert le Fort, the province of the
Seine, and the Loire,' under the title of the Duchy and Marquisate of France. His object was to make the power of
this chiefman a barrier against the Bretons, who were troubling the frontier. This Robert, while he lived, bravely supported his country against the enemies, foreign and domestic. He died in battle against the Northmen, A.D. 866.

Eudes, son of Robert le Fort, was count of Paris, which title he bore in his father's lifetime, and duke of France. He bravely defended Paris against the Northmen, who besieged it, A.D. 883, and compelled them to raise the siege. On the death of Charles le Gaul, A.D. 888, Eudes was elected king of France. He was involved in hostilities with his competitor for the crown, Charles the Simple, and died, A.D. 898.

On the death of Eudes, his brother Robert, who during the reign of Eudes had received from the county of Poitiers, became duke of France. He fought against the Northmen on behalf of Charles le Simple, against whom he subsequently formed a league with Raoul, son of Richard de Flandres, and other lords, and pronounced his allegiance in a council of the nobles at Soissons, a course of the troubles that followed, Robert, finding himself at the head of a powerful party, caused himself to be proclaimed king, and was consecrated at Reims by Wautier, archbishop of Sens, A.D. 922. Charles however, being sup-
ported by the counts of Toulouse and Auvergne, attacked Robert in the plain of Soissons. Robert fell in the battle, but his son Hugues continued the combat, and succeeded in putting Charles to flight. The battle was fought A.D. 923. Hugues, called by the chroniclers Le Blanc, otherwise Le Grand, and, from his holding several abbey in commendam, L'Abbe, succeeded his father in the duchy of Flanders, and was not aspiring to possess the crown, though he had it at his disposal, but bestowed it on his brother-in-
law, Raoul duke of Bourgogne. He was engaged in war with the Northmen on the Loire, and with Heribert, or Hereward of England. Upon the death of King Raoul, A.D. 936, Hugues procured the return of Louis IV, surnamed Outremier, son of Charles le Simple, from Eng-
land, where he had been conveyed by his mother. Louis was only sixteen years old; and Hugues at first virtually exercised the regal power, without the title of regent. But Louis having a year after emancipated himself from tutelage, Hugues formed an alliance with Heri-
bert of Vermandois (Champagne), and Gislebert duke of Loraine, and in succession with Guillaume Long-sword (Long-arm) duke of Normandie, against his sovereign. Hostilities, though delayed for a time by the intervention of the clergy, broke out; the rebel lords were supported by Otton, or Otho I, emperor of Germany, whose sister
The course of the Meu is in the department; that of the Ouat and the Cher, and of the Aff, a feeder of the Ouat, for a short distance to the left, but not within it. The Meu, Ouat, and Cher are all navigable for a short distance.

The Couesnon rises just beyond the eastern boundary of the department, and, at first flows westward, but gradually turns to the north and flows into the English Channel; its length is about 44 miles; the lower part of its course, which is navigable, is chiefly in the department of Manche. Its principal tributary is the Erme, which, after a short course, may be regarded as an affluence of the Couesnon, and which flows north-west to Dinan, in the department of Côtes du Nord. At Dinan it turns northward and re-enters the department of Ille et Vilaine just above its outfall, which forms the boundary between the department of Mayenne and that of Ille et Vilaine. Its whole length is about 70 miles; it is navigable below Dinan, 14 or 15 miles above its mouth. The Breton, a feeder of the Céléne, which has part of its course in this department.

The only canal of the Ille and the Rance, commences in the Vilaine at the junction of the Ille at Rennes, and follows the valley of the Ille to near its source; it then crosses the Menes range to the valley of the Rance, which it follows to the neighbourhood of Dinan, where it communicates with the navigation of the Rance. The summit level is where it crosses the Menes range near Héou; on the side of Rennes are twenty locks in a slope of 21 miles long; on the side of Dinan twenty-eight locks in a slope of 14 miles long.

The whole length of the branches and windings is about 55 miles, the greater part of which is in this department.

The high road from Paris to Brest crosses this department through Vitre, Châteaubourg, and Rennes. The road from Lorient branches off from this at Rennes. The road from Paris to Dol and St. Malo, which branches off from the Brest road at Mayenne, crosses the northern part of the department through Rennes and other government roads leading from Rennes in various directions. The whole length of the government roads is nearly 400 miles, but little more than half of this length is in a state of repair. The roads in this department, in aggregate length of more than 150 miles, but little more than half of this is in repair. The by-roads and pathways have a length of more than 2000 miles.

The whole of the department is upreprehended in the western district (comprising Bretonne and the adjacent parts of other provinces), occupied by the coal-measures and the subjacent primitive rocks (France), but there is no coal worked, or, that we know, found in the department. Lignite is obtained in a small portion of the eastern part of the department, and has been worked for many years. The principal rocks are granite and schists. Slate quarries are wrought in the southern part near Redon. There are many mineral springs; that of Guichen, between Rennes and Redon, is most resorted to.

The climate of the department is temperate; the thermometer seldom rises in summer above 77° Fahr., or falls in winter below 35°; but the south and south-west winds, which are prevalent, render the climate rainy; fogs are common, especially in spring and autumn. The agricultural produce consists of barley, oats, rye, and mixed corn, a little wheat, and a considerable quantity of buckwheat. The grain raised is barely sufficient for the consumption of the department. The cultivation of hemp and flax is considerable, and the quantity of fruit grown, apples and pears, is large. The climate of this department will bear a sea voyage. A little tobacco is grown near St. Malo, and a small quantity of very light wine is made. The quantity of pasture-land is considerable: the butter of this department is among the best in France. The breed of sheep has been greatly improved by crossing it with the Spanish sheep. The quantity of waste land is very great, perhaps one-fourth of the whole area of the department. The quantity of woodland is small. There is abundance of fish, especially near Lorient, and there are many bees. The fresh waters abound with fish; and on the coast are caught great numbers of turbots, soles, and other fish. The oysters of Cancale are in high reputation, and the chief port of Paris is from them. There are salt-panns along the coast.

The department is divided into six arrondissements, the situation, area, and population of which, with the number of communes, are as follows.
The number of cantons, or districts under a justice of peace, is 43 in the whole department.

The department of Rennes contains the city of Rennes, at the junction of the Ille and the Vilaine, which had, in 1836, a population of 33,532 [Rennes], and the towns of Hébé near the canal of the Ille and the Rance, and Cléon, situated between the Seiche and the Vilaine. Neither of these towns is of any importance. Hébé is in the midst of the Menes mountains.

In the arrangement of Fougères are Fougères, near the source of the Couesnon, and on the road from Paris by Mayenville, Dinan, and St. Malo, with a population, in 1836, of 9,384 [Fogeures]; St. Georges de Rennemmbert, near the Brevon (population 3258); Louvigné du Desert (population 3349); Antrain on the Couesnon, at the junction of the ille; Bazouges, near Antrain (population 4500); and St. Aubin de Cormier, on the ridge of the Ille and Menes mountains, between Fougères and Rennes. The last-mentioned place has a population of about 300 or 600 in the town and in the three times that number in the whole commune; but some historical interest is attached to it: it has an ancient castle, built in the year 1222, by Pierre Mauclerc, Duke of Brittany [Bretagne], of which the lofty ruin of a tower in the midst of the commune remains. At St. Aubin de Cormier a great battle was fought in the year 1488, between the forces of Charles VIII. of France, then in his minority, and those of the Duke of Brittany. The French were commanded by La Trimouille, then a mere youth; and the Bretons had the presence of Louis, Duke of Orleans, afterwards Louis XI., the prince of Orange, and other malcontent French nobles. The Bretons and their allies were defeated.

In the arrangement of Montfort are Montfort-sur-Meu (population in 1836, 1772); St. Méné; St. Piron, on the road from Rennes to Lorient (population 3560); Le Gué, close to St. Piron; and Bréal. Montfort retains some portions of its ancient walls.

In the arrangement of St. Malo are St. Malo, at the mouth of the Rance, which had, in 1836, a population of 9,744, or, including St. Servan, of nearly 20,000 people [St. Malo, St. Servan]; Dol, near the sea (population 3091 town, 3939 commune); Châteauneuf, near the Rance; and Cancolle (population 4080) on the sea. This last is a small sea-port well known for its oysters, which not only supply Plymouth but furnish also the English bays with oysters, which are laid in the beds in the estuary of the Thames and adjacent rivers.

The arrangement of Vitre contains Vitre (population, in 1836, 8901), and Châteauneuf on the Vilaine, and La Guerche (population 2100 town, 4210 whole commune), near the Seiche. Vitre is an ancient Breton town. Some antiquaries have thought that its walls have some traces of Roman building, but this is regarded as an error. It was the place of meeting of the states of Bretagne before the Revolution. It is neither well built nor neatly kept. Savary, author of 'Les Lettres sur l'Egypte,' was born here, and it was for some time the residence of Madame de Sévigné. The suburb is charming, with its pleasant promenades and a mineral spring of considerable resort. In the neighbouring castle of Rochers several articles once belonging to Madame de Sévigné are kept as relics.

In the arrangement of Rédon are Rédon (population, in 1836, 4506), at the confluence of the Oust and the Vilaine; Fougères (population 5501), near the Cher; Bain (population 3490), near the Sannon; Loheac, on the road between Rennes and Rédon; and Bécherel. Rédon carries on considerable trade with Rennes and other places. Vessels of 200 tons can come thus far up the Vilaine. At Rénac, a village near this town, cheese is made, which is sold under the name of Grouyère. At Bain are several sorge manufactories.

The population, when not otherwise mentioned, is that of the whole commune, according to the census of 1831.

The coarse 'yarns and sail-clot of this department are in high repute. Paper, starch, leather, and glass are made, and a great quantity of cordage. There are some iron-works and establishments for bleaching and wax. The chief exports of the department are flax, hemp, linen thread, coarse linens for sails and wrappers, cider, leather, butter, wax, honey, and hoseyry. St. Malo is the chief seaport. Several vessels belonging to the towns and places on the coast are engaged in the India trade, and in the whale and cod fisheries.

The department constitutes the diocese of Rennes, and is in the jurisdiction of the Cour Royale, and the circuit of the Académie Universitaire of that city. It is comprised in the thirteenth military division, the head-quarters of which are at Rennes. It sends seven members to the Chamber of Deputies.

Education is in this department very backward; it is however somewhat more advanced than in the neighboring department of Loire Inférieure, and considerably more so in the other departments into which Bretagne has been divided. Of the young men enrolled in the military census of 1828-29, only 25 in 100 could read.

In the time of the Romans the department was inhabited by the Redones, a Celtic people, whose name has been preserved in those of the capital and the town of Rédon. It was composed in the district of Armorca. In the Roman division of Gaul it was in Lugudunensis Tertia. In the downfall of the empire it became part of that independent state which, from the infusion of British population, took the name of Bretagne [Bretagne], and shared all the revolutions of that duchy. It was the scene of contest in the Vendée war.

ILLUSORIAE, a small natural order of Exogenous plants, chiefly consisting of herbaceous weeds, found in the temperate parts of the world; they differ from Amaranthaceae in nothing except having stipules and a tendency to produce petals; from Alismaceae in little more than having stipules and from Portulacaceae in their sepals not being in pairs. This order is one of those which break down the limits between Polyplental and Apetalous plants, and prove how entirely artificial are such divisions. The species are often conspicuous, especially when dried, for their silvery stipules and shining calyces, and are sometimes beautiful microscopic objects; but they are too small to be interesting in any other way, and are of no known use. They occur in various parts of the world, especially in the countries bordering on the Mediterranean.
twenty-seven petals arranged in several rows below the numerous stamens and pistils. The capsules are disposed in a circular manner, and open upwards; each contains a single seed, which is white, smooth, and flattened, and widely distributed. Two are indigenous in Florida; and the others in China and the neighbouring islands. I. floridanum is a red-flowered species, of which the leaves are twice as long as the flowers; it is found in Florida; and is closely allied to the Chinese species. The bark has been proposed as a substitute for cinnamon and cassava bark. I. parellorum also, a native of North America, has similar properties.

The most important species however is I. anisatum, or the aniseed tree of China, of which the fruit is exported from Canton, and well known in commerce by the name of Star Anise. The leaves are sometimes called Chinese Anise. Hence the name badiane, by which they are chiefly known on the continent of Europe, where they are more employed than in this country; being esteemed, as in the East, for their aromatic and carminative properties. The smell and taste of both the capsule and seed being like that of aniseed, a volatile oil is distilled from them, which may be employed for all the purposes of the oil of aniseed: it is said to give the flavour to aniseette de Bordeaux, and to aniseed-made candy. The Chinese use it in substance both as a condiment and a stimulating medicine, and burn it as incense in their temples. The tree flourishes in China and some of the Philippine Islands, and is said to be cultivated in the East Indies. It has yielded a new species. M. Perrotet also mentions that there is an underscribed species at Manilla, which is there called San-ki; that its leaves are mixed with their tea and coffee in the Philippines, and that a liqueur is likewise prepared from its fruit.

ILLINOIS, one of the states of the North American Union, is bounded on the south-east by the Ohio, which separates it from the 40th parallel of latitude. The Wabash is a tributary of the Ohio by the river 120 miles direct distance, and by a meridian line to Lake Michigan for 162 miles, by which river and line it is separated from Indiana; by the western coast of Lake Michigan, for 40 miles; on the north, by the parallel of 42° 50' N. lat. to the Mississippi, 157 miles, by which it is separated from the Huron territory; on the west by the Mississippi, which separates it from the Missouri territory for 200 miles, and from the state of Missouri for 360 miles. The whole circuit of the state is 1774 miles, and its area is 75,890 square miles, or somewhat more than the area of England and Wales. It lies between 42° 30' and 37° N. lat., and thus comprehends 94° of latitude. The Mississippi, Ohio, and Wabash are the principal rivers of the state. The state, known as the Kaskaskia, rises on the east side of the state, and, flowing to the south-west for about 250 miles, falls into the Mississippi about 60 miles above the junction of the Ohio. The Illinois and Kankakee, a tributary of the Wabash, falls into Lake Michigan, and flows first west, and then south-west, into the Mississippi, which it joins 20 miles above the Missouri. About 260 miles above its mouth it expands into a lake called Peoria, 20 miles long and 2 wide. A morass at its source in wet seasons discharges a part of its waters into the river, and a part into the Chicago, a small stream which flows into Lake Michigan. This large river takes the name of Illinois only from the confluence of the Piasa River from the north-east and the Kankakee from the east, both considered streams, and navigable for boats. Thirty miles below their confluence Fox River falls into the Illinois from the north; it rises in the Huron territory, and has a course of 300 miles south-south-west, more than half of which is in this state. The Fox River is sometimes considered the main branch of the Illinois, but whether we reckon by this or the Kankakee branch is a question. The river rises on the lakes, and bogs, and bogs for less than 400 miles. The other principal tributaries of the Illinois are the Vermilion river from the south-east, the Mackinaw from the north-east, Spoon river from the north-west, and the Sangamon and Sangano from the east. The last, by far the largest of these tributaries, has a very winding course, west of the mouth to the west of more than 250 miles, of which 140 miles are navigable, and it falls into the Illinois about 130 miles above its mouth. The whole river rises in the Huron territory, and entering the state of Illinois on its north boundary, crosses it in a south-west course of about 200 miles to the Mississippi. The principal tributaries of the Wabash in this state are the Embarras river, which joins the Wabash 10 miles below Vincennes, after a south and south-east course of about 150 miles; and the Little Wabash, which falls into the Wabash about 13 miles above its mouth. There is a range of broken hills near the river, and the western part of the state has an undulating surface; but with these exceptions, Illinois is one great plain, having a general slope to the south-west. It is estimated by Darby that every part of the state is within 15 miles of the river, with the exception of those parts which are subject to occasional inundation. 2. Dry prairie lands on the borders of the alluvial soil, and elevated above it from 30 to 100 feet. These lands sometimes almost reach the river, which issues from open prairie land, and are preferred as not being subject to inundation. 3. Wet prairies covered with coarse grass. 4. Timbered land, some of which is sterile, but the greater part very fertile. It is supposed that this state contains more good arable land than any other in the Union. The American Bottom, a tract on the Mississippi extending above the mouth of the Kaskasika for 96 miles, is noted for its fertility. Its soil, which is the richest river alluvium, continues unchanged for 26 feet below the surface, as is shown by portions of it have produced Indian corn without intermission and without manure for near a century. The minerals are iron, copper, and lead in the north-western angle of the state. The knowledge of the iron is supposed to be the richest in the world. The mining district is 300 miles in extent, and passes to the north of the state. Coal is found in every part of Illinois: salt springs are common, and limestone, granite, manganese, and marble are the usual rocks. The climate is very much the same as that of Missouri, except that it is more humid, and in general less healthy. It is remarked that there is a considerable difference in the temperature to several parts of the northern and southern part of the state. At New Harmony, which is in 38° 11', and opposite the southern part of the state, on the east bank of the Wabash, the thermometer has been observed to stand at 12° below zero in January. There is no doubt that the mean heat of Illinois would reach 53° Fahr.

Illinois is divided into 52 counties: its population in 1830 was 157,445, of which 747 were slaves, who were brought here while it was a territory; by the constitution no more slaves are allowed to enter than one in every ten years was 185 per cent. The agricultural products of the state are maize, wheat, hemp, flour, and tobacco. Swine are reared in great numbers from the abundant forestash from the state, except those of salt and lead of lead, 8,000,000 lbs. were produced in 1830. There is a single bank in the state, with a capital of 200,000 dollars.

Vandalia is the capital and seat of the state, and situated near the centre of the state, is the seat of government, but it is yet merely a village. There is no town in the state which contains 1000 inhabitants. Kaskaskia, near the mouth of the river of that name, and Cahokia on the Mississippi, are old French settlements. Belville and Galena on the Mississippi, and Shawnee town on the Ohio, are the most flourishing towns in the state, but the population of none of them exceeds 600.

Illinois college is the only public seminary. The Methodists, Baptists, and Presbyterians are the prevailing sects. The legislature consists of 26 senators and 55 representatives.

This state is within the limits of the cession which Virginia made to the United States in 1787; but the first settlements in it were by the Canadian French before 1763. It was governed, with Indiana, as a territory of the United States, from 1790 to 1809. In 1818 Illinois was admitted into the Union, in which year its constitution was formed.

ILLUMINATING [MANUSCRIPTS]. ILLIRYIA, THE KINGDOM OF. The name of Ilyria had disappeared for many centuries from the number of European countries, when Napoleon, after the conclusion of peace at Vienna, in 1809, created the Kingdom of Italy ceded by Austria, including Dalmatia, the name of the Ilyrian Provinces. Those countries being recovered by Austria in 1813 and 1814, several of them were formed into the kingdom of Ilyria, the extent of which was reduced in
1822 by the separation of the circle of Carlsbad and of the
Harrach, which were annexed to Hungary. The kingdom of Illriya, as now constituted, lies between 45° 43' and 46° 25' N. lat., and 11° 14' and 16° E. long., and is bounded on the north by Austria and Styria, on the north-east by Styria, on the south-east by Cruda, to the south by the Adriatic, and to the west by Italy and Tyrol.

The area of the kingdom, according to the latest authorities, is 10,801 square miles. The population was stated to be, in 1834, 1,154,685, and on the 1st of January, 1837, 1,262,905.

Divisions.—The kingdom of Illriya is divided into two governments, Laybach and Trieste, which are entirely independent of each other.

1. The Circle of Laybach (otherwise Upper Carniola) has an area of 1302 square miles, and about 166,000 inhabitants. The chief town is Laybach, the capital of the circle and the government, situated in an extensive valley at the mouth of the navigable river Gurk, which divides the city into two parts, connected by five bridges. Laybach with its eight suburbs has 11,275 inhabitants. It is a bishop's see, and has a fine cathedral, twelve other churches, a lyceum, a gymnasia, and many other excellent public institutions. The castle is situated on a commanding eminence. At a short distance to the north of the town there is a stone bridge of 11 arches, 540 paces in length, over the Save. Laybach is celebrated for its manufacture of Vitze parallic, which is sold in the principal cities of the empire.

2. The Circle of Neudal (otherwise Lower Carniola) has an area of 1239 square miles and about 187,500 inhabitants. The chief town is Neustadt, the capital of the circle, beautifully situated on the river Gurk; a very pretty regularly built town, with three churches, a gymnasia, a Franciscan convent, and 1860 inhabitants. Its distinguishing features are the castle of the Counts Kastelk, famous for the manufacture of sythes, sickles, &c.; none of these towns have so many as 2000 inhabitants.

3. The Circle of Adelberg (otherwise Inner Carniola) has an area of 1138 square miles, and 87,300 inhabitants. Adelberg, the capital, a well built town, with 1356 inhabitants, is noted for the richest grotto in its vicinity. The circle is drained by the Adriatic. The chief town, famous for its quicksilver mines, which were accidentally discovered by a peasant in the year 1497. It is situated partly at the bottom of a narrow valley surrounded by wooded mountains, and partly on several low hills, of which that called Mount Calvary is distinguished by its height and picturesque form. The town consists of about 400 houses, with 4139 inhabitants, who subsist partly by lace-making and straw-plaiting, but the greater part are employed in the mines and works. The entrance to the mine is nearly in the middle of the town, by a large iron gate, which opens to a horizontal passage hewn in the solid rock leading to a flight of 757 steps cut in the limestone rock, which are kept in perfect order, and provided with a handrail. At the foot of this staircase there is a small aile serving as a chapel, where the miners perform their devotions before they proceed into the mine, and where a couple of tapers burning on the altar alone cheer the eternal gloom that reigns in these subterraneen caverns. The visitor proceeding from this chapel soon reaches various adits running in various directions, and would be bewildered in this labyrinth without a guide. This mine is one of the greatest curiosities in the Austrian empire, and unequalled for the order, beauty, and safety which are remarked in every part. The noxious exhalations of the quicksilver, which scorch the eyes and stifle the breath, and frequently 90° in September, soon make the visitor anxious to return to the light of day, to which he ascends by a perpendicular shaft in a kind of box or case, which lands him on the surface of the earth, but a few minutes after the great depth at which he entered. The greatest depth of the mine is 750 feet. The produce of these mines has very materially diminished; it is stated to have formerly amounted to 16,000 cwt. of quicksilver annually; in 1822 it was said to be 5000 cwt.; and Cannabich, a highly esteemed author, in his "Geography," published in 1836, says it is now only 1800 cwt. Besides the quicksilver works, there is a manufactury of cinnabar, which produces 1800 cwt. annually. In the vicinity there are marble, jasper, and freestone. All the establishments for smelting, refining, &c. are admirably arranged, and there are various benevolent institutions for the poor miners, whose health is most dreadfully impaired by the deleterious atmosphere in which they are compelled to ply their sickly trade.

4. The Circle of Clagenfurt (otherwise Lower Carinthia) has an area of 1751 square miles, 197,795 inhabitants, 23 towns, and 1685 villages. The chief town is Clagenfurt, formerly the capital of Carinthia, now of the circle, containing with the four suburbs 9300 inh. [CA-
RINTHIA, now with the two circles and the former duchy of Carinthia united as one large kingdom, has about 433,250 people, of whom no other larger town has a population of more than 5000; the next largest is Wiener:, none in fact that have so many as 2000 inh. The village of Pferlach on the Drave, which with some neighbouring hamlets has 2840 inh., is famous for its manufactures of fire-arms. 5. The Circle of Villach (otherwise Upper Carniola) has an area of 1626 square miles, 13 towns, and 1147 villages. The chief town, Villach, is situated on the banks of the Drave, which is here navigable, in a deep valley, and in a beautiful country, which has been called the Inner Austrian Switzerland. The town, which was formerly much larger than it now is (perhaps the Julian Carnicum, Colonis Julia, or Forum Vibi of the Romans), has 2400 inh. The town of Villach was formerly a staple place for the commerce between Italy and Germany, and the traffic is still considerable.

II. The Government of Trieste, comprising the city and territory of Trieste and two circles, has an area of 4036 square miles, 199,500 inhabitants (of whom 18,083 are Venetians, 52,000 Italians, 15,000 Germans, 2300 Jews, 2300 Greeks, and 40 Armenians. 1. The Territory of Trieste has an area of 40 square miles, and, including the city of Trieste, with its four suburbs, has 18,125 inhabitants. 2. The circle of Istria has an area of 2178 square miles, and 192,544 inh. The chief town of the circle, Mitterburg or Pisan, has 7500 inh., and is situated on a headland, 187,500 inh. The island of Capo Istra, a seaport on an island in the Adriatic, connected with the continent by a bridge, 5000 inh.; Rovigno, 9500 inh.; Pula, celebrated for its fine Roman antiquities; Pirano, 3000 inh.; Dinga, 2600 inh. To this circle belong the following islands in the Gulf of Quarnero, viz., 1. Cherso and Osero, united by a bridge, having an area of 78 square miles, and 14,000 inh.; chief town, Cherso, 3000 inh.; Lussin piccolo, 2000 inh., the largest harbour in the circle; Crecchio, 1000 inh.; Libron, 9000 inh.; Capo Gorizia, 9700 inh. [GORZ or GORIZIJA]; Aqueija, 1400 inh.; Guardo, 2200 inh.; and Monfalone, 1200 inh., where a new harbour called Porto Rossi was opened in 1825.

III. The Circles of the Country. 1. Croatia—This is the whole a mountainous country, but the coasts are partly low and sandy, and partly marshy, especially towards the west. On the west the bay of Trieste, and on the east that of Quar- nee, run deep into the land, and form the great peninsula of Istra, the extreme point of which is Cape Promontore. In the circles of Villach and Clagenfurt the soil is good, and the valleys are in general fertile: these two circles could supply the whole country with sufficient corn for its population, if the extensive masses of rocks did not cover so much of the surface, and the elevation above the sea did not produce a temperature unfavourable to vegetation. The circles of Neustadt, Adelberg, and Laybach, containing the whole a mountainous country, but the coasts are partly low and sandy, and partly marshy, especially towards the west. On the west the bay of Trieste, and on the east that of Quar- nee, run deep into the land, and form the great peninsula of Istra, the extreme point of which is Cape Promontore. In the circles of Villach and Clagenfurt the soil is good, and the valleys are in general fertile: these two circles could supply the whole country with sufficient corn for its population, if the extensive masses of rocks did not cover so much of the surface, and the elevation above the sea did not produce a temperature unfavourable to vegetation. The circles of Neustadt, Adelberg, and Laybach, containing the whole a mountainous country, but the coasts are partly low and sandy, and partly marshy, especially towards the west. On the west the bay of Trieste, and on the east that of Quar-
quently visited of these caverns are the Adelsberg grotto and the Magdalæn cavern, both near Adelsberg. The first is distinguished by its extent and the extraordinary number and beauty of its stalactites. The Magdalæn cavern is remarkable on account of a small lake in it, in which the *Proteus anguinus* is found. Illyria has only two principal rivers: the Del and the Euyrös. The Del was one of the sources of the Vindobona and Clagenfurt; and the Save becomes navigable by Laybach. On the coast are the Lonzo and the Quieto; there are besides, in the government of Laybach, many smaller rivers, of which several are navigable and others become dry during the summer. There are no canals for navigation; the only canal, that of Wörth, in the circle of Clagenfurt, serves only to float timber from the shores of the lakes in the circle of Clagenfurt, 11 or 12 miles long, but narrow; the Oschach lake, 7 miles long; and the Mühltaliker lake, 8 miles long and from 2 to 3½ miles wide; this is the deepest and most beautiful lake in Carnithia, and the surrounding scenery is of singular exuberance.

The most remarkable lake in Carniola is that of Zirknitz, in the circle of Adelsberg, about three miles long, and from one and a half to two and a half wide, of which many wonderful stories are told, all originating in the fact that it is sometimes quite full to the brim, and at others dried up, and this without any regularity or regard to the season of the year; sometimes it does not dry up for years together. It is said that the lake is thirty-two inches, or forty minutes, broader than Carniola, but there are none that enjoy any remarkable celebrity. The climate of course varies in different parts. The lofty mountains covered with snow, which either encircle or form a part of the circle of Ljubljana, cause the air to be rather sharp and raw in the circles of Vlach and Clagenfurt: the vine does not thrive there. Though there are some persons afflicted with gout, the climate is most favorable to health, and the air is very salutary, as in the circles of Laybach, Adelsberg, and Neustadl, the vine, chestnut, and maize flourish. The government of Trieste has a hot climate: the vegetation is luxuriant, and the choicest fruits would succeed if the soil were good; for in the plain of Grado the immense ridge of sand being washed away, as well as the olive and the orange in the territory of Trieste: it is to be regretted that there is a deficiency of water. In the western parts of the circle the air is extremely unhealthy by the exhalations from the lagoons.

With respect to its natural productions, Illyria is inferior to many other parts of the empire. It however abounds in mineral waters, as at most mineral springs, it has copper of the finest quality; excellent iron, lead, silver (but in small quantities), cinnabar, alum, coal, and, besides a great variety of marbles, rock-crystal, porphyry, Jasper, garnets, &c.

The vegetable products contain many rare Alpine plants, medicinal herbs, and roots; also wheat, rye, barley, oats, maize, buck-wheat, potatoes, pulse, some flax, hemp, and hops, garden vegetables, and fruits. The forests have been much thinned for the use of the iron-works, but there is still an abundance of pine, oak, and other timber. In the animal kingdom there is nothing remarkable. The horned cattle and the horses are in general small, but the breed has been much improved of late years. The largest flocks of sheep are in the islands, especially Véglia, which has likewise many horses. Swine and poultry abound everywhere. Of wild animals, there are stags in the forests, deer, wild boars (in Carniola), the bear, the boar, the fox, the hare, &c. Bears and wolves are rare. The game consists of pheasants, bustards, partridges, snipes, and waterfowl. Singing-birds and birds of prey are numerous. The birds in fish and on land are very important, especially the tunny, mackerel, and anchovy fisheries.

Manufactures and Trade.—Though Illyria is not a manufacturing country, it has some branches of linen manufacture, which are pretty equally dispersed over the whole kingdom. The most important manufactures are those of various articles in iron and steel. There are considerable manufactures in Trieste, but they have little influence on the rest of the kingdom. Fine roads traverse the kingdom in all directions for the convenience of commerce, which chiefly consists in the transit trade between Vienna and Trieste.

History.—Ancient Illyria comprehended all the provinces on the east coast of the Adriatic, with the adjacent islands as far as Epirus, and was inhabited by a people called by the general name of the Illyrian nations. Illyria also extended into the interior as far as the Ister (Danube) and the Alps which lie between Italy and Germany. The Macedonian nations formed the eastern boundary. Within the limits thus marked, the inhabitants were of the same race, though of different nationalities. Illyria offered considerable portion of the Austrian and part of the Turkish dominions, there were other nations, and particularly Gauls, mingled with the Illyrians. (Strabo, 312, &c.)

The numerous and various part the Illyrians took in all the events of the world was due to the natures advantages for prosecuting a piratical warfare. The Illyrians defeated Amyntas II. of Macedonia, n.c. 383, and his eldest son, Alexander II., was obliged to purchase peace with them and give his brother Philip, the hostage. When Philip, however, the throne he had obtained the Illyrians, n.c. 359, and for a time broke their power. That the Illyrians were formidable neighbours to the Macedonians appears from the fact of their long-continued wars and the external great defeat which Fiume Macedoniarum sustained from them. Piracy was the chief pursuit of the maritime Illyrians, which brought them into collision with the Romans, by whom they were subdued. On the division of the empire Illyria remained to the Western empire, but on its decline (476) fell to the Eastern empire. In the sixth century colonies of Slavonians from Russia and Poland settled in the country, and soon made themselves independent of the Illyrians and formed the kingdoms of Croatia and Dalmatia. The Venetians and Hungarians took some small portions (1090): in 1170 the kingdom of Rascia was created, out of which, 200 years later, Bosnia, Hercegovina, and Dalmatia, and in 1419, the state of Ragusa. Thus the name of Illyria disappeared from the map of Europe till it was revived by Napoleon in 1810, and continued by Austria after the recovery of the province in 1813 and 1814. It was in 1822, as we have had occasion to observe, that an attempt was made to suppress the faithful Hungarian subjects a new proof of his favour, and to afford them an opportunity of enjoying the advantages of foreign commerce, resolved to annex to Hungary the territorial possessions of Fiume Macedoniarum sustained.

IMAGINARY. [NEGATIVE AND IMPOSSIBLE QUANTITIES.]

IMAGINATION denotes in its widest sense that faculty of the mind by which it processes at will thoughts, ideas, and materials for every other mode of the mental activity. It is often employed in a narrow acceptance as synonymous with fancy, which properly is only a particular species of imagination considered with judgment. It is the domain of this faculty according to the definition of Dr. Reid, who confines it to a lively conception of the objects of sight, and makes the imagination to differ from conception only as a part from the whole. And similarly Mr. Dugald Stewart teaches that 'the faculties of imagination are such as are derived from visible objects, since it is the sense of sight that furnishes the imagination with its ideas.' In its widest signification however imagination is coextensive with invention, furnishing the writer with whatever is most happy and appropriate in language, or vivid and forcible in thought. In the same manner it is the imagination that suggests to the scientific inquirer those bold and conspicuous conceptions which mark the difference between the secrets of nature and multiply its usefulness to man. Indeed, to adopt the language of Mr. Dugald Stewart, 'All the objects of human knowledge supply materials for her forming hand; diversifying industry, and perhaps the mode of her operation remains essentially uniform.'

It is in this illimitable activity that imagination differs from conception, which also is a reproductive faculty, but which apparently is more extensive, to bring forth novel, given and particular ideas; while the former, when once awakened by the presentation of a single thought, produces out of its storehouse of ideas all the manifold variations of similar and dissimilar. In this sense the imagination, indeed by the general laws of association, it is yet free to choose the principle of its combinations. Accordingly every age and every sex, every form of government and of religion, is said to have its special succession, and what is called a knowledge of men consists in nothing else than
a knowledge of the train in which their ideas respectively succeed to each other.

A disorderly imagination exhibits itself chiefly under three forms or characters: the fantastical, the fanatic, and the enthusiastic; and similarly the due succession of its representations may be triply distinguished into the natural, the logical, and the poetical.

Of the character of the imagination depends the happiness or misery of the individual. Acting upon human hopes and fears, it assumes the name of sensibility, and by the bright or sombre images with which it fills the distant prospect of life it affords a double relief to every enjoyment or gives a keener edge to sorrow and misfortune.

IMMOLATION. [HIMALAYA MOUNTAINS.]

IMMORALITY. [INSANITY.]

IMMROQ, an island of the Persian Sea near the southwest coast of the Lesser Antilles of Trinco, 18 miles southeast of the island of Samothrace, and about 22 miles northwest of Lemnos. It is now called Imbro, and also Lembro. It is of an oval form, and its circumference has been reckoned at about 50 Italian miles of 60 to a degree of latitude. (Dapper, Description des Isles de l'Archipel.) Its surface is hilly and well wooded, and it abounds in game. The valleys produce abundantly corn, wine, oil, and cotton. The island is watered by a stream called Ilissus, besides many springs. The population consists of about 4000 Greeks, who inhabit four villages, the principal of which has a castle, and is called Imbro. This island was in remote times the seat of the worship of the Cabiric, like the neighbouring islands of Samothrace and Thasos. (Cousinney, Voyages en Macédoine.) It was taken by the Persians about 508 B.C., under Otanes, general of Darius Hystaspes. It was afterwards possessed in succession by the Macedonians, by Attalus, king of Pergamum, and lastly, by the Romans.


IMPERIAL. [GEORGIA.]

IMMIGRATION. [PUGILISM.]

IMMATERIALISM. [BERKELEY; MATERIALISM.]

IMMOLATION. [MATERIALISM.]

IMOLA, a town and bishop's see of the Papal State, in the delegation or province of Ravenna, is built in a fine plain on the banks of the river Santero, over which there is a handsome bridge. One of the chief monuments of the place is the basilica of Isola, near the site of the ancient Roman colony of Forum Cornelian, but the present town was built by the Longobards. The town with its suburbs contains 10,500 inhabitants (Calindri, Statistiche). It has a fine cathedral and several other churches, a theatre, a handsome hospital, a college with a library of 4000 volumes, and a considerable manufacture of cream of tartar. The country around produces good wines. It is a high road from Bologna to Rimini, at the point where another road branches off to Ravena. Barnaba Chiaromonti was bishop of Imola before his excommunication of the papal chair under the name of Pius VII.

IMPACT (in pango), the shock of two bodies, one or both of which are in motion: impact and collision are the technical terms used in mechanics for the meeting of bodies which are in motion.

It is usual to treat the first principles of this subject by suppositions for the sake of being spherical; and for the following reason. When a body receives a blow, if it be free to turn as well as to move forward, a rotatory motion is generally speaking, produced, as well as a motion of translation. But if the direction of the blow passes through the centre of gravity, no rotatory motion is produced. Now if two equal spheres move upon a plane, it is obvious that when either strikes the other the direction of the blow passes through the centre of gravity. Making use then of equal spherical balls, of the same or different weights, moving upon a level plane, let it be remembered that all conclusions apply equally to bodies of any form, having no rotatory motion, and striking each other in such a way that the line joining their centroids of gravity passes through the point of contact at the moment when they strike.

The simple mathematical theory of impact proceeds, like other mechanical theories, upon suppositions which can only be approximately obtained in practice. For instance, if in the preceding supposition the level plane and the balls exercise any friction on each other, the consequence will be that the balls will begin to roll on the table, even though the blows which set them in motion pass through their centres. To the existence of this friction are due many phenomena which a game at billiards will present, and which will not result from the common theory. Let the table, then, be supposed to exert no friction on the balls, so that one of the latter, struck by a blow the direction of which passes through the centre, will move along the table without rolling.

Let us now suppose the ball A to be impelled directly towards an immovable obstacle, such as an upright ledge at the end of the table. On striking this ledge, the ball will, generally speaking, recoil more or less. Some substances will hardly give any recoil, while others will send the ball back with nearly the same velocity as that of its approach. This spring or elasticity is more easily measured than explained; it arises in the following manner. At the moment of impact, the ball compresses the part of the obstacle against which it strikes, which pressure continues until the reaction of the obstacle has destroyed all the velocity of the ball. At the same time the parts of the ball close to the obstacle become impacted with it, in the same manner. If then there were no effort in the parts of the obstacle nor in those of the ball to recover their former position, the ball would remain at rest, close to the obstacle. If the recoil were complete, that is, if the parts of both bodies were restored to their initial positions by an equal force equal to that which disturbed them, the recoil would rapidly but gradually [impulsa] create in the ball a velocity equal to that with which it approached. These two cases are the theoretical extremes which are supposed in a material body attaining: in the first case they are said to be wholly inelastic, and in the second the elasticity is said to be perfect. But if only a fraction of the velocity of approach is gave, then e is said to be the measure of the elasticity of the bodies.

Now suppose the ball A (which is so small that its size may be neglected) to approach obliquely towards the obstacle XY, say in the direction CD. Let CD be the velocity or length moved over in one second. Then [composition; velocity] the velocity CD is equivalent to the two velocities KB and KD.

 cities CK and KD. The first is destroyed, and then partially restored by the impact; the second remains unaltered, except by the friction at the moment of impact, which we do not consider. If then we take DL equal to KD, and draw LM perpendicular to XY, and in length such a fraction of KC as e is of 1, the ball will move after impact with the velocities DL and LM, that is, with the velocity DM in the direction DM. If the system were perfectly inelastic, the ball would proceed along DL; if perfectly elastic, CL would be equal to CK, and DM and CD equally inclined to XY. If the size of the ball be taken into account, XY must be supposed to be a line parallel to the obstacle, and distant from it by the radius of the ball.

The principles upon which are determined the velocities after impact of different balls which strike one another are as follow:

1. If two perfectly inelastic balls move towards each other in opposite directions, and with velocities inversely proportional to their weights or masses, they will destroy each other's velocities and remain at rest. Thus if A were twice as heavy as B, but if B moved twice as fast as A, there would be no motion after impact [momentum; motion, laws of]. Let a be the velocity of A, and b of B; then A and B being expressed in the same units of weight, and a and b being the same units of time, the preceding condition is fulfilled when as = b.

2. If the same velocities be added to or taken from both balls, so that their rate of approach is not altered, the forces
exerted in the shock will not be altered, and the rate of 
recess after the shock will not be altered. Thus a cannon 
ball rebounding from a wall, both having the motion of 
the earth, strikes with the same force and rebounds in 
the same manner as it would do if the motion of the earth 
were taken from both, or if the earth were at rest.

Now let two balls, A and B, move in the same direction 
with the velocities a and b, A being the hindmost, and 
b the greater velocity. Give to both the velocity x in the 
contrary direction, x being greater than b, but less than 
a, so that the actual velocities become a - x and b - x in 
contrary directions. Let x be so taken that A (a - x) = B (x - b), 
so that after the impact there would be no motion if A and 
B were quite inelastic. Hence x is Aa + Bb divided by 
A + B. Let e be the measure of the elasticity, so that 
balls rebound with the velocity e (a - x) and e (x - b). Let the first-mentioned 
direction be called positive, and its contrary negative. Then 

\[ e(a - x) \text{ is in the negative direction, and } e(x - b) \text{ in the positive direction.} \]

Restore to both the velocity x in the positive direction, which was taken from both, and which did not affect the impact, and the velocities after impact are

Velocity of A after impact: \( x + e(a - x) \) in the positive direction, or \( e(a - x) - x \) in the negative direction, according x is greater or less than \( e(a - x) \). That is, the velocity of A after impact is \( x - (a - x) \), which is in the positive or negative direction, according as \( x - e(a - x) \) is positive or negative.

Velocity of B after impact: \( x + e(x - b) \) in the positive direction.

Substitute for x the value already found, or \( (Aa + Bb)/(A + B) \), and we have, after the impact,

\[
\text{Velocity of A} = \frac{Aa + Bb - e(b - a)}{A + B} = u.
\]
\[
\text{Velocity of B} = \frac{Aa + Bb + e(a - b)}{A + B} = v.
\]

Velocity lost by A = \( (1 + e)(a - b) \) \( \Rightarrow A + B = a \).

Velocity gained by B = \( (1 + e)(b - a) \) \( \Rightarrow A + B = b \).

Momentum lost by A \( = (1 + e)(a - b) \) \( \Rightarrow A + B \).

Momentum gained by B \( = (1 + e)(b - a) \) \( \Rightarrow A + B \).

\[ u + v = e(a - b) \] \[ \Rightarrow A + B \]

\[ Aa + Bb = (a - b) - (1 - e)(a - b) \] \[ \Rightarrow A + B \]

\[ = Aa + Bb - \frac{1}{1 + e} \left[ Aa + Bb \right] \] \[ \Rightarrow \text{VIV VIS VIVA} \]

The preceding formulae will remain true when the bodies are moving in contrary directions, if the direction of A's motion being called positive, the velocity of B, or b, be made negative. The signs of the formulae will show in which direction the motion after impact takes place.

The following conclusions will now be readily deduced by any one who understands the preceding results.

1. If two inelastic balls move in the same direction, they do not separate after the impact, but either move on with a common velocity, or are reduced to rest. If both move in the same direction, the velocity after impact \( (Aa + Bb)/(A + B) \), but if they move in different directions, the motion after impact is in the direction of that ball of which the momentum \( (Aa + Bb) \) is the greatest, and the velocity is \( (Aa - Bb)/(A + B) \) or \( (Bb - Aa)/(A + B) \). When the momenta are equal, there is no motion after the impact. If \( b = 0 \), or if one of the balls be at rest before impact, the velocity after impact is \( Aa/(A + B) \). To deduce these results, make \( e = 0 \) in the formulae, and give the velocities their proper signs.

2. If two perfectly elastic balls move in the same direction they separate after the impact, the velocity of the foremost being augmented from \( b \) to \( b + 2(a - b)/(A + B) \). But the velocity of the hindmost is diminished, altered, destroyed, or made to change its direction, the algebraical formula for the velocity after impact being \( a - 2(a - b)/(A + B) \). This is nothing when \( B \) exceeds \( A \), and when \( b \) is to \( a \) as \( B - A \) is to \( 2B \). And according as \( b \) is to \( a \) is a less or greater ratio than the preceding ratio, \( A ' \) s velocity is or is not altered in direction.

3. If two perfectly elastic balls move in opposite directions, that of \( A \) being called positive, the velocities of \( A \) and \( B \) after impact are determined in magnitude and direction by the formula

\[ a - (a + b)/(A + B) \]

\[ b + (a + b)/(A + B) \]

4. If two perfectly elastic balls be equal in magnitude, the velocity of each after the impact is that which the other had before the impact, both in magnitude and direction.

5. In all cases perfectly elastic balls recede from each other after impact with the same velocity with which they approached before impact; since if \( e = 1 \), \( \nu = a - b \). But in every other case the rate of recession after impact is the same proportion of the rate of approach before impact which \( e \) is of 1.

6. The vivus of a couple of perfectly elastic balls is the same before and after impact; in every other case it is less after impact than before.

Now suppose two balls A and B to move in directions oblique to one another, and to strike each other. Decompose the velocity of each ball into two, one in the line joining the centres at the moment of impact, and the other perpendicular to it. The pair of velocities perpendicular to the central line will not be altered by the impact; and as far as the remaining velocities are concerned, the case is precisely the one already treated. For these velocities in the central line as altered by the impact, compound them with the perpendicular velocities which remain unaltered, and the resulting velocities and directions will be those with which the balls will proceed after the impact.

To take the most simple case, suppose the ball A, moving in the direction EC, and with the velocity EC, to strike the ball B, which is at rest. Join D and C, the centres of the balls, and decompose EC into the centre joining the centres, and EF perpendicular to it. Then A will only strike the ball B with the velocity FC. Suppose that by the preceding rules it is found that A, striking B at rest with the velocity FC, will be thrown back with the velocity CG, while B is struck towards with the velocity DK. Then B will receive this velocity, and this one only: as to A, it has after the impact acquired the velocity CG, which it combines with the velocity GL equal and parallel to EF; so that CL represents the velocity and the direction of the motion of A after the impact.

In every case of impact, when the balls approach one another with uniform velocities, the centre of gravity of the balls moves uniformly, and in a straight line. After the impact, though the directions and velocities of the balls may have changed, yet their centre of gravity still continues to describe the same line, and with the same velocity as before. This proposition is proved in all works on elementary mechanics.

IMPATIENS, a genus of plants so called from the sudden and elastic force with which they burst their capsules; hence 'Noli me tangere' is the name of one of the species, which might have the same signification. Another is well known as a highly ornamental annual by the name of Balsam. Whence the natural family to which it belongs has been called Balsaminae. The genus is especially an East Indian one, though single

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species extend into Europe, Siberia, and North America. linen was only acquainted with seven or eight species, but Dr. Wight, in the 'Madras Journal,' vol. ii., states that not less than one hundred species are now known, and almost all that can be grown from the collection of the peninsula of India, and the Himalayas; in those from Silhet as far north as the Sutlej, and in 30° of N. latitude, at as great elevations as 7000 feet. They are absent from the plains of India; some are found on the Malabar coast, little elevated above the sea; others are said to be found in the sea. It is ascertained that they are only found in the Himalayas during the rains, and hence inferred that the moisture and moderate tempera-
ture, as well as the equability of both during the rainy season, is as favorable to their growth as the heat and moisture of the peninsula; but Dr. Wight has since ascer-
tained that the species are chiefly found at elevations of 4000 and 4500 feet, in a season where there is moisture combined with a moderate but equal temperature. These facts are important as showing the influence of climate on vegetation; and useful as affording hints and principles for the cultivation of these plants at a lower temperature than is necessary for the plants of the plains from the same latitudes; though great success has been attained in the cultivation of balsams in this country.

IMPENETRBILITIES, a name given to the property of matter, the existence of which is suggested when we see that the most solid bodies in the system may be crossed by another without being resisted by the latter, or its success preceded by the removal of the latter. It is then but another name for the cause of that resistance, which we know by the term of touch, and which is necessary to every idea which we form of matter.

The impenetrability of matter can only be taken in con-
junction with the hypothesis of its porosity. Otherwise, it might be supposed that the body would be dissolved in water without increasing the bulk of the fluid; the (impen-
etrable?) matter is then penetrated; or else the matter of the fluid has interstices. But if any attempt be made to press it from a greater to a smaller space, the impenetrability of the water will appear by its resistance to the pressing sub-
stance.

Are we not then making a purely gratuitous introduction of words to supply explanations of phenomena? When matter resists, we have recourse to impenetrability, which is merely saying, so soon as we find resistance, that matter has a power of resisting. But when we ascertain that different portions of matter can be made to fill the same space, whether by solution, pressure, or otherwise, we then appeal to a porosity which we cannot make visible, and presume that matter has empty spaces in which other matter may be placed. This is very much like nature's borgot of a vacuum, and other explanations of the same kind.

The answer to this difficulty, and others of a similar kind which occur in attempting to define simple mechanical terms, must consist in giving them as definitions or doctrines, or simply as statements of observed phenomena, or at best as terms which imply that explanation is wanted, and serve, till further explanation, to enable us to recall the phenomena themselves and the universality of their existence. Subsequent study and ex-
periment must ascertain the character of this impenetra-
bility, that is to say, the laws of the resistance from which it derives its name. The term is useful to remind us that there is something which resists, which is called a solid; neither its etymology nor any common notions attached to it must be allowed to dictate any conclusion as to the nature, mode of action, or consequences of that something.

As to the action of matter upon matter shows us that the fundamental notion upon which the above-mentioned something received the name of impenetra-
bility is incorrect. That notion evidently was, that when a ball is rolled and one another rolling ball absolutely touches the stationary one before it causes motion. There are many circumstances from which it can be inferred, with the highest degree of probability, that such contact is only apparent, and not real. It must be concluded that when the two balls come within a certain small distance of one another, repulsive forces, of the cause and mode of action of which we know nothing, begin to be excited between those particles of the balls which are nearest to one another. It is not our intention to go further into the preceding subject than the mere men-
tion of what are called molecular attractions and repulsions, and this merely to point out that the action of matter upon matter must be admitted to commence before the instant at which their surfaces come into contact. [Inkarta.]

IMPERIAL CHAMBER, KAMMERGERICHTE, the highest judicial court of the German empire, was estab-
lished in 1495 by Maximilian I., in consequence of the earnest representations of the Diet, for the purpose of de-
fining the judicial uniformity of the empire, and for the benefit of the emperor, his subjects, and other members of the empire, administering impartial justice, and thus restoring internal tranquillity to Germany. The chamber consisted of a judge or president appointed by the emperor, and sixty-five other judges, including the nobles, and the other half doctors or licentiates of law, all chosen by the emperor out of the lists of candidates pre-
presented by the States. They were all irremovable, and for life, which was a novel feature of this court. They decided by majority of voices, the president having a casting vote. The Imperial Chamber held its sitting at Frankfurt-on-the-
Main, but it was afterwards removed successively to Worms, Nürnberg, Augsburg, Ratibon, and lastly to Wetzlar, where it continued till the dissolution of the empire in 1866. The authority of this court was at first very limited, in con-
sequence of the indefinite exercise of the Imperial prer-
rogative, and the establishment of the Aulic council, which was thus enabled to interfere in all the decisions. After this stretch of authority as an infringement of the rights of the Imperial Chamber. (Coxe's House of Austria.) Charles V. remodelled the Imperial Chamber, and framed new regulations for its proceedings, which have been greatly praised by competent judges. (Plüter, Historical De-
velopment of the Germanic Constitution.) He also es-
blished an annual visitation for the purpose of inspecting the proceedings of the chamber, making a report thereon, and granting special exceptions in particular cases a recon-
sideration of the parties concerned. The visiting commission con-
sisted of one commissary appointed by the emperor, and other commissaries or delegates appointed by several of the electors, ecclesiastical as well as secular, and by one of the Imperial cities. By the religious peace of 1555 it was agreed that the judge and assessors might be taken indiscriminately from among members of the old religion and of the confession of Augsburg, but it was not until the peace of Westphalia that the proportion of each was definitively settled. The number of assessors was then extended to fifty, of whom the Protestant states presented twenty-four, and the Roman Catholic states a like number. Inspect-
ing presentations being left to the emperor, the persons ap-
pointed were of course Catholics also, making the number of Catholics twenty-six in all. For the quicker despatch of business, the chamber was divided into sections called 

IMPETOGO is a term which has been employed by writers in many independent significations, and for various diseases. It is confined to a disease, which Dr. Wilton has defined to be a "eruption of yellow itching pustules, appearing in clusters and terminating in a yellow, thin, scaly crust." It is commonly known in this country as the lumpy-rum, or scab, and occurs on all parts of the body, though mostly frequent on the extremities. A variety of it is not infrequently met with in geese and those much engaged in handling sugar, and to this the term glucose has been applied; but it differs from the lumpy-rum, properly so called, in its non-contagiousness.
In a statement of the trade of England, said to have been found upon record in the Exchequer, and quoted in a tract called the ‘Circel of Commerce,’ published in 1628 by Edward Wescot, the list of our exports comprised only wool, coarse woollen cloths, and a small quantity of leather, amounting in value to 294,184l., including the export-duty; while the imports included fine woollen cloths, wax, wine, linen cloth, merchandise, and greenery, to the amount of 38,970l. The shilling at that time contained 213 grains of silver. Taking into account the different value of money then and at present, these values are equivalent to 726,600l. and 96,314l. respectively. The commerce of this country, however, is such as could not have existed in the commerce of an independent nation; but it is remarkable that this circumstance was only brought forward and commented upon as the proof of an extraordinary balance of trade in favour of the nation, a strange conclusion from such premises, but founded upon a view which we can hardly say is wholly exploded at the present day. It is however now pretty generally acknowledged that the commerce of a country is a successful one must include in the value of its imports the whole value of its exports, together with the gain which forms the sole inducement of the merchants by whom it is prosecuted.

Until a time comparatively recent our official trade accounts were not kept in such a manner as to allow of any certain deduction being made from them. The annual value of our imports and exports, drawn from statements deserving of full confidence, and extending back to the beginning of the present century, has already been given.

The following analysis of the most important part of the tables which that statement was drawn, namely, the export of British produce and manufactures, will show the course of our foreign and colonial trade during the period embraced by it, and may lead to reflections by no means favourable to the restrictive system adopted by our legislature.

A statement of the real or declared value of British and Irish produce and manufactures exported from the United Kingdom to different foreign countries and colonial possessions, in each of the years 1803 to 1811, and 1814 to 1836.

It will be seen that although the aggregate value of our exports has considerably increased during the last four years of the series, it is now but little greater than during the early part of the last century. The examination into the geographical divisions of the table, will be apparent that the portion of our trade which is carried on with the rich and neighbouring countries of Europe has actually and materially declined during that interval.

The spirit of jealousy and retaliation which, by our long-continued system of restrictions for the supposed advantage of a few producers, we have raised up in other countries, is continually showing itself in a more and more formidable form by the shutting up of one market after another, to an extent which would long ago have either compelled the reform of our commercial code, or have produced the ruin of our merchants, but for the extension of previously existing markets, and the opening of new ones in Asia and America.
The list of our imports from foreign countries and from British colonies and dependencies comprises almost every article of use and of luxury which cannot be profitably produced within the kingdom, including in this description most of those raw materials of manufacture which give employment to the larger part of our population, and thereby make up a great part of our exports. The actual value of the cotton, flax, silk, and wool imported in 1836, and a great part of which was afterwards exported in a manufactured state, is estimated at $10,000,000. This is mainly owing to the mechanical inventions which have given such extension to those branches of manufacture that England has hitherto maintained her commercial superiority and is now beginning to gain for the sustenance of her continually increasing population.

IMPOSSIBLE [NEGATIVE AND IMPOSSIBLE QuANtiTIES.]

IMPOSTO (Imposta, Italian), the horizontal mouldings serving as a sort of cap or cornice to the piers of arches, and on which the archivolt, or curved mouldings and fascia surrounding the arches themselves, rest. Like these latter the impost is made palmer or richer according to the order employed. It is generally rectangular, and in the Romanesque style it is usually succeeded by a row of rusticated stones sufficing for decoration, and giving the requisite architectural expression. Imposts are contrary to the genius of the Pointed style, but, except in the case above alluded to, are found in the Romanesque and Early English architecture. We have however a few recent instances in which impostes have been omitted, and the archivolt of the arch continued vertically down the edges of the piers. This was a fashion practised with Soane, both in his designs and many of his executed buildings; and it has also been adopted by Burton in the arches of the Ionic screen and opposite gateway, Hyde Park Corner, Piccadilly; but the effect is not happy, especially in a light and open structure, though it may be tolerated in buildings on a small scale, or which make no pretensions to correctness of style.

IMPRESSION (in Vegetable Physiology). Plants, like animals, are in their most perfect species furnished with organs, by the mutual action of which they are multiplied; the matter contained in the one fertilizing that which belongs to the other, and the result being a young plant or embryo, or vegetable fetus. In what way this circumstance was to be accounted for the great philosopher is not known. The earliest in the most superficial manner: modern observation has however thrown great light upon the subject, although the inquiry is still in want of much ulterior investigation.

IMPRISONMENT (of Suspects). In the Middle Ages, or, more correctly, in the eleventh century, there were forests, or woods, which contained a matter called pollen. The pollen is a congeries of excessively small hollow cases, having to the eye the appearance of fine dust. Each case contains a mucilaginous matter, in which is suspended a spore of the true seed. The pollen is often not more than 1/25 of an inch in diameter. The female organ, or pistil, is a hollow case, of considerable size compared with the pollen grains; it bears ovules, eggs, or young seeds in its interior, and is furnished at its apex with a lax, naked, secreting tissue, called the stigma.

At the proper time the anther discharges its pollen, which, by contrivances of various kinds, is made to fall upon the stigma still, or to which it sticks. In that situation each grain of pollen emits one or more fine transparent tubes, which plunge into the lax stigmatic issue and descend to the vicinity of the ovules, with which they eventually establish a connection, the female organ. The pollen-tube thus emitted the molecular and mucilaginous matter originally contained in the pollen is discharged, and passing along it eventually arrives in contact with the ovule. When these processes stand as they are present, they must be well made out. By some it is supposed that a portion of the molecular matter is introduced into the sac of the amnios, and there develops into an embryo. But it is by no means certain that this is the fact, although it is no doubt probable that some kind of action of the molecular matter upon the sac of the amnios and its contents produces the embryo. The whole subject is more in need of careful investigation now that Mr. Griffith has shown that in Lolium and Viciae the pollen-tube is often the last thing to be formed, and is therefore subsequent to impregnation. (Linn. Trans., vol. xviii., p. 77.)

IMPRESSION OF SEAMEN. [SEAMEN.]
lance of hereditary feuds, placed the conquered Britons under the protection of the state, and exposed and punished the frauds which might be committed in the transfer of merchandise and the cultivation of land." The first of the great military successes of Israël was achieved against the people of Kent, who, some years before his accession, had slain Mollo, the brother of Ceadwalla, but who, with their king Whirtred, were, in 692, forced to submit to Ina, and to pay him the full recompense, or legal compensation, for the murder of Mollo. Chroniclers state that the vessels were provided with silver, and Malmesbury, certainly by a great exaggeation, at 30,000 marks of gold. In 710 we find Ina engaged in war with the Britons of Cornwall, under their king Gerent of Cornwall; he was worsted, their forces were broken, and he was finally subdued, and even, it is said, compelled to resign his dominions. A subsequent contest with Cenwal, king of Mercia, was terminated, in 713, by the battle of Wodenbergh, where, however it is doubtful which side obtained the victory. The last years of Ina's reign were disturbed by the attempts of several pretenders to the throne—one of whom, called the Atheling Cynewulf or Cenulf, was slain in 721; and another of whom, called Kadryth, after being driven from the castle of Taunton, in which he had in the first instance fortified himself, was placed at their head by the people of Sussex, and was not finally put down till 725, after a year and a half of persecution. On the persuasion, it is said, of his wife Ethelberga, who was a daughter of King Oswin, the predecessor of Ceadwalla, resigned his crown in the Witenagemot, and retired to a monastery, where he appears to have lived for a few months in obscurity. But the next year, 726, he assumed the reins of power, reigned for a period of about two years, his own death being soon followed by that of his wife. There seems to be no truth in the story told in the History ascribed to Matthew of Westminster, that he founded an English school or college at Rome, and established for its support the tax called first Romesoc, and afterwards Peter's Pence. He was however a great benefactor of the church; and the abbey of Glastonbury in particular was indebted to him for ample endowments, and to his encourage- ment, for the support of the services and the development of its privileges. He is of course a great favourite of the monkish historians; but in this instance his panegyrics seem to have been deserved by the real merits of Ina, both as a monarch and a legislator.

Inachus, a genus of brachyurous crustaceans, placed by M. Milne Edwards under his tribe Macropodiotes. [Macropodiotes.]

Inachus. (Græping.)

Inca. [Perú.]

Incandescence. [Fræt.]

Incidence. Angle of, the angle made by a straight line passing through any point of a line or surface with the perpendicular to the tangent plane of that line or surface drawn through the point in question. The term is little used except in optics.

Incisors. [Jântiçon.]

Inclination (properly called the dip) of the magnetic needle is the angle which such needle, when supported on its centre of gravity, makes with the plane of the horizon. The instrument by which this inclination is exhibited is a slender cylindrical or prismatic bar of steel, from six to ten inches long, having, perpendicularly to its length, a short axis of bell-metal usually passing through its centre of gravity, which is the middle point of the bar. The latter, previously to being magnetised, would, if supported on or suspended by its centre of gravity, remain at rest in any position with respect to the horizon; but on receiving that quality by any of the ordinary processes it becomes a permanent magnet, and its position is then determined by the direction of its resultant. In general the horizontal axis is made to rest on the edge of two plates of agate, and a graduated circle of brass is fastened to them, so that the angle of gravity of the needle, serves to show the amount of the inclination. The plane of the circle is in a vertical position, and when the inclination is to be observed it must be made to coincide with the plane which passes through the line of direction of the said resultant. The angle made with the geographical meridian of the place by this vertical plane, which is that of the needle's motion, is called the declination of the needle; it is commonly the variation. [Declination; Variation.] It is probable that in the above, no one would agree to say that the plane in which the needle moves by the action of the magnetic power in the earth is exactly perpendicular to the horizon, though its deviation from such plane is as small as to be insensible in the most delicate observation.

The discovery of the inclination or dip was ascribed to Robert Norman, who observed that in London it amounted to nearly 72 degrees. This ingenious person, in order to ascertain whether or not the inclination was the same in other parts of the world, furnished needles properly mounted and of several convenient lengths for making voyages to the Indian Ocean, and from these he ascertained that about the equator the needles remained nearly parallel to the horizon; that on sailing northwards from thence their north ends became depressed, and on sailing southwards their south ends were correspondingly elevated, and that the sequence of this information Norman, in 1576 or 1581, published his work entitled 'New Attractive,' in which he announces the discovery; and without expressly saying that he considered the needle to be attracted to the earth, he mentions its tendency to some point within it. Erroneously supposing the inclination to be subject to an invariable law, he states that at the poles of the earth the needle will be perpendicular to the horizon; and he held out a prospect that the latitude of a ship at sea might, by means of this instrument, be easily found.

Dr. Gilbert, who in 1600 published his work 'De Magneto,' was the first to reason that the earth is itself a magnetic property; he supposed however that this property existed only in the terrestrial particles. Dr. Halley, in order to account for the changes observed in the direction of the needle, imagined that the earth was a magnetic sphere, and that it enclosed a magnetic fluid which revolved on its axis, and that this fluid was distinct from that of earth's diurnal revolution. He also endeavoured to explain those changes by assuming the existence of four magnetic poles, two in the Arctic and two in the Antarctic regions; the latter not diametrically opposite to the former. But it will readily be imagined that hypotheses, formed at a time when comparatively few observations had been made, could lead to no useful results; and the belief that the earth was the seat of a magnetic fluid, of the earth, it must be admitted that the prospects of being enabled to assign correctly the law of its phenomena is still very remote.

From the observations of La Caille, Le Peyrouse, and Humboldt, it seemed that the series of places on the surface of the earth where the magnetic needle rested in a position parallel to the horizon were situated on a great circle of the sphere inclined to the plane of the equator by an angle of about 12 degrees; it was supposed to cross the latter in two points diametrically opposite to each other, and one of these was placed in 113° 4' W. long. This was therefore the meridian towards which the needle was pointed, and it was thus found that the centre of gravity of the earth was, of course, considered as the magnetic poles; and it was concluded that there the magnetised needle would rest in a vertical position. Afterwards, comparing the results of observations in the meridian of Humboldt in Europe and South America, and assuming the magnetic equator to be a great circle of the sphere, M. Kraft of St. Petersburgh determined that the tangent of the needle's inclination was equal to twice the tangent of the magnetic latitude of the place of observation.

The experiments of M. Humboldt, which were published in 1805, first made known the fact that the intensity of the magnetic attraction in the earth is least at places where the dipping-needle is horizontal; they also showed that, with considerable irregularities, the intensity increases with the increase of the inclination. From comparisons of the observed intensities with the inclinations and the positions of the places of observation on the earth, M. Biot investigated the law of magnetic attraction in the latter; and his conclusion is, that this is the law of the inclination, but the law depends on the distance of the earth from his form, and the law respecting the inclination as had been immediately before announced by Kraft. And Dr. Young, in 1820, from a consideration of the experiments of Humboldt, was led to suppose that the intensity of the magnetic force would vary as $\sin^2 \phi$ (representing the inclination, or dip, of the needle). Unfortunately the observed irregularities of the inclination in different places are so great that no reliance can be placed on either of the above formulae. On the spot assigned to Biot for the magnetic pole, he has found the inclination to be little more than 89 degrees; and
this officer observes that no position can be proposed for the magnetic poles with which (if the magnetic equator and parallels are supposed to be circles of the sphere) stations whose magnetic latitudes are the same will not have differences of dip amounting to 10 or 15 degrees; and he considers that, on such an hypothesis, the inclination cannot be taken as an indication of magnetic latitude. In fact, it is now ascertained that the magnetic equator is a curve of double curvature, and crosses the geographical equator in three or four places.

The two voyages made by Captain Sabine, in 1822 and 1823, one towards the equator, and the other towards the north pole, have furnished the latest information we possess concerning the pole of terrestrial magnetism. At the island of St. Thomas, near the equator, the inclination of the needle was $0^\circ 4'$ towards the south; while the inclination was towards the north as the ship returned to Europe; at London it was found to be $70^\circ 3'$ north; and at Spitzbergen, the most northern station, it was $51^\circ 11'$ north. The intensities were determined at all the stations by observing the times in which ten vibrations of the dipping-needle were made; and, being reduced to the value of the intensity when the inclination is nothing, the results were found to differ so much from those indicated by the above formula, as to be decisive against the supposition that any relation subsists between the inclination of the needle and the intensity of terrestrial magnetism. It may be noted here that the result of Captain Sabine's experiments relating to the intensity is, that the latter increases in going from the magnetic equator towards the pole, according to the formula

$$I = \sin s \cos T,$$

($$T$$ being the distance, in degrees, of the given place from the magnetic pole; and $$s$$ the intensity at the magnetic pole appears to be twice as great as that at the equator.

Captain Sabine places the pole in lat. 60° N., long. 80° W., from the observations of Sir Frederic Perry it would appear to be situated in about lat. 70° N., long. 100° W.

When it is intended to observe the amount of the inclination, the dipping-needle, the latter having been constructed with a horizontal axis passing through its centre of gravity, it will be necessary first to bring the vertical circle into the plane of the magnetic meridian by means of a horizontal needle, which, having been placed for the purpose on a pivot provided for it, is immediately afterwards to be removed; the axis of the dipping-needle must then be placed on the agate plates, which by means of a screw are to be adjusted so that the axis may pass through the centre of gravity. The needle being so placed, the position which it assumes, that is, nearly in the direction of the magnetic attraction, it must be caused to vibrate on its axis, like a pendulum on its point of suspension, by bringing the former near either of its two extremities; after a few oscillations it will again rest near in the same place as before, and the value of the inclination may then be read on the graduated circle. This must be repeated several times. The face of the circle should then be reversed by turning the latter half round on the vertical axis, and the needle should be made to perform as many vibrations as before; after which a mean of all the inclinations thus observed must be taken. The poles of the needle are then to be reversed by the usual process, and a mean of the inclinations again found, after a repetition, with the reversed poles, of all the former operations. The true inclination will thus by this process be obtained.

Together with the method just described, it will be sometimes convenient for determining the inclination, to use an element which can be more readily estimated than the precise point at which the needle rests on the circle; and this is the time in which the needle makes any given number of vibrations. On such time the amount of the inclination may, in the following manner, be shown to depend.

Let NCS (fig. 1) be the direction of the needle in the plane of the magnetic meridian; take NC to represent the intensity of the magnetic force in that line, and resolve this force into the forces represented by Cs and $nN$, in a horizontal and vertical direction respectively. Then, representing the force in CS by $M$ and the angle $G$ of inclination by $d$; if the needle be made to traverse horizontally by a weight applied to some part of the arm CS, the intensity $Cs$ may be expressed by $M \cos d$. Again, if the needle be placed in a vertical plane perpendicular to the magnetic meridian, the horizontal intensities on the two arms being counteracted at C, the point of support, it follows that the needle will assume a vertical position, and that $M \sin d$, will represent the intensity in that direction. Now, if the force of gravity in producing the vibrations of pendulums, the intensity of the magnetic force is proportional to the square of the number of vibrations made by the needle in a given time; or, the time of making one, or any given number of oscillations, is inversely proportional to the square root of the force of attraction. Therefore, if we count the time (T) in which a given number of oscillations are performed by a dipping-needle moving freely in the plane of the magnetic meridian, and the time (t) in which that number of oscillations are performed by the needle is a plane perpendicular to the meridian, we shall have

$$T^2 : t = M : M \sin d; \text{ or } T^2 : t = 1 : \sin d.$$

Likewise, if we count the time (T) in which a given number of oscillations are made in the plane of the magnetic meridian, as before, and the time (\( t' \)) in which that number are made by a needle when traversing horizontally, we shall have

$$T^2 : t' = M : M \cos d; \text{ or } T^2 : t' = 1 : \cos d.$$

And by either of these methods the amount of the inclination $d$ may be obtained.

It is seldom that the horizontal axis will be found to pass precisely through the plane of gravity of the needle; and when this is not the case, the magnetic attraction of the earth becomes combined with that of gravity, so that the inclination due to the former is either increased or diminished by that which depends on the latter; and the observed inclination requires a correction in order to reduce it to what it would be if the centres of gravity and motion were coincident. For the purpose of obtaining the amount of this correction with precision, by rendering the effect of gravity very perceptible, Professor Mayer caused a wire to be placed in a brass ball at one end to be screwed into a needle, perpendicularly to the length of the latter, and immediately above or below the horizontal axis. Previously to being magnetised, the needle was made to balance itself accurately in a horizontal position when the wire and ball were below the point of support; and the place of the centre of gravity was, consequently, somewhere in the axis of the wire. Then, by observing the inclination both when the ball is above and when it is below the axis of the needle, the intensity of magnetism and the action of gravity may be eliminated; and a formula expressing the truth, in terms of the observed inclinations, may be obtained.

Let NS (fig. 2) be the needle in the plane of the magnetic meridian, and $C$ be the place of the horizontal axis. Let $N$ be the direction in which the magnetic attraction (1)}
on the needle, and let the same line represent that force; also, let NV be a vertical line: then \( ANV + d \) will be equal to the complement of the needle's true inclination; and, SN being produced, \( ANV + e \) is the complement of the observed dip or inclination. Resolve NA into NN and NB by drawing the latter perpendicularly to SN produced; then the effective force of the needle and the magnetic attraction in that direction. But \( AN = AN \) sin. nN\( A = M \) sin. (b - d); or (by trigonometry) = \( M \) (sin. b cos. d - sin. d cos. b) and this being multiplied by NC (= d) gives the energy of the magnetic power to turn the needle about C.

Let B be the brass ball at the end of the wire CB, and let G be the centre of gravity of the needle and ball. Then, taking G as the reference, we have the needle turning in the former parallel and the latter perpendicular to NS: the last produces no effect to turn the needle about C; and the former is equal to W sin. GNP cos. b, or to W cos. b. Then, if CG be represented by g, we have Wg cos. b for the effect of the weight of the needle to turn the latter about C. This force, in the above position of the ball, acting in an opposite direction with respect to the magnetic power at N, must be subtracted from the latter, in order to give the combined effect of both gravity and magnetism on the needle; and, in the case of equilibria, we have

\[
M (\sin. b \cos. d - \sin. d \cos. b) - Wg \cos. b = 0,
\]

or, dividing by M I cos. b, and putting C for \( \frac{Wg}{M} \), we get

\[
\tan. b \cos. d - sin. d - C = 0 \quad \text{whence} \quad \tan. b = \frac{\sin. d + C}{\cos. d}.
\]

By reversing the needle on its fulcrum C, so that G may stand above C, we should have, in like manner,

\[
\tan. b' = \frac{\sin. d - C}{\cos. d},
\]

and combining together these two equations we obtain finally,

\[
\tan. d = \tan. (b + b') = \tan. \left( \tan. \sin. \theta \right) \quad \text{where} \quad b' = \frac{\sin. d - C}{\cos. d}, \quad b = \frac{\sin. d + C}{\cos. d}.
\]

INCULMINATION. The inclination of two lines is a phrase commonly used for the line which they make with one another. Thus two lines which make a very small angle are said to be at a very small inclination to each other. Looking at the etymology of the word, and its use in common language, it would seem proper to say that one line is without inclination to another when the two are perpendicular to each other, or that the angle of inclination is zero. But custom has settled otherwise, and has, indeed, made the word inclination synonymous with angle; while the term angle of incidence holds the place which, according to the etymology, belongs to angle of inclination.

INCLINED PLANE. Among the mechanical powers, as they are termed, meaning the contrivances by which pressure is advantageously applied, the inclined plane has held a place in practice in every country in which the arts have made any progress. But the introduction of this contrivance into the theory of mechanics dates from the time of STEVENS, to whose life we refer for an account of the very remarkable addition which he made to the first principles of statics by means of the inclined plane.

If a weight be placed upon a horizontal plane on which there is no friction, it is obvious that the weight will be entirely supported, and that any horizontal pressure, however small, will cause motion; if the same plane be made vertical instead of horizontal, the weight cannot be placed upon it, for if the heavy body were made to touch the plane and then left to itself, it would fall down the plane exactly in the same manner as if there were no plane; that is, supposing there to be no friction.

If the plane be made to assume an oblique or inclined position, the effect produced will be intermediate between those of the preceding cases. If the weight will not rest, nor will it acquire velocity as rapidly as when it falls freely. The reaction of the plane will counterbalance a portion of the weight, as follows:—Let AB represent a section of the plane, and A a section of the weight. Let GV represent the magnitude and direction of the weight, and draw GW and WV perpendicular and parallel to AB. Then compose the pressure GV is equivalent to the two pressures GW and WV, of which the former is destroyed by the resistance of the plane, and the latter only acts to propel the heavy body down the plane. Now WV is equal to GF as BC is to AB; that is, a weight placed upon an inclined plane is propelled down the plane by such a fraction of the whole of the pressure of the weight as the height of any section of the plane is of its length.

If then it were required to draw the heavy body G up the plane, any pressure exceeding WW would be sufficient for the purpose; and a pressure equal to WV, applied in the direction AB, would keep the weight WW rest.

If a body which is placed at B on an inclined plane be allowed to fall to G, the velocity which it will then have, and the time of describing GB, are determined as follows:—Let BK be vertical, GM horizontal, and GK perpendicular to BG. Then the velocity at G is that which would be acquired by a body falling freely from B to M; and the time of describing GB would be that in which a body falls freely from B to K. From hence follows immediately the remarkable proposition that if any number of chords be drawn from the highest point of a vertical circle, and if these chords be the sections of as many inclined planes, the times of falling down any two of these chords are the same.

The preceding results are obtained by applying the method explained in the article FALL OF BODIES. Using the notation in that article, and supposing \( \theta \) to be the angle by which the plane is inclined to the horizon, the accelerating force which urges the weight downwards is \( g \sin. \theta \).

Consequently we have the following equations:

\[
v = g \sin. \theta, \quad s = \frac{1}{2} g \sin. \theta t^2, \quad \text{and} \quad \frac{1}{2} g \sin. \theta t = 2 g \sin. \theta, \quad \text{where} \quad t = 2 g \sin. \theta.
\]

Here is the length BG: and a sin. \( \theta \) is the distance BM.

The preceding results suppose friction not to exist: now let there be a friction, the proportion of which to the pressure is the fraction \( \frac{1}{\kappa} \). Then W representing the weight, the propelling pressure \( \frac{1}{\kappa} W \). But the pressure upon the plane, or GW, is \( \frac{1}{\kappa} W \); consequently \( \frac{1}{\kappa} G \) is the amount of pressure down the plane which friction will resist. If then \( \frac{1}{\kappa} \) \( \cos. \theta \) be greater than \( \frac{1}{\kappa} \), the weight will not move; if \( \frac{1}{\kappa} \) be equal to \( \cos. \theta \), the weight will be just poised; if \( \frac{1}{\kappa} \) be less than \( \cos. \theta \), the weight will move downwards with an accelerating force \( g \left( \sin. \theta - \kappa \cos. \theta \right) \).

There are many remarkable properties connected with the motion or equilibrium of bodies on inclined planes; but the preceding are those which are most fundamental and most frequently required.

INCOMMEMSURABLE, INCOMMEMSURABLES. The application of arithmetic to any science of concrete magnitude supposes a certain magnitude to be taken as unity, and all other magnitudes to be expressed by the number of times or parts of times which they contain this unit. Such an application therefore requires the assumption of this proposition, that all magnitudes are either fractions or multiples, or compounded of fractions and multiples, of any magnitude that may be named. This proposition is true; for instance, we shall presently prove that if the side of a square be called 1, no number or fraction whatsoever will exactly represent the diagonal. But we shall also prove that it may be made as nearly true as you please: for instance, that we may find a line as nearly equal to the diagonal as we please, which shall be a definite arithmetical fraction of the side. Quantities which are so related that when one is capable of being represented in terms of a certain unit the other is not, are
called incommensurables. The reason is as follows:—Any two whole numbers or fractions of the same unit must have a common measure: thus all whole numbers have the common measure 1; and any two fractions, $a$ and $b$, and $c$ and $d$, where $a$, $b$, $c$, and $d$ are whole numbers, have the common measure 1, which is contained exactly $aq$ times in the first, and $bp$ times in the second. Conversely, any two magnitudes which have a common measure can be arithmetically represented by the same unit: for if $A$ and $B$ have the common measure $M$, and if this measure be contained 7 times in $A$ and 10 times in $B$, then it is contained 35 by taking $M$ as the unit, 7 and 10 by taking $M$ as the unit. Therefore there be two magnitudes which cannot be represented by means of the same unit, they cannot have any common measure, and are therefore incommensurable. It also follows from the preceding that any two incommensurable magnitudes must be to one another in the proportion of some one whole number to some other whole number.

To prove that there are such things as incommensurable magnitudes, we shall take the (third and last) proposition of the tenth book of Euclid, which demonstrates that the diagonal and the side of a square are incommensurable. Let $D$ be the diagonal and $S$ the side, and if they be not incommensurable, $a$ and $x$ be whole numbers which are proportional, that is, let $M$ be a common measure, and let $D$ and $S$ severally contain $a$ and $x$ times. Then the square on $D$ will contain the square on $S$ and the square on $S$ will contain the square on $D$, $M$ $x$x times. But the square on $D$ is double of the square on $S$; therefore $a x$ is twice $x^{2}$. Now let $a$ and $x$ have no common whole measure except unity, which may be supposed, for if they have a common measure, divide both by it, which will give two whole numbers in the same proportion; and so on until no common measure is left. Then because $a$ times $x$ is equal to $x$ times $x$, $a$ times $x$ is an even number; whence $a$ is an even number, for if $a$ were odd, $x^{2}$ would be odd. Therefore $x$ is not an even number, for if it were, $a$ and $x$ would have the common measure 2: whence $x$ is an odd number. Let $k$ be the half of $a$, which is a whole number, since $a$ is even; whence $a = 2k$, and $x = 4k$, which is also $2x$, and thence it follows that $x^{2} = 4k^{2}$. Therefore $x$ is an even number, and $x$ also, for if $x$ were odd $x^{2}$ would be odd: whence $x$ is even. But it was just now proved to be odd; so that the same number is both odd and even, which is absurd. This contradiction follows whenever we suppose $S$ and $D$ to be in the proportion of any two whole numbers; consequently $S$ and $D$ are not in the proportion of any two whole numbers, and therefore are incommensurable; for if they were commensurable they would be in the proportion of some two whole numbers.

We have next to prove that any two magnitudes whatsoever, being incommensurable, may be made commensurable by an alteration as we please in each. Let $A$ and $B$ be two incommensurable magnitudes, and let $K$ be a third magnitude of the same kind, which may be as $K : 1$. I N C U S. [EAI]

INFERENCE means "not given or defined in magnitude. Thus a definite straight line is that of which the extremities are known; an indefinite straight line is one of which the direction is given, and which may be supposed to have any length, or which can be lengthened if necessary, without contravening any of the conditions of the problem. Thus Euclid, in the first book, constructs an equilateral triangle upon a definite straight line; and shows how to draw two lines making with one another the same angle as that made by two given indefinite straight lines.

There is however a species of the use of the word indefinite which is found in many mathematical works; namely, the employment of it to avoid the odium which attaches to the word infinite. Thus we hear of making a magnitude infinite, or of extending the so-called "infinite" in the chord, of the circle being a polygon of an indefinitely great number of sides. In all these cases it would be better, with a proper definition, to use the word undefined at once.

A want of proper distinction between definite and indefinite lines is to be observed. For instance, it is said that if a straight line be halved, if its half be then halved, and if fresh portions be continually taken, each of which is
the half of the preceeding, the result will at last become less than "any line which can be named." This is not true if the line which is to be named be indefinite; that is, if we may at any part of the process make it as small as we please: for it is obvious that whatever a line may be, a smaller line can be named. But it is true of a definition of line, made definite, or given in length, at the beginning of the process: name any line, however small, but such as you name it let it remain; then by continually halving any other line, however great, you must at last arrive at a line which is less than the length of the line of a line 'less than any line which can be named' has often caused a difficulty by not specifying the time at which it is to be named. The language used by Euclid himself is as follows: 'If you ask me how certain things are to be called by a question: * Two unequal magnitudes being given, if from the greater he be taken away its half, and from what is left its half, and if this be done continually, a magnitude will at last be which is less than the lesser of the two given magnitudes.'

**INDENTURE. [Def'd.]**

**INDEPENDENTS**, the name of a sect, class, or denomination of Christians, the name of the three who united form the Three Denominations, the other two being the Presbyterians and the Baptists.

When the principle of resistance to the power which made them taking away its half, and from what is left its half, and if this be done continually, a magnitude will at last be which is less than the lesser of the two given magnitudes.

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Robert Brown, a clergyman of the reign of Elizabeth, is generally reputed to be the first person in England who publicly avowed this opinion, and acted upon it by the establishment of various such separate churches, which however had no enduring existence. There is some question whether he retained his opinions to the last: but it is certain that after he had given no small trouble to the authorities in the church, he was presented to the living of Ashcroft in Northampton, and there received an ordination, at which time his opinions were known to count of this person may refer to the *Biographia Britannica*. He closed a long and very troubled life in the gaol at Northampton, or very soon after he had left it, in 1639.

Other parts of the history of the Puritans, adopted the opinion, but were restrained from acting upon it by the laws then in force for maintaining the Church of England as then established. But when Episcopacy was abolished and nationalized, there was a large party of these Independents which suddenly presented itself, who had a great share in the struggle which was then made, and who were the means of preventing the establishment of a national Church, of which it was the object of by far the larger portion of the Puritan body taking part in the contest to form. Cromwell belonged to the Independents. Dr. John Owen, dean of Christ Church, who was also for a time vice-chancellor of the University of Oxford, is considered as the chief ornament of this denomination at the time (the Commonwealth) when it first became considerable.

What the issue might be of the struggle between the principle of Independency and the principle of Presbyterianism cannot now be told, the king being soon restored, and with him the Episcopal church. In 1662 the Act of Uniformity was passed, the object of which was to exclude from the ministerial office in the Church of England divines of either of those opinions. The act required a direct acknowledgment of the principle of Episcopacy. The effect of it was, that about 1800 ministers retired from the places they held in the Church. These are the ministers whom Dissenters mean when they speak of 'the illustrious two thousand,' the ejected ministers,' or 'the Bartholomew worthies.' During the reign of Charles II the Independents were not allowed to exercise their ministry. But it was all in vain. They, or at least the greater part of them, persisted in preaching, notwithstanding the certain penalties of imprisonment and fines, that they might conduct the services of their own society. This was a principle of strictest interpretation, and was 1669, and for the seventy years following the date of its promulgation (as indeed was the case with the whole body of Dissenters) dwindled, and it would probably by this time have become extinct but for the state of things which we have now to describe.

About the middle of the eighteenth century there was an extraordinary revival of religious zeal under the influence created especially by the Wesleyans and Whitefield. The Dissenters, like the Church, had adopted the principle of 'the right to the verbal delivery of the religious service, and to the administration of the sacraments in their own way.' This was a great advantage to them, as it enabled them to present the paternal government of God as a source of consolation and of hope, to hold out the prospect of future accountableness and of eternal life, to show the evidence which religious men had of the existence of God, and of the prospect of a better life; and to declare that the Church was the only true messenger of his heavenly Father, were the principal subjects on which it was the duty of Christian ministers to insist. This was easy to represent as an abandonment of the old-fashioned and the distinctive truths of the Christian Church, and as a return to the spirit of the New Testament of the New Church, the Church of England, and it was received with great satisfaction by many persons, under the preaching above alluded to, were disposed so to regard it, and to seek a ministry by whom these distinctive truths would be maintained. The more prominent and the more influential among these people were the members of the three Methodist bodies; the Wesleyan Methodists, the Whitefieldian Methodists, or the Colliers of Backham's Connection; but there were many who declared to unite themselves with any of these bodies, and formed themselves into separate churches upon the Independent principle. This new body of persons incorporating with themselves the small remains of the old Independents of England, who, in some instances had, throughout the year of 1839, they were united and made an act of Independency, and that the body of Dissenters called Independents. By this act the Independents now greatly outnumber the Presbyterian denomination, and for the last few years had the proceedings of the body of Dissenters when acting in concert.

Of late however this concert has been disturbed. The body of Presbyterian Dissenters have withdrawn from the union of the three denominations, and act as a distinct body, with a view to maintain the principle of Independency; and are in general strongly opposed to a national establishment, whether...
Ephasopai or Presbyterian; and in doctrine vary, from the high Calvinism of the Savoy Confession, which exhibits the doctrines held by the Independents of the time of the Commonwealth, to the most moderate form of orthodoxy.

The number of Independent ministers is about the same as the number of chapels. The following is a list of the colleges and academies which are exclusively confined to the education of ministers for the Independent denomination. Some wealthy endowments; others depend upon annual subscriptions for their support. Very few Independent ministers are able to pay the expenses of their own education.

Bunglow college, Middlesex, founded in 1730. The number of students is 20; the term of study is 6 years.

Rotherham college, Masborough, Yorkshire, founded in 1756.

Coward college, University college, London, was, previous to the removal of the institution to London, at Wymondley, Herts. Dr. Dodridge was the first tutor of this college. Number of students, about 18; term of study, 5 years. This college is more richly endowed than any other dissenting college.

Hughby college, Middlesex, founded in 1778. Number of students, 40; term of study, 4 years.

Western academy, Exeter, founded about 1750. Figures, founded in 1816.

Airedale college, Underciffe, near Bradford, Yorkshire. Newport Pagnell college, founded in 1783.

Hackney college, Middlesex, founded in 1802. Term of study, 4 years.

A new college has been recently founded at Birmingham.

The following list of the number of Independent chapels in the different counties of England is taken from the Supplement to the 'Congregational Magazine' for the year 1825. In the time many new Independent chapels have been built:

Bedfordshire, 8; Berkshire, 14; Buckinghamshire, 31; Cambridgeshire, 23; Cheshire, 7; Cornwall, 31; Cumberland, 36; Devonshire, 39; Dorsetshire, 29; Durham, 13; Essex, 64; Gloucestershire, 30; Hampshire, 49; Herefordshire, 11; Hartfordshire, 28; Huntingdonshire, 9; Kent, 44; Lancaster, 88; Leicester, 17; Lincolnshire, 18; London and Middlesex, 31; Monmouthshire, 24; Norfolk, 21; Northamptonshire, 35; Northumberland, 8; Nottinghamshire, 12; Oxfordshire, 14; Rutland, 3; Shropshire, 35; Somersetshire, 47; Staffordshire, 32; Suffolk, 33; Surrey, 27; Sussex, 31; Warwickshire, 30; Westmoreland, 12; Wiltshire, 31; Worcestershire, 10; Yorkshire, 154; North Wales, 172; South Wales, 202—Total, 1683.

The word INDETERMINATE, a word which is mostly applied in mathematics, not to the character of a magnitude, but of a problem. A question is said to be indeterminate when it admits of an infinite number of solutions: if the number of solutions, few or many, be finite, the problem is sometimes, but not always not very frequently, called indeterminately.

The word indeterminate is also applied to the co-efficient of an assumed form of expansion, and the investigation by which they are then found is called the 'method of indeterminate co-efficients.' But when thus used, the word means nothing more than unknown, and the co-efficient are unknown or undetermined quantities. In the French mathematical writings, the word indéterminé should sometimes be translated by indeterminat, sometimes by arbitrary, and sometimes by undetermined, or unknown.

INDEX. [Exponent.

INDIA. (Hinduistan.)


Bengal Calcutta Lord Auckland
Fort St. George (or Madras) Madras Lord Elphinstone
Bombay Bombay Sir Robert Grant
Lord Auckland is also Governor-General of India. The Bengal Presidency was in Nov. 1834 (under powers given by 9 & 4 Wm. IV, c. 85, s. 38) divided into two, namely, the presidency of Bengal, and that of Agra; but at the end of 1835 the Agra Presidency merged again into that of Bengal. The Company still retain, by the above act, the power of dividing this Presidency.

Some years ago there was another presidency, called the Presidency of Prince of Wales Island, Singapore, and Malacca; but it now forms part of the Bengal Presidency, though the chief civil officer there is still called governor, on account of certain legal technicalities.

During part of the duration of the Agra Presidency, the seat of government was at Allahabad, a circumstance which has given rise to some confusion. The reader should bear in mind these facts in his perusal of the article Hindustan.

INDIA COMPANY. [East India Company.] INDIAN CORN. [Maize.]

INDIAN RUBBER. [Cauchochouc.]

INDIA/NA, one of the states of the North American Union, is bounded on the south-east by the Ohio, which separates it from Kentucky for 250 miles reckoned along the windings of the river; on the east by a meridian line, which separates it from the state of Ohio for 177 miles, and from the Michigan territory for 10 miles; on the north by the parallel of 41° 47' N. lat. from the lakes Michigan for 110 miles, and by the southern extremity of the lake of Michigan; on the west by a meridian line to the Wabash for 162 miles, and by that river to its mouth for 120 miles direct distance, which line and river separate it from the state of Illinois. It is between 40° 48' and 41° 47' N. lat.; its circuit is about 900 miles, and its area is 36,500 square miles, or about 14,000 square miles less than the area of England. The Ohio and the Wabash are the most important rivers. The Wabash rises in the state of Illinois, and flows through this state, having a course first to the north and then to the south-west; it then makes a great bend to the south, and flowing in that direction about 90 miles it becomes the boundary of the state. Its whole course through this state, and as far as the boundary, is between 300 and 600 miles, for the whole of which distance it is navigable except at its falls or rapids. All the other principal rivers of the state are tributaries of the Wabash: the White River enters the Wabash about 120 miles above its mouth, and forms two main branches, of which the northern has a west-south-west course of about 300 miles, and the East Fork has also a general south-west course of about 600 miles. Both of them receive several large tributaries. About 35 miles from the mouth of the Tippecanoe and Elk rivers from the north-east, then the Mississinewa from the south-east, and Little River from the north-east. White-water rises in Ohio, and entering this state, becomes the boundary of the state. The two branches of the Mississippi, that of the St. Joseph's and St. Mary's, both enter this state from Ohio before their confluence, and, what is most remarkable, in a course almost directly opposite to that which the Mississippi itself follows, and, after the junction of the Kankakee and its main branch the Pinekinkam rivers in this state, the former has the greater part of its course likewise in it.

This state, like Illinois, has a general slope to the south-west. Like that state also it is, with few exceptions, one of the great plains of America, and is indeed a part of the great bend of the Wabash, and the state is skirted on the south by those eminences called 'Ohio hills,' which sometimes touch the Ohio and sometimes retire from it for two or three miles; they occasionally rise 300 feet above the river. The timbered and prairie lands are more intermixed in this state than is usual; and the alluvial river bottoms are all wide. The soil is admirably suited for grass and grain. The climate is somewhat more equable than that of Illinois, and milder than that of western Pennsylvania. It is everywhere healthy except in the neighbourhood of the wet prairies and swamps. Iron, copper, coal, and salt are found, but no mineral wealth. Among its numerous caves is one of great extent near the Ohio, in which Epson salts are found in lamps from one to two pounds weight. A bushel of its earth yields from four to five pounds of the salt. Nitre and gypsum are found in the area.

Indiana is divided into sixty-four counties. Its population by the last census was 345,081; its increase in ten years was 139 per cent. The agricultural products of the state are wheat, corn, and potatoes, the latter of which it produces in the largest quantity of any state in the Union. Of all the vineyards in the United States are at Vevay on the Ohio. They are managed by the Swiss settlers at that place, and consist of native species of the vine the foreign being found too succulent in that soil and climate.

A canal designed to connect the Wabash from the mouth
of the Tippecanoe with Lake Erie through the Maumee River is in progress, and when completed it will probably be the channel by which Indians and a part of Illinois will receive their foreign merchandise from New York. Its whole length will be 311 miles, of which about 40 miles is in Ohio. In June, 1834, there was but one bank in the state, with a capital of 150,000 dollars. Another has been chartered.

Indianapolis, on the east bank of White River, in 39° 47' N. lat., is the capital of Indiana. It is near the centre of the state, and contains about 3,800 inhabitants. It has been settled since 1800, and is now a thriving town. It is a little below Louisville in Kentucky, is the largest town in the state, containing a population of 2,000. Jeffersonville, opposite to Louisville, is a small but handsome town with 1,000 inhabitants. Madison, midway between Louis- ville and Cincinnati, is a small village, particularly in barrelled pork; its population is 2,500. Vevay, on the same river, 45 miles below Cincinnati, contains about 1,500 inhabitants, chiefly Swiss. New Harmony, on the Wabash, was founded in 1814 by a community of Non-members. Rapp, who some years afterwards sold the establishment to Robert Owen, and removed with his followers to Pennsylvania. There is a college at Bloomington, and another at St. Mary's, both of which have a small number of students.

Geographical Distribution of the Indostorinae.—Africa. The other subfamilies belonging to the Cusciidae are, according to Mr. Swainson, Cecocyzinae, Crotophagine, and Leptostominae.

The Cuscyza, or Hook-billed Cuckoos, are characterized as having the wings short and rounded, the nostrils linear, the bill curved, the margins of the upper mandible dilated, the tarsus naked and lengthened, and the tail very long and concealed.

The genera comprised by Mr. Swainson under this subfamily are:

Sericinices, which has the bill short and strong, the gony thick, ascending, and angulated; the culmen thickened and arched; the tarsus and middle toe equal, the lateral toes unequal, and the claws short. Example, Sericiniceo cristatus (Sw.).

Zanclostomus. Bill much compressed throughout, gony curved downwards, culmen and upper mandible greatly curved, and the basal margin considerably dilated; wings, tail, and feet as before; the bill is considerably larger than in the preceding; the tarsus is at a nearly equal. Locality, Tropics of the Old World (Sw.). Example, Zanclostomus javanicus, Phasianus Java.

Cucocyzus (Vieill.) Bill moderate, thickened at the base, compressed; gony straight; basal margin of the upper mandible not curved outwards, and scarcely dilated; tarsus and middle toe of equal length; lateral toes unequal. Locality, America only. Example, Cucocyzus guayanesis. This genus has the breast and belly streaked black, from which it collects the insects which form its food.

Mr. Swainson places the Cucucuza of India and Africa under the subgenus Leptosoma. The specific name is: Philepitos (Vieill.) Bill intermediate in form between Cuscyza and Crotosoma; nostrils long and linear; feathers of the head and neck slender and rigid; tarsus and middle toe equal, lateral toes unequal, all the claws curved and of equal size, bill short and obtuse. Locality, South America. Example, Philipitos cristatus. (Sw.)

Crotosoma (Lill.). Bill strong; tarsus and middle toe equal; anterior claws slightly longer and more curved. Habitats to different species are: Crotosoma argentatum, Locality, Africa. Example, Crotosoma argentatum. Salt, in his "Travels," notices this bird as common in the mountainous districts (Abyssinia), generally sitting in the thick European and thorny bushes, whence it is difficult to drive it.

Geographical Distribution of the Cuscyzinae.—Asia, Africa, America.

The Crotophago, or Horn-bill Cuckoo, consist of the following genera:

Crotosoma (Crotosoma, vol. viii.)
Dasylophus. Bill rather large and compressed throughout; gony angulated; culmen convex, gradually arched; frontal feathers incised and complete; nostrils basal, oval, close to the gape, placed in a groove of the bill, and defended by stiff, erect bristles. (Sw.)—Example, Dasylophus superciliosus. (Sw.)

Phasianus (Vieillot). Bill large, very thick, smooth, resembling that of a toucan; the culmen miniaturized; face naked; nostrils basal, oval, close to the gape, placed in a groove of the bill, and defended by stiff, erect bristles. (Sw.)—Example, Phasianus nachas. Geographic Distribution of the Crotophagidae, Africa, America.

The Leptostominae, or Long-billed Cuckoo, consist of the following genera:

Saxrothera (Vieillot). Bill lengthened, longer than the head, and straight, except towards the tip; the culmen convex, the gony straight, the upper mandible with its margins finely crenated; orbits naked; wings moderate, second and third quills longest; feet short—Example, Saxrothera velata. 2 N. 3 N.
Anadenum. General structure of Saurothera; but the upper mandible is only notched at the tip, the margins are entire; wings much rounded, the four first quills graduated. (Sw.) Locality. India. Example, Anadenum rufescens. Leptostoma. Bill very long and entire; wings very short and white; rather long and cuneate; tarsus much longer than the toes. Example, Leptostoma longicaudata.

Mr. Swainson considers Leptostoma to be the granillar type of the Cuculidae. Centropus he also considers to be a granillar ty.

**Geographical Distribution of the Leptostominae, India, America. — [Cuculidae; Cuculinae.]**

**INDIGENCE; CYCLE OF INDIGENCE.** (Period of Rain or Drought.)

**INDIMENT** is a written accusation of one or more persons of a crime or misdemeanor preferred to and presented by a grand jury. The sheriff is bound to return to every session of the peace and to every grand jury commission of terrier and terminer and of general gaol delivery twenty-four freeholders of the county, who are usually chosen from the class of gentlemen of fortune. Twelve at least of this panel, and not more than twenty-three, are sworn upon the grand jury. They are previously instructed in the articles of their inquiry by a charge from the presiding judge, and then withdraw to sit and receive bills of accusation, which are presented to them in the name of the county, but at the sole expense of any private person. The decision of the grand jury is not in the nature of a verdict upon the guilt of the accused, but merely the expression of their opinion that from the case made by the prosecutor the matter is fit to be presented to the grand jury, and that, in conditions the inquiry the evidence in support of the accusation only is heard. If the grand jury think the accusation groundless, they indorse upon the bill "not a true bill," or "not found." If in a state of partibus, a true bill; and the indictment is a true bill twelve at least of the grand jury must concur. Antiently the words 'ignoramus' and 'billa vera' were used for the like purposes. When a bill is found to be a true bill, the trial before the accused takes place in the usual form, and when the bill is found not to be true or, as it is frequently called, 'ignored,' the accused is discharged, but a new bill may be preferred against him before the same or another grand jury. Scacco, when the bill is ignored, by account of some slip or error, the judge will direct the accused to be kept in custody, in order to prevent him from escaping from justice. (4 Bl. Com.)

**INDIES, EAST (East Indies).**

**INDIGENCE.** [Dyspepsia.]

**INDIGIO, a well known and beautiful bright vegetable colour, which is extensively employed in dyeing and calico printing.**

**Botany.** — [Indigofera.]

**Chemistry.** — Indigo is found in the leaves of several plants, in which it occurs in a peculiar and very different state from that in which it constitutes blue indigo. When the plant is dried and pulverized, most of the water is removed, and the drug is then cut, and put, either recent or previously dried, into vats, and covered with water; fermentation takes place accompanied with the evolution of carbolic acid, and probably other gaseous products, and the yellow liquor is covered with a froth which in a little time becomes of a violet colour, and a substance is dissolved which is rendered blue by absorbing the oxygen of the air, and being then rendered insoluble it is precipitated; and this, when collected and dried, is indigo.

The usual appearance of indigo as it occurs in commerce, besides some earthy matter, consists of indigo-blue, indigo-red, indigo-brown, and a glutinous matter. When common indigo has been treated with dilute acids, alkalis, and alcohol, the remainder is indigo-blue, or indigoitin, or indigo near the contents of the leaves, and the chemical properties of this are, that it is insoluble in water or alcohol; neither dilute acids nor alkali solutions act upon it; when heated to between 500 and 600 it rises in a purple vapour, and condenses as an oil; or a solid mass of purple colour, strong sulphuric acid, and what is remarkable and unusual is, that, unlike most vegetable matter, it neither decomposes nor is decomposed by the acid; the solution has an intense blue colour, and is employed occasionally in dyeing, under the name of Saxon or liquid blue.

Chemists are not agreed as to the nature of this solution of indigo in; it has been called sulphate of indigo. According to Berzelius, it contains indigo-purple, sulphate of indigo, and hyposulphate of indigo; the next two compounds have also been called sulphoindigocid acid and hyposulphoindigocid acid. They combine with oxides to form salts of a fine grain texture.

Of all the properties of indigo, the most remarkable is its deoxidization by bodies which have a powerful affinity for oxygen, such as the protioxide of iron, the solution of sulphate of indigo in polash, and the blue iron. It is by the employment of these means, and especially of the protioxide of iron [Blue], that indigo is rendered soluble in time-water and alkali solutions, and thus applied to the fixing of indigo upon cloth. According to Dumas in indigo is composed of

<table>
<thead>
<tr>
<th>Substance</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen</td>
<td>397/eq</td>
</tr>
<tr>
<td>Carbon</td>
<td>724</td>
</tr>
<tr>
<td>Oxygen</td>
<td>1250</td>
</tr>
<tr>
<td>Acetate</td>
<td>1173</td>
</tr>
</tbody>
</table>

100% 94

**Indigio Acid** is prepared by treating indigo with twice its weight of hot nitric acid of sp. gr. 1.280. When pure it has the form of colourless needles, which are but slightly soluble in water, but readily soluble in alcohol. According to Dumas it is indigo combined with five times more oxygen; this it acquires by decomposing the nitric acid. It is a feebly acid, and acts faintly upon litmus, but it decomposes carbonates. When heated in a tube, it sublimates above the carbolic acid and forms a stable mixture. Indigo in open vessels it evaporates and burns with much smoke. Its properties are given in the section of a large quantity of nitric acid upon indigo. The substances which it contains are indigo-blue, indigo-red, and glutinous, are quite unimportant substances, except that they render common indigo impure by their presence.

**Manufacture and Trade.** — On the discovery of the Mexico the use of Indigo was found to be common among the Aztecs, who employed it to impart a blue colour to their cotton fabrics. After the conquest of Spain the plant was extensively cultivated in Central America and in the Antilles, and its produce in those parts was for a long time greatly superior to that made in India. Since the beginning of this century however the cultivation and preparation of indigo in India have been so much improved that the quantities from Bengal have again been considered the finest in quality, and have commanded the highest prices in the markets of Europe the cultivation in our West India colonies has long ago ceased.

In the indigo factories of Bengal it is the custom for the European factors to provide the seed and to advance the money necessary for the cultivation of the ryots, or native farmers, who are bound to deliver to the factor, by whom they are thus supplied, the whole number of plants produced, at a price agreed upon between them. The terms of these contracts have usually been such that any failure in the crop from bad seasons or other accidental circumstances has given to the factor a command over the cultivator to whom advances have been made; the farmer by this means becomes dependent upon his creditor, so that he is compelled to deal yearly after exclusively with the same factor. The cotton and indigo are frequently conducted upon a very large scale, and a considerable amount of capital is engaged in them.

The seed is sown in straight furrows about a foot apart, and usually is not long sown; but in some cases it is kept the young plantation free from weeds, particularly in the early stages of vegetation. When the plants begin to blossom, which usually occurs about two months from the sowing of the seed, they are cut down about one or two inches above the ground, crushed into cubes, and delivered at the factory. A subsequent growth from the same root is again ready for the sickle in six or eight weeks, and four crops are sometimes thus obtained from one sowings; and it is said that the indigo is more pure and finer than any ordinary crop, and it is seldom found profitable in India to obtain more than four harvests from the same roots. Among the Arab
cultivators in Egypt the seed is sown only once in seven years, and two crops are obtained each year.

Two distinct methods are pursued for extracting the colouring matter from the plants, In most cases it is extracted by fermentation, but in some instances by scalable. In both cases the whole plant, or what passes, is subjected to the process, as colouring matter is yielded by every part. Where fermentation is the process used, three wooden vats are provided, and so placed at different levels that the contents of the two highest can be readily transferred to the second, and again from this to the third or lowest vat. The upper vessel, which is also the largest, is called the steeping vat; in this the plants are loosely laid in a bed of hot water, which is poured over them until they are all covered to the depth of three inches: heavy wooden frames are then laid upon the plants to prevent their rising during the fermentative process. In about 18 hours, which assists in the separation of the plants, they swell and give off large quantities of gas, which tinge the water with a lively green colour. This fermentation is allowed to go on until all the colouring matter, or grain, as it is technically called, is extracted, after which the turbin liquor is drawn off into the second vat. If this is done too soon there will be a loss of colouring product, and if it is deferred too long, so that the putrefactive fermentation commences, the turbin liquor of the dye vat is impure. Impurities, immediately upon the drawing off of the liquor from the steeping vat, is cleared from the refuse plants and washed, and a supply of fresh plants is subjected to the process. The turbid liquor, being received into the second vat, is violently agitated and beaten, in order to separate the pulp or grain from the water. A great quantity of air bubbles are driven off by this beating, and the colour of the contents of the vat changes from green to deep blue. Some lime-water is added at this time, which assists in the separation of the grain. This beating process must be continued so long as to separate all the grain, but if carried beyond this point a second fermentation would begin, which would mar in an injurious manner the quality of the indigo.

When the grain has subsided to the bottom of the vat the supernatant liquor is drawn off, and the grain is discharged into the third vat, where a further submergence and drawing off of the liquor continues until the grain is next transferred to the sacks, which are hung up to drain; it is then placed in small wooden boxes, which are exposed to the air and sun until all moisture is evaporated, when the process is completed, and the indigo is packed in chests for shipment.

The method here described is that which is commonly practiced in America and in some parts of India; but in the great indigo factories of Bengal some peculiarities are occasioned by the agency of fire. When the beating process has been performed, the contents of the second vat are transferred to a boiler, the bottom of which is of iron, and the sides are of masonry, this is called the drying vat, and on the grain, which is of sufficient consistency to be transferred to large cloths, in which it is gradually dried by exposure to the air and sun. The great advantage of this mode of proceeding is, that it effectually prevents any fermention after the first separation of the grain, which evil is very likely to be experienced, notwithstanding the utmost care is used to prevent it.

The method of extracting the dyeing matter from the plants by scalding is not much employed. Indigo thus made is said to have less colouring matter, and the dye is accounted to be less permanent than that extracted by fermentation. The scalding or boiling is performed in vessels of about eighteen inches in diameter, to which hot water is added until all the colouring matter is extracted. The liquor is then strained into other vessels and beaten, as already described, for the separation of the grain. The matter is then left in this state until the supernatant liquor is drawn off, and the grain is put into bags to drain. The remaining drying processes are performed as already described.

The trade in indigo is of considerable importance to the native farmers of Bengal some parts of the country, as it forms a very convenient means of remittance in return for the outward shipments of British manufactures. A great part of what is thus brought to England is re-exported to other countries, and the indigo grown in that part of the country is hence supposed to be of a higher quality than that grown in the former.

The quantities imported, re-exported, and taken for use in the United Kingdom, during each of the ten years from 1827 to 1836, were as follows:—

<table>
<thead>
<tr>
<th>Year</th>
<th>Imported</th>
<th>Re-exported</th>
<th>Taken for use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1827</td>
<td>9,913,010</td>
<td>4,589,658</td>
<td>3,064,915</td>
</tr>
<tr>
<td>1828</td>
<td>6,748,291</td>
<td>4,286,605</td>
<td>2,113,830</td>
</tr>
<tr>
<td>1829</td>
<td>6,243,400</td>
<td>4,686,205</td>
<td>2,654,545</td>
</tr>
<tr>
<td>1830</td>
<td>7,295,605</td>
<td>4,374,241</td>
<td>2,940,134</td>
</tr>
<tr>
<td>1831</td>
<td>6,353,065</td>
<td>5,346,725</td>
<td>2,395,635</td>
</tr>
<tr>
<td>1832</td>
<td>6,363,436</td>
<td>3,664,014</td>
<td>2,323,300</td>
</tr>
<tr>
<td>1833</td>
<td>4,115,399</td>
<td>3,928,386</td>
<td>2,477,857</td>
</tr>
<tr>
<td>1834</td>
<td>4,168,392</td>
<td>4,674,098</td>
<td>2,250,666</td>
</tr>
<tr>
<td>1835</td>
<td>7,710,544</td>
<td>3,691,951</td>
<td>2,940,359</td>
</tr>
<tr>
<td>1836</td>
<td>6,545,873</td>
<td>3,587,561</td>
<td>2,226,194</td>
</tr>
</tbody>
</table>

Of the above importations 94 per cent, was supplied by India.

The following statement of the annual produce of indigo in the territories possessed by the East India Company, during each of the twenty years from 1812 to 1831, was laid before the Committee of the House of Commons on the Affairs of India previous to the last renewal of the Compagny's charter. It shows how greatly this branch of cultivation has been extended, especially of late.

<table>
<thead>
<tr>
<th>Year</th>
<th>Creta.</th>
<th>Chesta.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1812</td>
<td>23,500</td>
<td>1822</td>
</tr>
<tr>
<td>1813</td>
<td>25,800</td>
<td>1823</td>
</tr>
<tr>
<td>1814</td>
<td>28,200</td>
<td>1824</td>
</tr>
<tr>
<td>1815</td>
<td>30,500</td>
<td>1825</td>
</tr>
<tr>
<td>1816</td>
<td>27,800</td>
<td>1826</td>
</tr>
<tr>
<td>1817</td>
<td>28,500</td>
<td>1828</td>
</tr>
<tr>
<td>1818</td>
<td>29,000</td>
<td>1829</td>
</tr>
<tr>
<td>1819</td>
<td>27,000</td>
<td>1830</td>
</tr>
<tr>
<td>1820</td>
<td>27,200</td>
<td>1831</td>
</tr>
<tr>
<td>1821</td>
<td>21,100</td>
<td></td>
</tr>
</tbody>
</table>

**Annual average 22,890** | **Annual average 33,170**

Not being an article of substantive or independent consumption, but depending in this respect upon the condition and progress of other manufactures, upon the cost of which the price of dyeing is only an inconsiderable effect, the market value of indigo is subject to violent fluctuations, according to the productiveness of the crop. It is only when the price has been driven down to a ruinous rate by the glutted state of the principal markets that speculators step in to check and palliate the evil. The following statement, taken from the accounts of the East India Company, will show how hazardous the trade has been from fluctuations in consecutive years:

<table>
<thead>
<tr>
<th>Season</th>
<th>Average Sale</th>
<th>Average Amount of Produce</th>
<th>Average proceeds per peck</th>
</tr>
</thead>
<tbody>
<tr>
<td>1822-23</td>
<td>12 1/2</td>
<td>94 1/2</td>
<td>90</td>
</tr>
<tr>
<td>1823-24</td>
<td>9 1/2</td>
<td>94 3/2</td>
<td>110</td>
</tr>
<tr>
<td>1824-25</td>
<td>11 1/2</td>
<td>90 1/2</td>
<td>140</td>
</tr>
<tr>
<td>1825-26</td>
<td>9 1/2</td>
<td>89 2/2</td>
<td>100</td>
</tr>
<tr>
<td>1826-27</td>
<td>8 1/2</td>
<td>83 3/2</td>
<td>150</td>
</tr>
<tr>
<td>1827-28</td>
<td>7 1/2</td>
<td>87 2/2</td>
<td>80</td>
</tr>
<tr>
<td>1828-29</td>
<td>5 1/2</td>
<td>93 2/2</td>
<td>70</td>
</tr>
<tr>
<td>1829-30</td>
<td>4 1/2</td>
<td>72 2/2</td>
<td>55</td>
</tr>
</tbody>
</table>

**History.**—Its common name in India is neel, or teel, and its Sanscrit namee. From these no doubt the Persian melck and the Arabic neelak were derived. In the Arabic it is called osarakh-neel, juice or extract of the neel-plant. It is noticed by Avicenna under the name of neel, but has been erroneously considered in the Latin translation to be the analogous dyeing substance called wood, produced by Indus tinctoria, a plant not found in India. It was undoubtedly known to the Greeks and Romans, as Beckman has shown in the 4th volume of his History of Inventions. The accounts given by Dioscorides of *Indicum* (i.e., Indus), lib. v. c. 107, and by Pliny of *Indicum*, lib. xxxv. c. 27, are substantially the same. The name does not give us any assistance, for, like Persics, Armeniaca, and others, the inhabitants engraven it in the soil. In some editions of Dioscorides the chapter is entitled 'On the stone Indicum' ('*ανδρην* ἄγαλληSION), and it has hence been supposed that the substance described was of a mineral nature,
but in the same way catechu was and still is frequently called Terra Japonica. That the true indigo was known is clear from the direction given by Pliny for detecting sophistications: 'The proof thereof is by fire, for está the right indigo upon live coals it yieldeth a flame of most excellent purpl.]' Indeed, indigo is one of the items known in the 'Peregrin' of Arrian as exported from Barbark in the Indus to Egypt.

That it was known at still earlier periods is probable, as Mr. Thomson, from the effects of chemical tests on the blue streak of a pair of cuisses of Eton College, clothes is hotly de-\textit{\textcircled{\text{d}}}, concludes that they were dyed with indigo. (\textit{Eng. Antq.}, ii. p. 200.)

The earliest notice of this substance in modern Europe is in a Latin treaty between Bologna and Perugia in 1328, where 'indigo' is mentioned in the customary article. Marco Polo, in the thirteenth century, describes the process of making 'endium' in the kingdom of Coulan, or Collum. In the seventeenth century so great was the consumption of indigo in Europe that the sale of wood became seriously injured, and the use of indigo was prohibited, which, in an Imperial edict published in 1654, was denominated the \textit{dye\textquotesingle}s \textit{disgrace}, as hopes were in England prohibited as the \textit{wicked weed}. The Nurem-\textit{\textcircled{\text{b}}}, who, to a great extent, compelled the dyers annually to swear that they would never use indigo. (\textit{Phil. of Perm. Colours}, i. p. 166.)

Dr. Bancroft has remarked that many plants employed to dye have certain more or less of the basis of indigo, combined with only a small portion of oxygen, and therefore capable of being extracted and held in solution by water; and not a little power is not surprising to the indigo of all countries, except India, should have thought it suffi-\textit{\textcircled{\text{c}}}, to purify or grind the plants naturally containing this basis, and leave it to the dyer to adopt such processes as would bring such further portion of oxygen as, when assisted by the dyeing process, would fix it permanently in the cloth and fully manifest its blue colour. He further observes:—By what circumstance or process of nature the inhabitants of Hindostan, several thousand years ago to discover and adopt means by which the blue colourable matter of the indigo plant might be ex-\textit{\textcircled{\text{t}}}, oxygenated, and precipitated free from almost all the other matters with which it was naturally combined with it, and afterwards brought into the dry solid form in which we now find it, no one can, I believe, conjecture. (i. p. 168.) This early adoption of a complicated process is a proof, among many others, of the extreme attention paid by the Hindus to arts unknown to their\textit{\textcircled{\text{p}}}, that by discounting the number of years.


The genus \textit{Indigofera} is one of the largest in the natural family of \textit{Leguminosae}, indigenous in the equinocial parts of Asia, Africa, and America, and celebrated for some of the species yielding indigo. The species are about 150 in number; all are herbaceous, with few, if any, shrubby or subshrubby. The leaves are simple, usually pinnate; the flowers small and papilionaceous, in axillary clusters of a purple, blue, or white colour. The calyx is 5-cleft; segments acute; vexillum roundish, emar-\textit{\textcircled{\text{g}}}, keel furnished with a subulate spur on both sides. Stamens diadelphous (9 and 1). Legume continuous, one or more seeded. Seeds usually truncated, separated by cellular spurious partitions. There is some difficulty in ascertaining the cultivated species of the subject; it is usually neglected both by naturalists and cultivators.

\textit{I. tetricia} is the species generally cultivated in India, whence it has been introduced both into Africa and America. It is a suc-ticeous, erect branched; leaves pinn-\textit{\textcircled{\text{a}}}, leaves 5 or 6 pinnate; leaves spinose, yellowish, or white, lanceolate, or linear, racemes of flowers axillary, shorter than the leaves. Legumes approximated towards the base of the racis, nearly cylindrical, slightly tubular, deflexed, and more or less acuminate, more or less 3-valved, veins about 10, cylindrical, truncated at both ends. This species is sometimes called Indigo Franc and French Indigo in the West Indies.

It is said to be found wild along the sands of Senegal. (\textit{Floral de Senegambie}, vol. i. p. 178.)

\textit{I. Anl.} From the name it might be inferred that this was an Asiatic plant; but it is said by De Candolle to grow wild in America, and to be cultivated in both Indies, as \textit{I. Anl.} is not a name of any plant which has passed into the Spanish, has evidently the same origin as the Arabo \textit{neel} or \textit{nil}. The Spaniards and Por-
taguese, who had found the way to India by two opposite courses, must have there been acquainted with indigo, and adopted its Indian name; they were the first to manu-\textit{\textcircled{\text{f}}}, in America, the Portuguese in Brazil, and the Spaniards in Mexico. This species is characterized by an erect suffruticose stem; leaves pinnate in 2 to 8 pairs; leaflets ovate-oblong, scarcely pubescent on the under surface; racemes axillary, shorter than the leaves; legumes compressed, not tubular, deflexed, curved, with both actures of equal thickness. (\textit{Floral de Senegambie}, vol. i. p. 178.)

\textit{I. M.} Wright and Arnott state, 'We have not sufficient materials to enable us to determine if \textit{I. Anl.} be a distinct species: we know of no distinguishing character, unless it is to be found wild in America, and nowhere else, and even then in the two species differ in different authors.' But the authors of the \textit{Floral de Senegambie} consider them distinct, as do most botanists.

\textit{I. corollae, Roxb.} This is a new species described by Dr. Roxburgh, and called \textit{kanoreli} in Telingsa by the natives of the peninsula of India. Dr. R. states that from the leaves of this plant he had taken a most beautiful light indigo, more so than he ever could obtain from the common indigo plant, or \textit{I. Leguminosae}, and in a large proportion. He says it is an erect shrubby species, growing in dry, barren, uncultivated ground, to the height of three feet, and higher in good garden soil. It flowers during the hot and cold season, in July and August; leaves pinnate; leaflets four-paired, obovate, emarginate; racemes rather shorter than the leaves; legumes reflexed, curved, contracted against the seeds, hairy; from 3 to 4-seeded. \textit{I. corollae} is a plant native to \textit{I. tinctoria}, Linn. The process he adopted for extracting indigo from this plant was similar to that practised with the leaves of \textit{Nerium tinctorium}, or the sealing process.

\textit{I. argentia} is a species usually stated to be native of India, and the authority of Roxburgh might be cited for the fact, but Maes Wright and Arnott say \textit{I. argentia} of Linnaeus is not found in India. It is the species cultivated in Egypt and Barbary for the sake of its indigo, and, according to Humboldt, also in America. The Indian species has been confounded with it in \textit{I. pseudofolia} of Delile, which has alternate leaflets, and linear, slightly compressed, tuborous legumes. \textit{I. argentia} is shrubby, with round branches, which appear of a silvery whiteness from oppressed pubescence; leaves pinnate, one to two-paired; leaflets opposite, obovate, silvery-pubescent, narrower than the leaf; legumes pendulous, much compressed, tuborous, canescent; 2 to 4-seeded.

\textit{I. dispersa.} This, according to Humboldt, is also one of the species cultivated in America, being one of the most ancient hieroglyphical paintings of the Mexicans. Dr. Bancroft considers it as the species called Guatemala indigo, which yields fine pulp, but is less productive than \textit{I. tinctoria}, the leaves pinnate, 7-9 pairs of leaflets round; leaves pinnate, 4 to 6-paired; leaflets elliptico-oblung, smooth; racemes slender, larger than the leaf; legumes round, tuborous, mucronate; 2-seeded.

Plants of other genera are also employed for obtaining indigo; as Wrightius (\textit{Nertium, Roxb.}), \textit{tinctoria}, \textit{Marandia tinctoria}, \textit{Galinae tinctoria}, but especially the two first. Dr. Bancroft (vol. i., p. 190) also adds \textit{Splittanthus tinctoria}, \textit{Scabiosa sucuca}, \textit{Cheranthus fenestralis} also a species of \textit{Bignonia} a. \textit{Perennialana}, of America, with \textit{Amorpha fruticosa} and \textit{Sophra tinctoria}, as \textit{tinctoria}, yielding a blue dye, or coarse sorts of indigo.

\textbf{INDIVISIBLES.} (\textit{Cavalleri}.)

\textit{Indoris} is a large order of invertebrates of Malva, and the capital of the dominion of Holland, which at present consist of about 11,500 square miles on both sides of the river Nerburda. Indoris, which stands in 22° 42′ N. lat. and 15° 20′ long., is situated nearly opposite to the site having been wholly destroyed by fire by Sinda, in 1801, during the war between that chief and Holland.

The extension of the city since 1818 has been extremely rapid, and its population has increased from 10,000 to 60,000 souls. The streets are spacious and well paved; a great proportion of the houses are of two stories, and built of masonry; but there is no uniformity of plan, and the names, as well as the appearance, of the houses is the same common in India, there are many dwellings tapers, and the principal is the palace, which was begun in 1819, is a large quadrangular granite
building. The English residency is without the city, about a mile to the south. Indore is 371 miles from Nagpur, 456 miles from Bombay, and 1830 miles from Calcutta, all travelling distances.

INDRE, a river in France belonging to the system of the Loire. It rises in the hilly region of central France of which the mountains of Auvergne form the nucleus. The source of the Indre is not however in the Auvergne mountains, but near Bouresse, just within the department of Châteauroux, capital of that department. It flows along the left bank of the Tence, and the hill of Igney, save on the left the Vouvre or Vann, which receives the Magny. Close above Châteauroux it joins on the right bank by the Angot. From Châteauroux it pursues its course to the north-west by Buxauppas, Confolais near Fontaine, and St. Chastier, and consolidates itself with Cormery, both in the department of Indre and Loire. From Cormery it gradually turns westward, and flows past Montbazon and Assay le Rideau into the Loire. Its whole length is about 115 miles, for about 36 of which, namely from Lechee, it is navigable. Between Leches and Cormery it receives the Indroyes. Near its junction with the Loire this river is divided into several arms, one of which joins the Angot.

INDRE, a department of central France, bounded on the north by that of Loir et Cher, on the east by that of Cher, on the south by those of Creuse and Haute Vienne, on the south-west by those of Indre et Loire, and on the west by the Angot. Its form is a triangle. The greatest length is from the bank of the Cher, on the north, to near Aigneron, on the south, 60 miles. The greatest breadth, on the left bank of the Angot, by the Angot, near St. Chastier, on the east to the bank of the Garnempe in the west, about the same distance. Its area is estimated at 2669 square miles, which is rather more than that of Lincolnshire. The population, by the census of 1831, was 29,422, and, by that of 1847, 19,061, in five years, and giving about 96 or 97 inhabitants to a square mile, considerably below the population of Lincolnshire, and less than two-thirds of the average relative population of the same departments. The climate is temperate, and the soil has its source just within the boundary. The eastern side of the department is watered by the tributaries of the Cher, which itself touches the boundary on the north side. Of these tributaries the principal are the Arnon, which just touches the eastern boundary, with its feeder the Theols; the Fezon, with its feeder the Nahon, which receives the Moulines; and the Monon. The western side of the department is watered by the Vienne, a tributary of the Vienne, which crosses this part in a north-west direction to the Gartempe, which it crosses the Bouzane, into which flows the Gournon. The Gartempe, a feeder of the Creuse, just touches the western border; its tributary the Angin, or Langin, receives the Benaissie, and the united stream of the Angin and the Langin are the Claise, also a feeder of the Creuse, waters a portion of the western side. That portion of the department which lies between the Creuse and its feeder the Claise is covered by a more or less extensive forest, a considerable extent, but of little depth. These large sheets of water produce, in the heats of summer, pestilential exhalations very injurious to animal life. Beside the pools which are numerous in the interior, the drainage of this district, which is called 'Brenza,' would bring many thousand acres into cultivation, besides removing a perpetual source of disease.

A part of the department is entirely destitute of inland navigation. The road from Paris by Orleans to Limoges passes through it, entering it on the north-east side, and passing through Vatan, Châtéraouroux, and Argenton. There are roads from Châtéraouroux to Guéret (Creuse), Tours (Indre et Loire), Blois (Loir et Cher), and Bourges (Cher). The aggregate length of the government roads is about 240 miles, of which about three-fourths are in good repair; the remainder is out of repair or unfinished. The aggregate length of the Route Départementale is about 125 miles, of which nearly one-half is out of repair or unfinished. The by-road and paths have a total length of nearly 3300 miles.

A line drawn from the north-east through Châtéraouroux determines the geological character of the department. North-west of that line is found the chalk which surrounds the Paris basin (FRANCE, GEOLOGICAL). South of that line there are extensive formations between the chalk and the new sandstone, or red sand dimunt. Along the southern border of the department the primitive rocks are found. Iron is abundant; many mines are wrought; and there are excellent quarries of marble, millstones, sandstone, and limestone. For lithography, gun-flints, and potters' clay are also procured.

The air is generally tolerably mild; but there is a sensible difference of temperature in different parts of the department. In the marshy districts the climate is constantly moist and unhealthy. The prevailing winds are the north-east, south, west, and north-west, especially the last, which is frequently injurious to the crops. The more common diseases are smallpox, malignant fever, malarial fever, inflammation of the lungs, and rheumatism. In the marshy districts sudden blindness is not uncommon, but it admits of cure.

The soil varies much: but, excepting in the sandy tracts, which form tolerably wide belts, it is considered fertile. Agriculture is in a backward state, but the produce is beyond the consumption of the department. The species of grain chiefly cultivated are wheat, rye, barley, oats, and buckwheat. The vine is cultivated in all parts of the department, though not to any great extent; the wine produced is of very middling quality: half of it is exported. The cultivation of hemp is general. Very little fruit is grown, except by the inhabitants of the little town of Montbron. The sheep and cattle are not many. The quantity of woodland is considerable: the oak is the most common timber tree, and there are the hornbeam, the beech, the birch, and the elder. The ash, oak, and fir are not numerous. The trees are found in the valleys. The pasture lands are extensive: a great number of horned cattle are reared; also of horses, the breed of which is receiving continual improvement, and sheep. The breed of sheep has been much attended to; the wool has long been esteemed very good, and constitutes a considerable portion of the wealth of the department. Swine and goats are numerous, and poultry is abundant, especially geese and turkeys. The heath on the Indre is well watered, and that of the Creuse is but little game. The rivers and pools abound in fish, but the practice of dragging the pools every two years prevents their growing to a sufficient size.

The department is divided into four arrondissements, as follows:

<table>
<thead>
<tr>
<th>Arrondissement</th>
<th>Situation</th>
<th>Area in</th>
<th>Population</th>
<th>Commerce</th>
</tr>
</thead>
<tbody>
<tr>
<td>Châtéraouroux, Central &amp; N.W.</td>
<td>936</td>
<td>96,908</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>Le Blanc</td>
<td>S.W.</td>
<td>726</td>
<td>57,789</td>
<td>56</td>
</tr>
<tr>
<td>Issoudun</td>
<td>N.E.</td>
<td>469</td>
<td>47,527</td>
<td>49</td>
</tr>
<tr>
<td>La Châtre</td>
<td>S.E.</td>
<td>528</td>
<td>55,066</td>
<td>59</td>
</tr>
</tbody>
</table>

There are 25 cantons, or districts under the jurisdiction of a justice of the peace.

The arrondissement of Châtéraouroux contains Châtéraouroux on the Indre population, in 1836, 18,847 and Bourg Dieu, or Bourg Deols (pop. 1792 town, 2113 commune), which is in fact a suburb of Châtéraouroux (CHÂTRAOUROUX; BOURG). Argenton (pop. 3498 town, 3964 commune), on the north-west; the commune of Levroux (pop. 2343 town, 3055 commune), on the Montils; Valancéy (pop. 3095), on the Nahon; Buxauppas (pop. 2729 town, 4416 commune), Palluaux, and Châtillon (pop. 2726 town, 3393 commune), all on the Indre; and Argy, near that river. Argenton was a place of note in the time of the Romans. It was called Argentomagus, and was on the frontier of the Germans and the Britons. Many houses, and other antiquities have been found here. An ancient fortress was demolished by Louis XIV. - some ruins yet remain.
Levroux is also of great antiquity. The Romans erected here a fortress, of which a tower is still standing, and the remains of an amphitheatre and of other antiquities may still be traced. It is supposed that its Roman name was Galatium. The town is surrounded with walls, which, after the fall of the fortress, were strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthened and strengthen
branch from this last road to Lavall (Mayenne). The aggregate length of the government roads is about 192 miles, of which all except seven miles of unffurished road is in good repair. The Routes Départementales have an aggregate length of 282 miles, four-fifths of which are in good repair, the rest out of repair or unfinished. The by roads and paths have an aggregate of 1,000 miles. Much of the agriculture of the department is so well furnished with the means of communication, whether by land or water.

The department is almost entirely occupied by the chalk belt which surrounds the Paris basin. For the westward, the Loire is crossed by the bay of the Loire, the chalk is covered with very deep alluvial beds, and the fertilizing mud left by the inundations of the river has rendered this district so fertile as to obtain for it the designation of the Loire valley. The cultivation of the vine and the growth of wood, and just as others form tolerably extensive tracts of waste land, which however an improved system of agriculture is gradually bringing into cultivation. Freestone, millstones, and stones for lithography are quarried; and there are pipeclay and potteries clays.

The quantity of corn produced is now more than sufficient for the consumption of the department: all kinds are cultivated. Kidney beans and other pulse, vegetables, meadows, and pastures, are general, and so are the carse and coriander; and a great quantity of flax and hemp are grown. The quantity of fruit is great: the plums, when preserved, are in high repute, and are exported to various parts of the kingdom, and for the better market, and for the better market, and for the better market. The wheat is very generally grown, and furnishes a considerable quantity of oil. The meadows are tolerably numerous, but not many head of cattle are bred. Swine and poultry are abundant; game, including the wild boar, the stag, and pheasant, is not very plentiful. The rivers and ponds, and pools furnish fish. The department is divided into three arrondissements, comprehending in all 24 cantons, or districts, under a mayor of peace, and 585 communes.

In the arrondissement of Tours are the capital, of the department, on the south bank of the Loire, with a population in 1836 of 36,669; Amboise (pop. 4613), also on the south bank of the Loire; Château Renaut, or Renaud (pop. 2299 town, 2468 commune), on the Brânne; Laynes, on the north bank of the Loire; Reugny, near the Brânne; Neuvy, near the Long; St. Christophe, between the Long and the Fore; Bière, on the Cher; and Cormery and Montbazon, on the Indre. [Amboise; Tours.] Château Renaut is divided by the Brenne into the Upper and Lower towns. Laynes has a handsome house or almshouse, and several manufactories of lace and trinkings; it gave title to the famous lace, consular of France, and favorite of Louis XIII. In the neighborhood of this town many of the inhabitants occupy dwellings excavated in the side of the chalk cliffs. In the neighborhood of Bière is the largest and best of the old Roman baths, which were destined by the emperors to the Téranes and other baths, De Poitiers, and received great embellishment from her and from Catherine de' Medici.

In the arrondissement of Chinnon are Chinnon (population in 1831 111), and the castle, near the Vitray and near Lime; Richelieu (pop. 3695 town, 3729 commune) on the Mably; Faye, near the same river; Canèzes, on the junction of the Vitray and the Loire; Azay-le-Rideau, on the Indre; St. Espéon and St. Ouen, on the Indre; Vailly, on the Indre; Richelieu, on the Loire; Savy, near the Etang de Rillé; and Château La Villedoire, on the Loire. Chinnon is surrounded with walls, the remains of its ancient fortifications, and has preserved the ruins of a castle, in which Henry II. of England died, and where Jeanne d'Arc presented herself first to Charles VII. of France. The townsmen carry on a considerable trade in wine and in preserved plums. Langenais has the ruins of a castle, built in the tenth century, in an apartment of which was negotiated the marriage of Charles with Matilda of the House of Normandy, a marriage which eventually united that duchy to the crown of France. Some linen are manufactured here; and also tiles. The meleons of the neighborhood are considered excellent.

In the arrondissement of Loches there are: Loches (pop. in 1836, 4753), on the Indre; Beaulieu (pop. 1890 town, 4753 commune), which is little more than a suburb of Loches, being separated from it only by a small island of the Indre and the two arms of the river which enclose it; Montmorot, on the Indroy; Preuilly and Le Goulet, near the Creuse; Le Cluse; La Guerche and La Haye, on the Creuse; Ligueil, on the Evre; and Le Louroix and Montelan, north-west of Loches. Loches is on a slope rising from the river Indre, and is commanded by an ancient castle which overlooks a beautiful prospect, and is rendered interesting by many historical recollections. Here Agnes Sorel sought to arouse the energies of her lover Charles VII.; here Bishop Fautes endured a confinement of eleven years in an iron cage, to expiate his offences against his master Louis XI. The tomb of Agnes Sorel, originally erected in the choir of the church at Loches, is now in the office of the sub-prefect of the borough. It is a simple house, with its simple furniture, is still carefully preserved.

The population as given above is, where not otherwise distinguished, of that of the whole commune, and from the returns of 1836.

The manufactures of the department are of considerable importance. The manufacture of silks for upholstery and for dress, which had long since obtained considerable celebrity, is now carried on in a high degree of perfection. Woolen yarn, woolen cloth, carpets, and flannel; paper, lampas, and damask, where the most important manufacture of the kind in France, are very well made, and thus, together with weaving, and pottery. The best wines are sent to Nantes to be shipped for the Netherlands; other wines are exported to Paris and Bordeaux. Flax is made into rope and sail-cloth at Angers, and exported to Lorraine. Preserved fruits are sent into all parts of France, and even exported to foreign lands.

This department constitutes the archiepiscopal diocese of Tours, and is included in the jurisdiction of the Cour Royale and the circuit of the Académie Universitaire of Orleans. It is comprised in the fourth military division, the head-quarters of which are Tours. It sends four members to the Chamber of Deputies.

In respect of education, the department is in a very backward state. Of the young men enrolled in the military conscription of 1829-30, only 27 in every 100 could read and write.

This department was antiently the seat of the Turones, one of the nations of the Celtic stock, whose name has been preserved in that of the capital of the department, Tours, antiently Caesarodunum. Amboise was known to the Romans by the name Ambapia. Under the late division of the Roman empire, the country of the Turones was comprised in the province of Lugdunensis Terra. From the Romans it passed into the hands of the Franks, who held the part north of the Loire, and of the Visigoths, who occupied all the country south of the Loire; but the conquests of Clovis brought the whole into the power of the Franks. In the reign of Charles the Seventh, the town was given to the abbess of Cluny by the will of Diane de Poitiers, and received great embellishment from her and from Catherine de' Medici.

INDUCTION (Mathematics). The method of induction, in the sense in which it is used in natural philosophy, is not known in pure mathematics. There certainly are instances in which a general proposition is proved by a collection of the demonstrations of different cases, which make up the whole process, or the collection of the general from the particular. Such instances however must not be taken as permanent, for it usually happens that a general demonstration is discovered as soon as attention is turned to the particular.

There is however one particular mode of proceeding

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which is extremely common in mathematical reasoning, and to which we propose to give the name of successive induction. It has the main character of induction in physics, because it is really the collection of a general truth from a demonstration which implies the examination of every particular case; but it differs from the process of physics inasmuch as each case depends upon one which precedes. Substituting however demonstration for observation, the matheematical process bears an analogy to the experimental one, with a difference; the assumption is a sufficient justification of the term 'successive induction.' A couple of instances of the method will enable the mathematician to recognize a mode of investigation with which he is already familiar.

Example 1. The sum of any number of successive odd numbers from 1 to a certain number is always a square number; namely, the square of half the even number which follows the last odd number. Let this proposition be true in any one single instance; that is, n being some whole number, let 1, 3, 5, ..., up to 2n + 1 put together give (n + 1)^2. Then the next odd number being 2n + 3, the sum of all the odd numbers up to 2n + 3 will be (n + 1)^2 + 2n + 3, or n^2 + 4n + 4, or (n + 2)^2. But n + 2 is half the even number next following 2n + 3: consequently, if the proposition be true of any one set of odd numbers, it is true of one more. But it is true of the first odd number 1, for this is the square of the half even number next following. Consequently, 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, etc., are squares of 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, etc.; being true of 1 + 3, it is true of 1 + 3 + 5; being true of 1 + 3 + 5 + 7, it is true of 1 + 3 + 5 + 7, and so on, ad infinitum.

Example 2. The formula x^n = ax^n being a whole number, is always algebraically divisible by x - a.

x^n - a^n = (x - a)(x^n-1 + x^n-2a + x^n-3a^2 + x^n-4a^3 + ... + a^n-1).

In this last expression the second term a^n-1 (x - a) is obviously divisible by x - a: if then x^n-1 - a^n-1 be divisible by x - a, the whole of the second side of the last equation will be divisible by x - a, and therefore x^n - a^n will be divisible by x - a. If then any one part of the succession x - a, x^2 - a^2, x^3 - a^3, x^4 - a^4, etc., is divisible by x - a, so is the next. But this is obviously true of the first, therefore it is true of the second; being true of the second, it is true of the third; and so on, ad infinitum.

There are cases in which the successive induction only brings any term within the general rule, when two, three, or more of the terms immediately preceding are brought within it. Thus, in the application of this method to the deduction of the well-known consequence of

1 + 2 + 3 + ... + n = n(n + 1)/2,

it can only be shown that any one case of this theorem is true, by showing that the preceding two cases are true; thus its truth. When n = 5 and n = 6, makes it necessarily follow when n = 7. In this case the two first instances must be established (whether by hypothesis and when n = 2, by independent demonstration), which two establish the third, the second and third establish the fourth, and so on.

An instance of mathematical induction occurs in every equation of differences, in every recurring series, etc.

INDUCTION (in' dju"n ksh'n), as defined by Archbishop Whately, is 'a kind of argument which involves respecting a whole class what has been ascertained respecting one or more of its members.' And Hamilton the word has been employed to designate three very different operations:—1. The objective process of investigating particular facts, as preparatory to Induction, which is to be derived either directly from the process of reasoning of any kind; 2. A material illusion of a universal from a singular, as warranted either by the general analogy of nature or the special presumptions afforded by the object matter of any particular case; but in the latter case, with less material illusion from the facts of physics individual, as legitimated solely by the laws of thought and abstracted from the conditions of any particular matter.

The second of these operations is the inductive method of Bacon, which proceeds by means of rejections and conclusions that would arrive at those axioms or general laws from which we may infer by way of synthesis other particulars unknown to us, and perhaps placed beyond reach of direct examination. (Nov. Org., Ap. iii., c. iv., c. v.) Aristotle's definition coincides with the third and induction is an inference drawn from all the particulars. ('Prior, Analy., ii., c. xii.) The second and third processes are improperly confounded by most writers on logic, and treated as a single and purely logical operation. But the second is not a logical process at all; since the conclusion is not necessarily inferrible from the premises, for some of the antecedent does not necessarily legitimate the all of the conclusion, notwithstanding that the procedure may be warranted by the material of the science, or the fundamental principles of the human understanding. The third alone is properly an induction of logic; for logic does not concern itself with the facts, but the general terms of thought under which the mind conceives them; and the logical inference is not determined by any relation of causality between the premises and conclusion, but by the subjective relation of the mind. The reason why the inductive process is exactly the reverse of the deductive; for while the latter proceeds from the whole to the part, the former ascends from the part to the whole: since it is only under the character of a constituted part that anything can be taken as a constituent and contained part, that anything can become the term of logical argumentation. Of these two processes, Professor Hamilton gives the following figures:—

\begin{align*}
\text{Induction.} & \\
\text{Deduction.} & \\
X Y Z \text{ are whole B.} & \text{X Y Z are under B.} \\
\text{whole B is A.} & \text{X Y Z are A.} \\
\text{Or.} & \text{Or.} \\
A \text{ contains X Y Z.} & A \text{ contains X Y Z.} \\
A \text{ contains B.} & A \text{ contains X Y Z.} \\
X Y Z \text{ contains B.} & X Y Z \text{ contains B.} \\
\text{A contains X Y Z.} & \text{A contains X Y Z.}
\end{align*}

This confusion of material and logical induction led Gillies and others to insist on the sameness of the Baconian and Aristotelian induction; while Campbell and Dugald Stewart, who to a large extent rejected the value of all logical inference, yet rightly maintained their difference.

By Aristotle induction and deduction are viewed as in certain respects similar in form; but in others as diametrically opposed, the latter being an analysis of the whole into its parts, proceeding from the general to the particular; the former ascends by a synthetical process from the parts to the whole. The logicians who misapprehended the nature of induction reduced it to a deductive syllogism of the third form, and therefore overthrew the validity of all deduction itself, since the latter is only possible by means of the former, which legitimizes the proposition from which its proceeding proceeds.

Again, the Aristotelian induction was drawn from all the particulars, whereas the confusion which Professor Hamilton has pointed out gave rise to a division of the inductive process into perfect and imperfect, according as the enumeration of the particular is a complete or an incomplete one. This, of course, gives only a probable result, whereas the necessity of the conclusion is essential to all logical inference, as its demonstrative stringency depends upon the form of the illation, and not upon the truth of the premises.

(Recent Publications on Logic; Edinburgh Review, April, 1833.)

INDUCTION. [Benefice, p. 219.]

INDULGENCE is a power claimed by the Roman Catholic Church of granting to contrite and confessed sinners remission of the penalty, or part of the penalty, which they ought to suffer here or hereafter in expiation of their sins. The indulgence does not remit either the guilt or the obligation to pay or make amends, but only the temporal penalty which the repentant sinner, after having duly confessed his sins and received absolution, has still to undergo after death, or in respect of his body, according to the belief of Roman Catholics. [Confession.] In the early ages of the church repentant sinners after confession had to undergo public punishment, often very severe in proportion; but in modern times, especially in the 16th century, this was frequently mitigated by the indulgences, which, in particular cases, abridged the austerities enjoined by the canons, or remitted them for works of charity or penance. There were also indulgences granted for special services. (Maldonat, De Indulgentiis; Bibliothèque Sacrée, par les Pères Richard et Giraud, article 'Indulgence'; Lingard, History of England, vol. iv., p. 95.)

Several of the early fathers of the church, such as St. Cyriac (De Loppita) and Theodulfus (De Pudicitia), complained of the abuse of this practice in their time, and
especially that simple priests presumed to grant indulgences, which was the exclusive privilege of bishops, and that bishops themselves granted them with too much facility. The canonical or ceremonial penalties becoming in course of time disused, together with the practice of public confession, the indulgences which continued to be granted afterwards were understood to remit that part of the peine to be undergone in purgatory which was equivalent to the canonical penitence which would have been awarded by the early church. (No. 47.) The faith of Catholicks, says Maimbourg (Histoire du Luthéranism, vol. i.), has always been that the Son of God has conferred on his church the power of relieving the penitent sinner not only from the bonds of hell by his merited sacrifice of atonement, but also from the punishment which he would suffer, either in this world or the next, as a satisfaction to the divine justice for offences committed after baptism. Hence St. Paul, at the request of the Corinthians, remitted to the incontinent man whom he had excommunicated, the remnant of the penalty incurred for the crime; hence the bishops of the earliest ages gave peace to apostates, and reconciled them to the church by abridging the time of the criminal penance through the intercession of martyrs, and in virtue of their sufferings, joined to those of the Saviour of the world, who redeemed them precious in the sight of God. The 'Bibliothèque Sainte,' above quoted, contains the most elaborate article on the subject of indulgences, divided into eight sections, namely, 1. On the name and nature of indulgences. 2. On the various sorts of indulgences. 3. On their virtues and effects. 4. On the manner of acquiring them. 5. On the causes of indulgences. 6. On the subjects or persons to whom indulgences are applied. 7. On the conditions and dispositions required in order to obtain the benefit of the indulgences. 8. On the abuse of indulgences. We may observe on this last point that indulgences are granted in some cases to those who give money for the building of churches and other pious purposes; but that the sale of or traffic in indulgences has never been so unprofitable by many councils, and the bulls of indulgence have been so directly against the Pope contain the clause that 'if any thing be given as the price of this indulgence, the indulgence itself becomes null.'

INDUS. [HINDUSTAN.] The INDUS (the Indian), a constellation of Bayer, situated between Sagittarius and the South Pole.

INEQUALITY. (Astronomy.) For convenience, the average motion of a planet or satellite, supposed to be made in a circle which has the average distance of the body from the sun or primary for its radius, is the first object of calculation, and the place of the body a, b, or motion, but requires for that purpose the action of some external cause, to the magnitude of which the change is in proportion. Previous to some remarks upon the use of this word, we shall say at length the third definition of Newton's Principia, from which the common usage of it is derived. 'The vis ineritae, or innate force of matter, is a power of resisting by which every body, as much as in it lies, endures or tends to persist in its place, or is the foundation of the body's habit; of moving uniformly forward in a straight line. This force is ever proportional to the body whose force it is; and differs nothing from the inactivity of the mass, but in our manner of conceiving it. A body, from the inactivity of matter, is not without difficulty put out of its state of rest or motion. Upon which account this vis ineritae may, by a most significant name, be called vis inertiae, or force of inactivity. But a body exerts this force only when another force impresses upon it, endeavours to change its condition.'

We could wish that the use of this word were entirely exploded, and for the following reason. When a term is proposed to stand for a property, mode of being, or condition of existence, about which we know nothing except that certain phenomena always occur under certain circumstances, such a proposition may be listened to, on condition that there is in our power to enumerate phenomena which wants a distinctive name, and also on condition that the word is to be used in a purely characteristic, and not in a doctrinal or explanatory, sense. Thus the word impermeability [imbosorption], though likely to cause misconceptions, as pointed out in the last notice, is nevertheless a good word to those who know how to use it, and a necessary word to those who desire to describe and reason on our knowledge of matter. It conveys to the mind, by one act of separation or at least, the notion of a cause for a phenomenon which might be conceived to exist independent of the other properties of matter. We can imagine impenetrable space, not endowed with mobility, colour, or composition, or any other second property. But what other property can be used by Newton, we do not describe any quality of matter, but supply a term of causation for matter itself, so far as these properties are concerned which are studied in mechanics. The question is, 'What is the matter of a body of a certain type of dynamics? That which obeys certain three laws of motion, or presents phenomena which are of a certain threefold description. What word, according to Newton, should be used as a term for a body of a matter thus characterized?'

Inertia. [Inertia.] The INERTIA. What for the second law? The inertia. What for the third law? Still the inertia. Consequently, this inertia is literally nothing but an expression of the possibility of every body to pass over other laws except those which it really does obey; and the policy of admitting such a term is not merely a question of mechanics. Need we accompany every fundamental term of every science by another, which merely expresses that there must be some reason why the thing signified has the collection of properties which it is found to possess, and not any other? We think the answer must be in the negative, in which case the term itself may be substituted for a substance, the two phrases being perfectly interchangeable in every work on mechanics. [Motion, Laws of.]

If the word Inertia be admitted at all as one of distinction, it must be limited to the object of observation of a kind of mechanics. In the former we consider space only, that is, bounded portions of space: in the latter we suppose this bounded space to have inertia. But the distinction is quite sufficiently made in the introduction of the less of rest or of moving uniformly forward in a straight line. In geometry we consider space without reference to the question, whether the space be vacuum or matter; in mechanics we consider matter. Thus much as the use of Inertia in a scientific sense: in many popular writings we find it applied as a sort of explanation of the properties of matter, which are so and so because matter has inertia. Since this various application of words is not by any means confined to the case before us, it is needless to multiply the instance.

There is one use of the word inertia which is convenient and harmless, namely, as part of the phrase MOMENT OF INERTIA. If we imagine a material system which admits of no revolution about any axis, it is enough that the mass is closely the matter of which it is formed is collected about the axis the less resistance will be offered to the production of rotary motion. The law of this resistance will be explained in the article following.

INFANT, a person under the age of twenty-one, whose acts are in many cases either void or voidable. As a general rule, an infant cannot make any binding contract, though to this there are some exceptions: thus an infant may bind himself to pay for his necessary meat, drink, apparel, physic, and such other necessaries, and likewise for his good teaching and instruction. (Co. Lit., 172.) But where the infant is liable to be responsible under his father's care, he is not liable even for necessaries. The necessaries for an infant's wife are necessary for him.
Since the article Age was published, the statute 1 Vic., 26, has been passed, by the 7th section whereof persons under age are incapacitated from making a will of personal property, which before the passing of this act they were competent to do.

It should also be observed, that an infant, how young soever he may be, and even a child in the womb, or, as it is technically expressed, en centre sa mere, may be appointed an executor; but the statute 26 Geo. III., c. 87, disfrances annullating the effect of any such appointment, if the same be actually exercised after the death of the infant, or after he is born, and before the infant has attained the age of seven years.

INFANT SCHOOLS. [School.]

INFANTICIDE. The practice of putting infants to death has prevailed from the very earliest periods and nations, though the motives for the act have somewhat varied. In some at least of the states of Greece the destruction of those who were born weak or deformed was either commanded or allowed. In Rome children were exposed or put to death, not only with the view of removing those who might throughout life have remained a burden to their friends and useless to the state, but to prevent the too rapid increase of the population.

The custom of exposing the infant was checked for a time in France, and A.D. 315, Constantine the Great provided for the maintenance of the offspring of those who were themselves destitute, and imposed severe punishments upon cruel fathers. This prevailed however to a slighter extent till the time of Charlemagne, when the sentence of execution, 'born in the letter and spirit of the Cæsarian Law,' (Gibbon, Decline and Fall.) Among the contemporary barbarous nations, the same motive, and the sacrifices required for their deities, induced the same crime to even a greater extent.

In modern times, the practice, though it is not anywhere sanctioned or commanded by law, is yet permitted in many countries. In China a large proportion of the female population is put to death as soon as born. Among the Hindus it was practised to a very great extent, till the marquis of Wellesley, when appointed Governor-General of India, used every possible exertion to put a stop to it. By this means the custom was reduced to a small extent, and his exertions were successful, though unhappily for only a short time, for Bishop Heber tells us that since that time things have gone on very much in the old train, and the answer made to the chiefs to any remonstrances of the British officers is, "Pay our daughters' marriage portions, and they shall live!" (Narrative of a Journey in Upper India, and Hindu Infanticide, by E. Moor, F.R.S., 1811; including Wellesley's plan to abolish the practice.) Heber remarks that in 1821 "the number of males exceeded that of females by 20,000; in one district there were to every hundred men only fifty-five women, and in those parts where the number of females is peculiarly small, the female population is about one hundred to the Musulman." Here also, as in Hindustan, the difficulty and expense of educating female children, and the small probability of their marrying without some dowry, while a single life is deemed disgraceful, are the motives leading to the perpetration of the crime. As considered by the Mohammedans, the practice is not discontrusted, though the necessity for it is greatly lessened by the habit of producing abortion, which is universally prevalent. In the numerous islands of the Pacific, infanticide is practised to such an extent, that some of them have at times, when pestilence has contributed its influence, been nearly depopulated. When Cook visited Otaheite, he found its population to be upwards of 20,000; but during the last part of the century it was reduced to between 5000 and 6000, and this principally from the practice of murdering their offspring. Mr. Ellis (Polynesian Researches) says that he does not recollect having met with a female in the island, during the whole period of his residence there, who had been a mother, while idolatry prevailed, who had not imbrued her hands in the blood of her offspring. We have similarly destroyed the offspring of nearly all the Indian tribes in America, from Hudson's Bay, Labrador, Mexico, &c.; but it is most gratifying that in all, one of the first and greatest blessings which have followed the introduction of Christianity, has been the decrease or complete cessation of this abominable custom.

In more civilized lands, although infanticide is regarded with the deepest abhorrence, and is visited with the ex-


treme severity of the law, the expense and trouble of maintaining, and the fear of shame and loss of reputation, are motives sufficiently powerful for the occasional perpetration of the crime.

It is one of the most difficult questions of Medical jurisprudence to discover and establish the murder of a child lately born. The chief points for decision are, 1st, whether the infant, the subject of inquiry, was born dead or alive; and 2nd, whether its death was the result of violence or of natural causes. The law has provided for the application of these principles to the effect that the consequence of misfortune, or whatever its nature, is not to bemixed.
might arise from any of these circumstances may be removed by cutting up the lungs into small portions and squeezing each piece firmly under water: if natural respiration has been performed, the smallest portion of lung, unless torn by the continued pressure into mere shredlets, will continue to float: but if they have been completely expelled that portion will sink. In no case moreover, except where natural respiration has taken place, will the absolute weight of the lungs be increased; for if the child has lost the increased flow of fluid from the heart take place.

On the other hand, there are very rare cases in which, though the child was born alive, the lungs will not float. The same cause may be the exact cause of being able to breathe completely, but in both these cases the same plan of cutting each lung into small pieces and testing each will remove all doubt, for there will be at least some portions into which the air has entered sufficiently to be made to feel. Statoc and hydrostatic tests therefore, when carefully employed together, will certainly prove whether the child have breathed, but they afford no evidence as to whether it was murdered or not. For it may have lived for a short time without breathing. These cases are however exceedingly rare, and their occurrence is so clearly indicated by the circumstances that they can ever embarrass the evidence that would be given. The signs of a child having lived after birth, which are to be found in the heart and other parts, need here be only alluded to. They consist in the part of the clotting of the blood unless life has continued for at least a day, and then the lungs alone will always suffice for decision. Neither need we here consider the evidence required to prove whether a child has been punished, or died from natural causes, for it must be similar in all respects to that which is necessary in cases of homicide.

Law relating to Infanticide.—If the result of the evidence is that the child was born alive, and that it was destroyed, the offence is murder, and punishable accordingly. [MURDER.] So also if a woman be quick with child (that is, if she has felt the child move within her), it is murder if she take, or any person cause, or cause, or use any means to procure abortion. But in cases where the woman is not quick with child the offence is felony, and punishable at the discretion of the court by transportation for any term not exceeding fourteen years or more. The murder of bastard children by the mother was considered as a crime so difficult to prove, that the statute 21 James L. c. 27, made the concealment of the death of a bastard child equally criminal with that of a legitimate child, and by the mother, except she could prove, by one witness at least, that it had been actually born dead. This cruel law was mitigated by the 43 George III. c. 36; and now, by the statute 9 George IV. c. 31, sec. 14, the concealment of the body of a bastard child is declared to be a misdemeanor, and made punishable by imprisonment for any term not exceeding two years, with or without hard labour.

These are the regulations of the English law directed to prevent infanticide. There are however institutions in this country, as well as in many other European countries, which have been founded with the view of restraining the commission of this very heinous and heinous children; for in all of them, except the London Foundling Hospital, which is a comparatively wealthy establishment, their records show an astonishing amount of mortality, in some cases high as seven out of ten lives.

The cause of legislation for the prevention of infanticide, and the existing laws upon the subject, which have been established in most of the countries of which we have any knowledge, are clearly and concisely stated in Dunlop's edition of Hook's Elements of Medical Jurisprudence, pp. 185-194.

INFANTRY is a name given to the soldiers who serve on foot. It is immediately derived from the Italian word fanto, which, though in strictness denoting a child, is in general applied to any young person. From the latter word comes fantoccino, and this is the origin of fantassin, a name which was once so commonly applied to a foot-soldier. During the time that the feudal policy was in vigour the numerous dependants of the nobility served in the wars, for the most part, on foot; and being called children, because they were so considered with respect to their patron lords, or, to the towns or seigneories to which they belonged, the infantry became at length the general name for that species of troops. Boccaccio, who wrote in the fourteenth century, designates by the word fanteria the men who marched on foot.

Among the ancient nations of Europe the foot soldiers constituted the chief strength of the armies. In the best days of the Grecian and Roman states battles were mainly won by the body and discipline of the phalanxes and legions, and the number of the infantry in the field exceeded that of the cavalry. The latter were then, as at present, employed chiefly in protecting the wings of the army and in completing the victory which had been gained by the former. It may be remarked also that most of the writers on tactics, from Polarn downwards, express a decided preference in favour of the infantry.

The French historians agree that the ancient Franks, when they left the banks of the Rhine, when they set out on their marches and fight on foot; and that they persevered in this practice even after they had obtained possession of the country of the Gauls, which abounded with horses. In this country part of the French army consisted of infantry, the cavalry being formed of the thanes, or richer proprietors of the land; the infantry were divided into heavy and light armed troops; the former being provided with swords and spears and large oval shields, and the latter having only spears, clubs, or battle-axes.

But soon after the time of Charlemagne the institutions of chivalry began to be generally adopted in the kingdoms of Europe. The custom of frequent and prolonged exercises of martial exercises on horseback in presence of the sovereigns and assembled nobles; and the interest inspired by the achievements of the knights on those occasions was natural followed by the request and regard for the arms of men. By degrees the cavalry, which was composed of persons possessing rank and property, and completely armed, acquired the reputation of being the principal force in war; and the foot soldiers, ill armed and disciplined, were held in comparatively small esteem.

From the capitiaries of the French kings of the Kings of the second race it appears that the foot soldiers who served in the armies of France consisted of slaves and freed serfs: the latter were either cut off from the rank of the army, or were not liable to the service. The murder of bastard children by the mother was considered as a crime so difficult to prove, that the statute 21 James L. c. 27, made the concealment of the death of a bastard child equally criminal with that of a legitimate child, and by the mother, except she could prove, by one witness at least, that it had been actually born dead. This cruel law was mitigated by the 43 George III. c. 36; and now, by the statute 9 George IV. c. 31, sec. 14, the concealment of the body of a bastard child is declared to be a misdemeanor, and made punishable by imprisonment for any term not exceeding two years, with or without hard labour.

The English troops at that time wore a plain iron helmet called a bacinet, and a linen doublet stuffed with wool or cotton; their arms were generally pikes, but frequently they had swords and battle-axes.

Under the third race of kings in France the possessions of fiefs were not compelled to furnish infantry for the armies; and it appears that this duty was then imposed on the towns. This practice was continued, for which much account is given in the article FOUNDLING HOSPITALS; but the history of these establishments shows that though they have may rendered infanticide less frequent, they have by no means tended to preserve the lives of illegitimate children; for in all of them, except the London Foundling Hospital, which is a comparatively wealthy establishment, their records show an astonishing amount of mortality, in some cases high as seven out of ten lives.

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INFANTRY is a name given to the soldiers who serve
Swiss; and subsequently Charles VIII. added a large body of Lanzquenets, or German infantry. The reputation of the native troops in France seems to have been then at a low ebb; for Brantôme, in his Discours des Colonels, describes them as being mostly the refuse of society—men with matted hair and beards, who for their crimes had had their shoulders branded and their ears cut off. On the other hand the Swiss soldiers were inured to discipline; they were protected by defensive armour and formed into deep battle files. When, in state they were arrayed to render their shock of cavalry entirely unavailing. Large divisions of these troops accompanied the army of Charles VIII. into Italy, in 1494, where their good conduct and discipline greatly contributed to raise the reputation of the infantry to its ancient standard.

The superiority of this class of troops consists in their being able to act on ground where cavalry cannot move; and it is evident that the latter must, at all times, have been nearly useless in the attack and defence of fortified castles or towns. Even when the cavalry were held in the highest estimation it was sometimes found convenient for the knights to dismount and act as infantry. Freisaert relates that at the battle of Cerignola, the English cavalry, the infantry of the cavalry having retired, had been supposed, though this opinion of the origin of the name is now rejected as fanciful, to have been commemorated by the designation of infantry, which was bestowed on them in consequence of their having been headed on that occasion by an Infante of Spain. The great share which the Spanish forces had in the wars carried on both in Italy and Flanders during the reigns of Ferdinand, Charles V., and Philip II.; their success being the result of the union of the English and Spanish arms, and the success with which the armies of the two countries were kept in working order, have led to the term being applied by historians to the whole army of Charles VIII. which engaged and defeated the French at Pavia. It is also said, in consequence of the superiority of their infantry, that at the battle of Pavia they were the first to cross the river Po. The battle of Pavia was fought on March 24th, 1525. The superiority of the French cavalry in this battle is attributed to their use of the cavalry charge.

Phylidia.

Mantle naked, and most frequently coriaceous; no shell.
Mouth a small proboscis, with a tentacle on each side; two other tentacles come forth above two small cavities of the mantle.
Organs of Generation under the right side forward. Heart towards the middle of the back.
Stomach simple, membranous; intestine short. (Cuvier.)

M. de Blainville describes the body of the genus Phylidia as oblong and rather convex; the head and the foot hidden by the mantle. In the branchia, the two upper ones retractile in a cavity which is at their base, the two lower buccal; mouth without an upper tooth; a lingual denticulated mass; branchial laminae all round the lower border of the mantle, except in front; vent at the posterior and mesial part of the back; oviduct of the organs of generation in a common tubercle at the anterior third of the right side.

Example, Phylidia putulosa.
Locality, the Indian Seas, where the other species have also been found.

Phylidia putulosa.

Diphylidias (Lingueilla ? Leach).

Branchiae nearly the same as in Phylidia, but the mantle is more pointed behind; the head, which is dimorphic (la tête, en demi-cercle), has on each side a pointed tentacle and a slight tubercle; vent on the right side. (Cuvier.)

M. de Blainville thus describes Lingueilla, which both Cuvier and himself seem to consider as identical with Diphylidia.

Body oval, very much depressed, the mantle projecting beyond the foot on all sides, except in front; head uncovered. Branchial lamellae oblique, and only occupying the two posterior thirds of the inferior border of the mantle; vent inferior, situated at the posterior third of the right side; oviducts in the organs of generation in the same tubercle, at the anterior third of the same side.

Example, Lingueilla Effortii (De Blainv.), Diphylidias Brugmani. (Cuv.)

M. de Blainville states that the locality is unknown. Cuvier says that Lingueilla Effortii appears to him not to be different from his Diphylidias Brugmani.

M. de Blainville further says that it is probable that the genus established by Cuvier under the name of 'Armina' does not differ much from Lingueilla. In his 'Additions and Corrections' to his 'Manuel' he says that which the odour is emitted; it should be sprinkled about the floor and on the walls; or small vessels containing it should be exposed to evaporate in the air; or pure chlorine should be dispensed in the form of gas from the materials from which it is manufactured. (Clorina.) Fumigations with aromatic resins, as camphor, &c., are perfectly useless, only serving to conceal the smell, but having no influence either on it or the infectious particles. Perfect cleanliness is of the greatest importance; every portion of the room or house should be carefully and frequently washed with hot soap and water; clothes and everything removable should be immersed in hot water, and after being well washed, should be exposed for a long time to the open air, or sprinkled with chloride of lime; the walls and ceilings should be whitewashed, and beds, bedding, &c., cleaned and exposed in the open air. Dr. Henry has rendered it probable by numerous experiments that the infectious qualities of substances which cannot be conveniently washed, as trunks, packages of valuable merchandise, &c., may be sufficiently destroyed by exposing them to a dry heat of 200° for not less than an hour.

Inferobranchiata, the third order of Gastropoda in the system of Cuvier, who describes them as having nearly the form and organization of Doris and Tritonia, but remarks that their branchial, instead of being placed on the back, are arranged in the form of two long series of leaflets on the sides of the body under the advanced border of the mantle. He records two genera, Phylidia and Diphylidia.

Diphylidia (Lingueilla ? Leach).

Branchiae nearly the same as in Phylidia, but the mantle is more pointed behind; the head, which is dimorphic (la tête, en demi-cercle), has on each side a pointed tentacle and a slight tubercle; vent on the right side. (Cuvier.)

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M. Otto has discovered a species of *Linguella* in the sea of Naples.

**Linguella** Eilottii. (De Blainv.)

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M. Rang observes that *Diphylidia, Linguella*, and *Armita* have identical Cuticula, which should be preserved; the two subsequent names should consequently be omitted.

**INFINITELY, INFINITY, INFINITESIMAL, INFINITESIMAL CALCULUS.** The word infinite is literally 'without bounds,' and when applied in an absolute sense to magnitude means that its quantity is utterly unlimited, so that there is no conceivable and determinable magnitude but what is less than the infinite magnitude.

The notion of infinity is therefore at first purely negative, but it does long remain so: for we are forced upon what we take the liberty of calling a definite notion of infinity, by our consideration of time, space, and number. We cannot convey to our minds the conception of space, or confine it within certain limits; nor can we suppose duration to have an end. Even if we imagine our own annihilation we cannot rid ourselves of the idea of something else existing, with the immutable conception of unbounded space and eternity. If we try to conceive all sentient existence at an end, we know from reasoning that we ought to suppose also the annihilation of space and time: but the constitution of our nature must not permit it, and as long as we exist we think, even about our own non-existence, the reality of space and time will prevent our conceiving their destruction.

Whether the preceeding be good or bad metaphysics is perfectly indifferent to us, since the idea of infinite is infinite in the exact sciences: the ideas expressed, true or false, are those which will, in the first instance, present themselves to the mind; and those which object to one method of expression will embody the same thoughts in another.

The other extreme in the scale of quantity is the perfect absence of all magnitude, expressed in the word 'nothing' or the technical term 'zero.' If it is necessary to treat the two together in mathematical reasoning, since all difficulties which belong to the one term belong equally to the other. We have also to consider the words 'infinitely small' as well as 'infinitely great.'

There are two distinct methods of proceeding in regard to the employment of these terms in mathematical reasoning. Firstly, we have those who would use the words 'infinite' or 'nothing' in their absolute sense, relying upon the theory of the magnitudes how they be finally signified by them. Secondly, there are others who would entirely banish the use of the words, because in their absolute sense they do not represent assignable magnitudes. Thirdly, others admit the use of the words, guarding them by definitions which point out the processes in the expression of the results of which they may be employed.

The first it is answered that the absolute use of *w* and 0 (the mathematical symbols of infinite magnitude and absence of all magnitude) in the same manner as symbols of definite quantity, is extremely liable to lead to error; which was never avoided by the advocates of this system, except by expounding their theory, and applying in practice the maxims alluded to under the third of the preceding heads.

The absurdity of an absolute and unrestricted use of these terminal symbols may be very easily shown, if it be maintained that they are to be used precisely as other symbols. For example, it will readily be conceded that if *a times x be y* and if 8 times *x be y* then *a and b* must be equal. Now twice an infinite magnitude is infinite, and three times an infinite magnitude is infinite, therefore 2 and 3 must be assumed to be equal. The same is true of the unrestricted use of *w* and 0 avoid such results by a method of selection which amounts to keeping within the definition presently to be noticed.

To the second of the three sects above mentioned it may readily be conceded that they have a right to refuse any branch of mathematical reasoning, so far as themselves only are concerned. But we deny that the code of mathematical controversy contains any such axiom as that 'mathematics is the science of assignable magnitudes only,' by which to claim the submission of an opponent. The general rule is, that mathematical demonstration exists wherever there is a logical deduction, and that is universally relevant to magnitude. Nor does the word 'universally' here mean that such maxims must have obvious to every individual of the human race. If there were no such thing as mathematical demonstration they would not have found instances in which persons have denied that the sum of all the parts makes up the whole. It would not be very easy to lay down a rule by which it should be determined what fraction of 1 is a fraction equal to 0, and the conclusion appears to us to be the practice. When any individual who has been successful in advancing the mathematical sciences, and whose talent and originality are widely known, disputes what is usually received as a first principle, it is customary for subsequent writers on the same subject to preserve his objections, and place them before the reader. If two or three such persons unite in an objection, the fact of there being a majority of the same class on the other side would not save the principle attacked from being considered as dubious. All differences which affect results are very soon settled; but those which only array one mode of reasoning against another, appearing to do as much for the one part as the other, which fundamental and indefinable terms are understood, are generally perpetuated from one age to another. Now it is a proposition which is very rarely disputed, that the science of mathematics is concerned with magnitude, and that the notion of infinity, though requiring to be used with care, is one with regard to which sound and obvious maxims of reasoning may be laid down.

We proceed to state these principles, that is, to enumerate the method followed by the third of the sects mentioned. If we look at the manner in which we derive the notion of infinity, we shall not find any one who imagines that he absolutely understood the notion of infinity, as it was signified by one single and independent conception of his mind. To space, space may be added, to this again space may be added, and so on without limit, until the space thus accumulated is greater than any finite space (I am sorry to say which was named at the outset of the process. From thence comes the notion of infinite: we cannot imagine the greatest possible space, because any space, however great, being diminished may be made greater. Consequently the phrase 'space is infinite,' whatever more it may imply, certainly may be allowed to stand for an abbreviation of the preceding two sentences. And in like manner, if we see a conclusion—which we can nearly always obtain by the use of a magnitude how it is used, and the use of a larger, and so on without limit, that is to say, as nearly as you please, if we may use a magnitude as large as we please, but which is never absolutely attained by any conception how it is used, and the use of the latter principle, said, for abbreviation, to be absolutely true when the magnitude is infinite. It may appear to some as if the conclusion, under the preceding circumstances, is really true when the magnitude is infinite: this may or may not be the case, but the mathematical use of the word infinite does not require the question to be raised. The convention under which that term is introduced demands that the preceding conditions shall be fulfilled, and excludes the word whenever they are not fulfilled: those who think that the fulfillment of the conditions makes that which we call a convention a necessary consequence, most on common will add that it would reject the term as a term of infinity. The former are allowed their own words, and their own result, together with their own method of arriving at it; the latter are not required to use the word infinite, except as an abbreviation: to the mere collection of the letters which compose it, and the words which have been largely objected to, the conditions of its introduction are precise and intelligible.

We shall now give a few instances of the development of propositions in which the word infinite appears.

1. When *z* is infinite, *A* may be made as nearly equal to *B* as you please if we may take *z* as great as we please; but no value of *z*, however great, will make *A* absolutely equal to *B*.

2. A finite quantity, divided by an infinite quantity, is
nothing.' If $x$ be divided by a comparatively great quantity, the quotient is small; this quotient may be made as small as you please, if we may take the divisor as great as we please; but no divisor, however great, will make the quotient absolutely equal to nothing.

3. But since a regular polygon of an infinite number of sides nearly coincides with the circle; a polygon may be made to coincide with the circle as nearly as you please, if its number is great enough. But no polygon, however great its number of sides, can absolutely coincide with the circle.

4. When $x$ is infinite and $a$ and $b$ are both finite; but $a$ is as great as $b$. This is said when it is true that $a$ increases, $A$ and $B$ both increase, so that $a$ and $B$ may both be made greater than any quantity you name, provided we may then make $x$ as great as we please: provided also that $A$ increases faster than $B$, so that when you name any number, however great, we, being allowed to make $x$ as great as we please, can make $A$ contain $B$ more than that number of times.

5. When $x = a = x$. This is infinite. It may be said when $x$ is greater than $a$, or nearly equal to $a$, and may be made as great as you please, if $x$ may be made as nearly equal to $a$ as we please: provided that, however near $x$ may be to $a$, $x$ has still an assignable value.

6. However, one of these conclusions is sufficient to show what is meant when the terms 'infinite,' 'infinite,' or 'infinite, great,' appear: we now proceed to the corollaries of 'nothing,' 'infinite, small,' 'evanescent,' &c. The independent use of the adjectives 'finite' and 'small' laid down by some writers is yet more difficult than that of infinitely great. If $A$ be an assignable magnitude, $x$ is said to be infinitely small when it is so small that it is absolutely incomparable to $A$, so far as $A$ may be termed a magnitude. Now, taken in this sense, $x$ may be absolutely equal to nothing, this cannot be; so that the infinitely small quantity, as thus defined, can have no magnitude whatever. Here we seem to rest, not in an absolute manner; for what possible benefits may not arise from inventing a new word to stand for the nothing by which two equal magnitudes differ? A little further consideration of the term 'nothing' will here be necessary.

There is one process of arithmetic which yields an absolute zero, namely, subtraction. From a take $a$, and nothing remains. Consequently, in considering the idea of the absence of all magnitude, we usually refer it to the result of that process, of which it is directly and unambiguously obtained. But from no other process of arithmetic does this idea arise, except by the same train of ideas which leads us to the use of the word infinite. We cannot, for example, obtain the notion of nothing by taking the absolute magnitude by another; we can make the result small, smaller, as small as we please, but not absolutely nothing. When therefore we consider an equation made by addition and subtraction, the absolute magnitude of nothing is without reservation: thus, $2x + 3 = a$, and $2x + 3 = a = 0$, may be written for each other without any particular examination of the symbol $0$. But in any other case we can only consider it as the limit towards which we approach by an interminable succession of diminishments, no one of which is ever final, corresponding to the interminable succession of augmentations by which we attain the notion of infinite. In strict analogy therefore with our former proceeding (mutatis mutandis, we repeat our former conclusion—which we can nearly attain by the use of a small magnitude, more nearly by the use of a smaller, and so on without limit, that is to say, as nearly as you please by the use of a magnitude as small as we please, but which is never absolutely attained by any magnitude however small; then such conclusion may be said, for abbreviation, to be absolutely true when the magnitude is nothing. The sentence then follows, 'nothing,' 'infinite,' and 'infinite' into 'nothing.' But in the meanwhile the term infinitely small does not approach its use seems to be superseded by that of the word 'nothing.' And it is true that 'nothing,' introduced under the preceding conditions, might supply the place of an infinitely small quantity. But since there is an absolute use of 'nothing,' not merely subtraction, from which the mind clings, and of which we do not find the like in connection with the term infinite, we shall, after some further explanation, use the term infinitely small instead of 'nothing.'

Our explanation of the term infinite will readily show the meaning of the following assertion; two infinitely great quantities may have a finite ratio. As follows—when $A$ and $B$ are two great their ratio may be nearly, say that of $10$ to $7$; when they are still greater they may be still more nearly in that ratio, and so on; and their increase may be so regulated that the greater they become the more nearly is their ratio, but no polynomial, however great its number of sides, can absolutely coincide with the circle.

But the idea of two nothings which have a finite ratio, however strictly defined in accordance with the preceding conditions, shocks even many of those who can grasp the method of using the word 'infinite.' The absolute nothing of this order is the possession of the reason, and we are forced to content ourselves while to contest it for the use of a word. The term 'infinitely small' therefore supplies the place of 'nothing' whenever the latter is introduced under the conditions correlative to the absolute nothing. We may take the magnitude which is allowed. But it must be remembered that if the infinitely small quantity thus introduced is to be added to or subtracted from a finite quantity it makes no change in the former, in the same way as the infinity of arithmetic. In two instances of the development of propositions will now be given.

1. When $A$ is infinitely small $B$ is infinitely great. As $A$ diminishes $B$ diminishes; for what possible benefits may arise from inventing a new word to stand for the nothing by which two equal magnitudes differ? A little further consideration of the term 'nothing' will here be necessary.

2. An infinitesimal arc of a curve is equal to its chord. (The smaller the arc the more nearly are the two in the ratio of $1$ to $1$; and the ratio may be made as nearly as you please that of $1$ to $1$; if the arc may be taken as small as we please.

3. Of two infinitesimal quantities, one may be infinitely smaller than the other. When two magnitudes, $A$ and $B$, diminish together, the smaller they are made the greater may be the ratio of $A$ to $B$, in consequence of $B$ diminishing much faster than $A$; and it is possible that $A$ may be made to $B$ in a great ratio as you please, if both quantities be diminished. Let us suppose that $A$ is the sine of an angle; $B$ the length of the arc over which the sine is taken. Both diminish without limit with the angle; but the smaller the angle the greater the number of times which the sine contains the versed sine; and therefore $A$ may be made to $B$ in any ratio.

Infinite small quantities thus used have been called infinitesimals, and a succession of infinitely small quantities, each of which is infinitely smaller than the preceding, is said to be a series of infinitesimals of different orders. Such a series is $x, x^2, x^3, &c.$, in which, by making $x$ sufficiently small, any one may be made to contain the next as often as we please. The infinitesimal calculus is a name sometimes given to the differential calculus, when presented by means of the idea of infinitely small quantities, in the manner originally propounded by Leibnitz.

The preceding considerations refer to the substance of nearly all the disputes which have arisen under the first principles of the differential calculus (Differential Calculus); and the different systems noticed in that article (with the exception of that of Lagrange [Functions, Theory of]), spring out of different views of the manner of presenting the same principles of demonstration.

In the article Angle we have taken notice of the circumstance that an extension of the word 'equal' to infinite spaces which coincide, would allow of a proof of the well-known assumption of Euclid, that two equal angles having their sides infinitely extended. We have then two infinite spaces, of which it may readily be proved that either, may be made to coincide with the other through the whole extent. And if any two angles are taken, and their infinites of sides be drawn, it is known that the infinite space of the greater angle is greater than the
Inflammation may be either acute or chronic, circumscribed or diffused, acute inflammation being that which occurs in a person otherwise healthy, which run a regular course, are usually of an acute character, and terminate in a few days, whereas chronic inflammation is one in which the disease is of longer duration.

Terminations.—Inflammation is said to terminate in three important ways: suppuration, the formation of pus; resolution, the return of normal tissue; and granulation, the formation of new tissue. Suppuration is said to have occurred when the inflammation has gone on to the formation of pus; the swelling then becomes more prominent, of a shining red colour, and soft in the centre; if now no artificial opening be made, the matter obtains exit through one or more orifices produced by the absorption of the walls of the cavity in which it is contained, and as it escapes, in popular language, is said to have burst. Mortification is the final and most frequent but not the only mode in which inflammation can terminate, and usually is productive of great constitutional disturbance; when it is the result of a high degree of inflammation, the attendant pain is exceedingly severe, the bright red same feature of the part becomes livid, and vesicles form on its surface; complete death of the part then takes place and the pain abates, but the pulse is small and feebile, and great prostration of strength, with troublesome hiccup, are the constant attendants.

Causes.—The remote or exciting causes of inflammation are produced either by mechanical violence or by the action of chemical or other agents; but it sometimes occurs spontaneously, or without any perceptible cause for its production. With regard to the proximate cause, this is a question which is not so easily solved; it has occupied the attention of pathologists from the earliest times, and the number of theories on this subject attest the number of those who have interested themselves in the inquiry. The older pathologists imagined that all inflammations were produced by the union, or flow of certain humours to a part, and the peculiar nature of the swelling was supposed to depend upon the kind of humour; thus blood produced phlegm, bile produced phlegmasia, &c. After the discovery of the circulation of the blood by William Harvey, Boerhaave appears to have been the first who applied the discovery to the solution of this complicated question: he supposed that the minute blood-vessels became obstructed by the viscosity of the blood, or where this viscosity did not previously exist he imagined that the larger globules of the blood passed into the small vessels and blocked them up. But change in the this case it is clear that a is in the centre, being first formed, will expand before bc and cce, that is, will open on one side, and the same way all the others: hence the order of expansion of the flowers is from the centre to the circumference. To this kind of inofrestance is called a cyma. It occurs in the common Elder, the Laurus tinus, &c.

The centripetal inofrestance, in its simplest state, is merely a branch bearing flowers instead of leaf buds, as in the Hyacinth and the Orchis. In the Orthocarpus, it is a spike, if stalked, a raceme. If sessile, it is then called a spike; if stalked, a raceme. If sessile, it is then called a spike; if stalked, a raceme. If sessile, it is then called a spike; if stalked, a raceme.
to become a broad disk, as in the Dandelion, or Daisy, or
common Artichoke, the inflorescence is called a head or
capitulum; if the same thing happens to a raceme, the
umbel of Astrantia, Fennel, Parsley, &c., is the result.
Let the flower-stalks of the raceme be branched or racemose,
and the composite is produced. To these primary forms of
inflorescence all others are referrible, as simple and genera-
ally unimportant varieties.

INFLEUNZA (La Grippe, Fr.).—Influenza is the
name given by Helianthus, to an epidemic, not general,
which has spread more extensively than any other epidemic; and
this universality of its attacks, together with the greater
severity of its symptoms, principally distinguishes it from
colliquittary or typhoid fever, conditions of which diseases
but is seldom fatal except to the aged, or to those pre-
viously suffering from or having a tendency to pulmonary
disease. Notwithstanding the great frequency of this epi-
demic, it is remarkable how little variety there has been in
its symptoms, and the records of cases which occurred in
1510 nearly resemble those which have been observed
during its later visitations. The following are the symptoms
which most generally characterize it: the person is seized
with a slight chill, weakness, and sometimes, severe
fever over the eyebrows, there is an increase of the lacrimal
and nasal secretions, with loss of appetite, prostration of
strength, a weak frequent pulse, dyspnoea, hoarseness, and
cough. These symptoms, taken piecemeal, are not alarm
ances have revealed acute inflammation of the mucous
membrane lining the air passages, or pleurisy and pneu-
monia. The duration of the disease varies from one to two
days in some persons, but great debility often remains behind
for many weeks, and in some epidemics relapses have been frequent.

Several epidemics of influenza have been remarkable for
a marked preponderance of male victims. In the first great
outbreak of 1859, it was considerably more frequent
as well as that of the organs of respiration. The cases occur-
ing towards the subsidence of the epidemic are generally
less severe than those at its commencement.

The history of this disease is curious. When once it has
made its appearance, it pursues a regular course from one
country to another, from continent to continent, across seas
and over mountains; but this course, although regular as
regards each epidemic, yet varies somewhat with the season. In
1510 it was in a north-westerly direction; in 1527 due west, attacking whole populations almost on the same
day; in 1580 from east and south to west and north, and
was complicated with plague, but France was the only
European country infected; and yet, as with the latter, that
of 1729 was very fatal in London; London says more people
died of it than at any one time since the plague of 1665.
In the month of September, 1729, 1800 weekly were
cased of operation. The epidemic of 1806 travelled from south to north.

These epidemic visitations have taken place most fre-
quently in the spring and autumn, but have seldom re-
enlarged than since.

On the existing causes of this, as of all other epidemics,
we must confess our ignorance. Some have attributed it
to the sudden changes of weather; others to a particular
morbid principle, different from but resident in and con-
veyed by the air; and others again to contagion. The first
of these hypotheses is evidently untenable, for atmospheric
changes as great and sudden have taken place as some of
those observed to precede the breaking out of the epidemic,
and without the latter being observed; and still more, without being preceded by any apparent atmospheric pecu-
liarity; the sensible state of the air too preceding and
accompanying the same epidemic has been different in dif-
frent places. The idea of contagion, although it has had more advocates than either of the former hypotheses,
does not appear to us to rest upon any better foundation;
the instances of isolated individuals and districts, together
who in the open air, being attacked, and the very
and almost instantaneous manner in which whole
populations have been seized, which was particularly
remarkable in the epidemic of 1557, seem to set at nought
all this talk of contagion, so mention of insufficiency of this view to explain whence the first indi-
viduals attacked contracted the infection. It remains then
to examine the validity of the second hypothesis, viz. the
effects of a principle conveyed in and conveyed by the air.
Now the very doubts on any subject which give rise to theories for explaining the phenomena connected
with such subjects presuppose the want of any direct proofs
or evidence of a tangible shape; and if, putting aside the
idea of the epidemic we are speaking of being caused by
any deleterious or unwholesome quality of our food, we
allow the atmosphere to be the medium of conveyance of
the morbid principle, we must admit that all endeavours
hitherto made with the view of demonstrating such prin-
ciple have only afforded negative results; neither does it
appear that there is any one spot on the earth whence it
regularly proceeds, and the absence of opinion of the
cause of this malady, all physicians of eminence have
agreed remarkably in their testimony as to the general rules
and principles of practice. Notwithstanding the inflam-
matory or morbid principle, the mode of attack is rarely
employed with safety, much less with benefit; and
persons who have been subjected to this operation recover
more slowly than others, and remain in a debilitated condition
much longer. In severe cases, omittings at the commencement
have been found useful, either in cutting short the disease
or in moderating its violence. Mild aperients administered
with caution, the exhibition of antimonial and saline me-
dicines, and a cool temperature, constitute the means which
experience has found to be most efficacious.

INFORMATION, an accusation or complaint exhibited
against a person for some criminal offence. It differs from
an indictment (INDICTMENT) principally in this, that an in-
dictment is the production of the prosecution, whereas an
information is simply the allegation of the officer who exhibits it. Informations are of two sorts; those
which are at the suit of the king, and partly at that of the
present king only. The former are exhibited for numerous
offences inferior to felony, as wilful and corrupt oppression by a
justice of the peace, libels, conspiracies, &c., and are filed
by the attorney-general, or by the attorney-general at his own
discretion, and are called ex-
cicio informations. The former kind, which are called
criminal informations, can only be filed by leave of the
court of King's Bench, and the application for leave must
be supported by an affidavit of the information, and the
information of the attorney-general is only made to him by the
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information of the attorney-general is only made to him by the
attorney-general at his own
discretion.

When it is necessary for the court of chancery to interfere
with the regulation or management of any charity, the
attorney-general, or the solicitor-general, has power to file informations.

INFUSIONS are solutions of some of the principles of
vegetables, generally in water, but occasionally in other ve-
hicles. When water is employed, it may either be hot or
boiling. If boiled it is used in cold water, but in many
instances cold is preferable. Where cold water is
necessary to continue the digestion longer than when it is
warm. The vegetable substances may either be fresh or
dried; when the former, they are to be cut into pieces; when
the latter, bruised or very coarsely powdered, never reduced
into a fine powder. The water being poured on the sub-
stance employed, is to be allowed to stand in a covered ves-
sel for a space of time varying with the nature of the article
infused, the weather, and the parts of it required for use. Infusions generally spoil soon, more particularly if
warm water be employed, or if the substance contain starch
or other fermentable ingredients. Sometimes alcohol is
added, after straining, to which alcohol is added, after straining, to which
it is added, after straining, to which
increase its powers. Hard water should if possible be
avoided in the preparation of infusions.

INFUSORIA. This term has been applied to the nu-
erous microscopic animals which abound in water, which are
commonly called animalculae.

The invention of the microscope by Hooke revealed the
existence of myriads of living creatures whose presence was
formerly unknown; and this instrument has shown that a drop of water, even though it appears and always
be perfectly clear, is perhaps swarming with living beings.
Ehrenberg (whose labours have primarily contributed to
the knowledge of the true nature and structure of the
infusorii) has described species which are not larger than
from one-thousandth to one two-thousandth of a line

INFUSORIA. This term has been applied to the nu-
erous microscopic animals which abound in water, which are
commonly called animalculae.
in diameter, and which are separated from one another by intervals not greater than their own thickness, may thus contain more than 800,000 millions of these beings, estimating them only to occupy one-fourth of its space; and a single drop (measuring not more than a line in diameter) placed under the microscope will be seen to hold billions of these. The whole number of human beings on the surface of our globe.

If a single drop of water thus swarms with life, what in calculations of 100,000,000,000 of these might be contained in every stagnant pond or lake, and in the sea.

Historic.—When Linnaeus arranged all the organized beings known to him in the 'Systema Naturae,' the structure of the stomach was unknown and the anatomists were not enabled to distribute them according to their relations in several classes; he therefore placed them at the end of his last class Vermes, in a genus which he denominated Chois. Cohn-Friedrich Müller first separated them as a distinct order; and as the greater number of animalculae had been detected in liquors, in which vegetable or animal matter had been dissolved by infusion, he gave them the name Infusoria. Müller described many species, and acquired a considerable knowledge of the structure and organization of these minute beings; but he did not base his arrangement of the different genera on their varieties of structure, but only on the differences of their modes of motion. When he introduced, in the 'Systema Naturae,' adopted Müller's arrangement, as also did Lamarck and Cuvier, who only altered the divisions and subdivisions of the class without changing the modes of motion. It is, however, in the modes of motion of these animals, Bory de St. Vincent formed his classification; and he also based his system on their external forms, which later investigations have shown to possess important differences.

The substance which he found to answer this purpose in the most satisfactory manner was pure indigo. (The indigo of commerce is always contains white lead, which killed the animal.) It was soon adopted and almost universally adopted by all subsequent writers, and is the basis of all subsequent conclusions respecting the anatomical structure of the Infusoria, which have been verified by other observers.

Digestive System.—Distinct organs for performing the functions of digestion are not demonstrated by means of a powerful microscope in all the species. Ehrenberg says, 'All true Infusoria, even the smallest monads, are organized animal bodies (none consisting of a homogeneous jelly), and distinctly provided with at least a mouth and internal nutritive apparatus.' Cuthbertson absolved, the mode in which nutrition was generally supposed to take place by Müller and other naturalists, has never been observed by Ehrenberg. The form of the alimentary canal is very various, being either transverse like a tube, or a straight canal, namedRotifers, there is generally a simple stomach, situated in the anterior part of the body, communicating with an oesophagus and intestinal canal, which extends nearly the whole length of the animal, being naturally extended into a pouch or cloaca (for the reception of the ovum and seminal fluid) previous to its termination at the surface of the animal. In the simpler forms of these animals the alimentary canal mostly has the appearance of a long intestinal tube, which traverses the greater part of the body, and is furnished with a number of conical appendages or stamens, which are connected with the main canal of the intestine by tubes of different lengths and diameters. The whole of the intestine of the animal enclosed in a tubular sheath, which contains various transparent, these cavities can only be seen when filled with coloured fluids, the colouring particles of which may be observed to enter at the mouth, and to be conveyed from thence immediately to the stomach. The mouth in

The Infusoria are either furnished with serrated mandibles, as in almost all the Rotifiers, and as it has been lately shown in many of the polygastric infusoria, or it is a simple unslitted opening; but in both cases it is surrounded with numerous vibratile cilia, or delicate hair-like processes, which perform a very important part in the economy of these animals; they are considered as the main organs of taste, touch, and propulsion; and they have been also supposed to act in respiration, by bringing successive portions of water into contact with the body of the animal. When a drop of water is placed on a slide, the fluid is seen to be divided into the forms of these animalculæ, currents are seen to be excited in all directions by the rapid motion of the cilia, which form a crown around the anterior part of the body: these currents, by the movement of the body and by the rapidity of the colouring matter, are seen to converge towards the mouth of the animal, and the body, which was previously transparent, becomes dotted with a number of distinctly circumcised circular spots, which are the gastric cavities. From one hundred to two hundred of these sacs may be counted in the course of the intestine of some species. In the furred animals, which are filled with colouring matter the common intestinal tube is usually quite empty and transparent, which may have been one reason why these numerous stomachs were mistaken by Müller for ova.

The anus may generally be easily distinguished from the mouth by its discharging the colouring particles in masses, and in the manner of discharging its contents. The opening into the 'Systema Naturae,' was adopted Müller's arrangement, as also did Lamarck and Cuvier, who only altered the divisions and subdivisions of the class without changing the modes of motion. Bory de St. Vincent formed his classification and based his system on their external forms, which have been observed to possess important differences. For the functions of both mouth and anus; but this is not probable.

Muscular System.—No distinct fibres have been detected in the simpler or polygastric forms of Infusoria, but in the more complex, the greyish-white fibres may be seen traversing longitudinally the clear gelatinous bodies of these animals. These bands are plainly muscular, for they may be observed to shorten and become broader on one side, and to be lengthened and attenuated on the other when the animal throws itself into lateral contortions.

Generative System.—Reproduction has been observed to take place among the Infusoria in various manners, but though numerous observations have been made on this subject, much is still involved in obscurity. The viviparous, oviparous, and gemmiparous or isoparous forms of generation have all been observed, as well as the combination of these modes have been seen to take place in the same animal at different periods of its existence. The higher group of the Rotifer is always hermaphrodite; and the species are mostly viviparous, and not gemmiparous, or spontaneously dividing into two or more distinct animals, as is frequently observed among the polygastric forms.

Vascular System.—The organs of circulation in the polygastric infusoria are wholly unknown; and it is only in some of the species of the Rotiferous division, particularly in the Hylatina senta, that any distinct traces of what are considered vessels have been observed: these are a series of sinus varicose, which are connected by larger sinuses; while the animal, which appear to terminate at right angles in a longitudinal line or vessel, of similar appearance but larger size, running down the back.

Respiratory System.—Ehrenberg has detected in some species of Infusoria several small vibratory moving bodies, which are placed in two longitudinal series in the cavity of the body; he regards them as internal branches, which are connected upon by means of a peculiar canaliculus of the ani- mal; but this supposition as to the function of these organs must be considered as requiring further proof.

Nervous System.—In the polygastric no nervous fil- laments have yet been detected, though they are generally pro- vided with eyes; but the Rotiferous division is characterized by a series of nerve-cords which run through the bodies surrounding the oesophagus, which send off slender filaments differing in their arrangement from both the other vessels and muscles; and in the middle of the body of some species small isolated knots or ganglia are found

3 P 2
suspended to the long nervous filaments which communicate with the cœsophageal ganglia. These small abdominal bodies are very delicate and simple, and give rise to other minute filaments; they are always free and unattached, and placed in the same spot; and they have distinctly the form of ganglia of nerves and ganglia, and move in a passive man¬ner with the movement of the muscles.

The eyes of the Rotifera appear as one, two, or even several spots, generally of a red colour, placed on the fore part of the animal, either before the rotatory organs or behind it, and immediately connected with the nervous system. Ehrenberg having detected a direct communication between the red points and the cœsophageal ganglia. The Infusoria show that they possess the sense of vision, and the mode in which they pursue and capture their prey.

Classification.—Ehrenberg has separated from what he calls the true Infusoria several families of animals which were formerly included in the same class. The prin¬cipal genera thus separated are Spermatozoa, Cercoaria, and Fibrio, which are now considered by some as part of the class Entosoa, and are divided into two families, named Cercoartiade and Fibrioridea. In the article Entosoa, we briefly mentioned the Spermatozoea, or Seminal Cercoaria, which are the only species of this group of animals that can properly be classed among the internal parasites, as they alone are constantly found in the bodies of other animals.

The Cercoaria found in vegetable infusions have an ovoid or cylindrical body, furnished with a tail, which is not so long as in the Zoosperma; and in some of the species a mouth, and in others a dorse body colour. In some cases it has been observed that the posterior extremity is formed on the anterior part of the body; but in none of them has the polygyotic structure been seen, though the Cercoaria Leana is stated to have a simple alimentary canal. The mouth, when present, is formed from their darting or quivering motion, includes the eel-like microscopic animals which abound in stale paste, vinegar, &c., together with others which are parasitic living vegetables, where they cause serious damage from the damage which they occasion to ears of corn, as the Vibri Tritic, which festinates the grains of wheat, and occasions the destructive disease called ear-cockle, or purples. The Vibrio, as well as the Cercoaria differ from the true Infusoria not only in the absence of internal stomas, but also of external cilia, which prevents them from exciting any currents when placed in coloured water.

The true Infusoria have been separated into two distinct divisions—polygyotic, which have large orifices in the stomachs and a very simple structure (no vascular or ner¬vous systems having been yet detected), and the Rotifera, Rotatoria, or wheel animals, named from the singular rotatory organs which abound in most of the species. These organs are formed of one or more circles of cilia, which, when in motion, have the appearance of toothed wheels turning round on their axes, first in one direction, and then in the opposite. The rotatoria, besides being more highly organized than the polygyotic, have more perfect external forms, a separation into head, trunk, and tail being distinguishable in many species.

On account of the difference in the perfection of struc¬ture between the two groups of infusory animals, they have been separated and placed in distinct divisions of the animal kingdom by some naturalists. Mr. Owen makes the polygyotic the lowest class of the sub-kingdom Accria, and places the rotatoria in the division Monogoneura. Dr. Grant ("Cyclop. of Anim.") separates them in the same manner, placing the polygyotic in his lowest group Cyclo¬neura, and the radiata among the Diplo-neura. Ehren¬berg who retains both forms of infusoria, subdivides the sections polygyota and rötatoria into many minor groups, which are founded upon the modifications of different organs: first as to the form of the intestine, whe¬ther it is round or tubular, complex, or perfect; secondly as he considers the varieties of the organs of mastication or dental apparatus; thirdly, many of the infusoria have the intestements naked; others are furnished with a crustaceous or hollow shell; and both among the rotatoria and polygy¬tota the naked and coated species are intimately connected together, and very often entirely agree with one another in internal and external structure, with the single exception of the consistency of their covering. These characters, however, though not separating the animals into distinct divisions, are used as subordinate means of classification; and Ehrenberg has formed two parallel series, named Nuda and Loricata; which correspond to certain of the Gymnogla and Crustacea of Bory St. Vincent. The num¬ber of loricated polygyota is very small, but among the rotatoria there has been a nearer proportion to the naked species. For the details of classification and the enumer¬ation and description of the numerous genera and species of infusory animals, we must refer to Ehrenberg's work on the Infusoria.

Obluration, &c.—These animals are not only met with in water containing large quantities of organic or inorganic matter, but in common sea-water, stagnant fresh water, and well water which has been exposed for a short time to the air. Ehrenberg has found a few species in the subterranean water of mines; he met with several in silver mines in Russia at the depth of 36 fathoms below the surface; but he never succeeded in detecting any in atmospheric water, having many times carefully examined the dew-drops, what are so plentifully deposited during the night in hot climate.

With respect to the origin of these beings, it has been thought that they are generated spontaneously; but as they never make their appearance in fluids secluded from the atmosphere, we may suppose that ov of exceeding minuscule¬ness are always floating in the air, and only require to meet with a proper medium to develop themselves. It is an argument, however, against the theory of spontaneous pro¬duction, that they are often formed in the air when the species which they are producing is nearly dying out, and their bodies are thus removed from the air. Hagel has also shown that the period of their appearance is rather determined by the season of the year, and has kept some of the polygyota alive for a fortnight: the existence of these animals cannot therefore be so ephemeral as some have supposed. Their rate of increase is favoured by a plentiful food and warmth.

These animals live on fine particles of animal or vegetable matter in solution in water, and the larger species devour the smaller animals.

Fossil Infusoria.

Ehrenberg has detected an immense number of fossil animals, principally in siliceous deposits near Berlin. Most of the species are so well preserved that they can be minutely investigated. Some specimens of siliceous rock brought from the Isle of France, which he examined, were found to consist almost entirely of the shells of infusory ani¬mals chiefly belonging to species still living; those from the Isle of London were almost entirely of the remains of remains found near Berlin belonging to recent fresh-water species. The slaty Tripoli of commerce and some other forms of slate, as the polishing slate of Blin in Bohemia (which is not yet thoroughly understood), contain almost entirely of the remains of minute infusory animals.

INGA, a genus of plants of the natural family of Legu¬minosae, which, though it has been separated from Mimosæ, yet contains upward of one hundred species. They are found in the tropical parts of Asia, Africa, and America. They are distinguished by their leghorns being broadly linear, compressed, and celled. The seeds are usually covered with pulp, more rarely with fimbriate matter or a pellicle. The species form shrubs or trees, and are com¬monly unarmed. The flowers are in spikes, or are capitata, and of a red or white colour. From the number of species in this genus, as well as in Acacia and Mimosæ, and from the nature of their百姓 Paraxysma, it has led some confusion in the synonyms. A few of the useful species have been further separated into the genus Paris: but many still remain which are important in the coun¬tries where they are found, in one cultivated species, like many Mimosæ and Acacia, for or the edible nature of the fæcies or pulp which surrounds their seeds. Thus, I., Cochloicarpus has bitter and astringent bark, and contains upward of one hundred species. It is taken to Portugal, where it is called the Brazilian Baf¬fle and used even as a substitute for that of the Cinchona. Martius distinguishes from this species, which he calls I., Arenaria, another which he has named I., Astrigera, and which, with the bark has a similarly similar properties. The bark of these trees is considered by some authors to be the Cortex Astrigera Brasiliensis of old pharmacopœias. I., saltator, is another astringent species, a native of New Granada, of which the bark is much used in the form of decoction for
various complaints in which astringents are indicated, and for the same purposes as ratan root. Some of the species, as before mentioned, are esteemed for the sweetish edible pulp with which their seeds are surrounded, as I. dani on in India, and I. narangi in the province of Quito, where it is called Guabo, or Guabas, but Passas in Peru. So I. Camu- chil, according to Perrotet, is similarly esteemed in Manilla, and I. Paroba in Western Africa, in the neighborhood of the Senegal. The root, according to species, though the law has undergone with respect to it, are stated in the article Fox.

GROSSING is an offense under the common law against trade. It is described by the statute 5 and Ed. VI. c. 14, to be getting into their hands, by buying, &c. (except in the ways mentioned in the statute), corn or other dead victuals with intent to sell them again. The punishment for this offense is death, and in 1783 a statue was passed by the Parliament of Ireland, which was founded in 1472, and transferred to Landbeach in 1880. It has 6000 inhabitants. 48° 45' 50" N. lat., 11° 25' 31" E. long.

INGLISHSTADT. [Essex].

INGOLSTADT, a town and a fortress of Bavaria, the history of the year 1806, was the most important fortress in Bavaria till the fortresses were destroyed by the French in the year 1806. As the situation of this place renders it of peculiar importance for the defense of the Neuwyn, many thousands have been found in some parts, while it continues to be a fortress of the first class. The town is well built, with broad long streets, situated in a fertile country on the Danube, where there is a stone bridge. It is a dull place, without any trade. It has nine churches and two monasteries. The principal buildings are the chief parish church, the magnificent edifice formerly the Neuwyn Palace, which was founded in 1472, and transferred to Landbeach in 1880. It has 6000 inhabitants. 48° 45' 50" N. lat., 11° 25' 31" E. long.

INJUNCTION. An injunction is a writ issuing by the order and under the seal of a court of equity, and is of two kinds, remedial and judicial.

The remedy of injunction is used for the following purposes among many others: to restrain parties from proceeding in other courts, from negotiating notes or bills of exchange, to prevent the sailing of a ship, the alienation of a specific chattel, to prevent waste by selling timber or pulling down buildings, the conveyance of land, and other similar oppressions, and to put an end to vexatious litigation. It is impossible here to enumerate the variety of cases in which a plaintiff in equity is entitled to the relief afforded by the writ of injunction. The common-law remedy is generally obtained by the defendant's not appearing after being served with a summons, or not answering in due time. The special injunction is commonly obtained ex parte, and behind the back of the defendant (as the phrase is), without any service of summons. But either kind of injunction may be moved for after the defendant has answered the plaintiff's bill, and on the merits of the case as appearing from the defendant's answer; and if a special injunction has been obtained ex parte, the defendant may move to set aside the order and before he puts in his answer. If the defendant is residing abroad, and the plaintiff supports the material facts alleged in his bill by an affidavit, the court will at once admit the affidavit and prevent the defendant from committing or continuing acts injurious to him.

As a general rule, no injunction will be granted except there is a bill already filed, though there have been cases specially circumstantial where this rule has been dispensed with; but it is scarcely going too far to say that these precedents would not now be followed.

A court of equity frequently refuses an injunction where it acknowledges a right, as the conduct and laches (neglect) of a party complaining have led to the state of things that occasions the application.

Special injunctions, as already observed, are usually obtained before appearance upon motion in court supported by a certificate of the bill having been filed, and an affidavit verifying the material circumstances alleged in the bill of complaint; but in pressing cases, where the court is not sitting, the process will be granted upon petition supported in like manner. If the defendant has not entered his appearance to the bill, notice of the application for a special injunction need not be given to the defendant, unless the court directs a notice to be given thereafter.

Special injunctions, as above observed, are also obtained upon the merits disclosed by the answer in those cases which do not appear to be of so urgent a nature that the court would not stay the defendant's acts till the bill is answered. The special injunction granted upon the merits after answer continues until the hearing of the cause.
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The wet called the common injunction only stays proceedings at common law, and in the first instance it only stays execution, and does not stay trial if issue be joined; but it may be affidavit be immediately extended to all.

The common injunction and the injunction extended to stay trial continue in force until the defendant has fully answered the plaintiff’s bill, and the court has made an order. The defendant therefore cannot apply to dissolve this injunction until he has put in a full answer; but the special injunction before answer continues until answer or further order, and consequently the defendant may move upon affidavit, to dissolve a special injunction before putting in his answer.

It would be useless, in an article of this description, to state the various rules which govern the practice of the courts as to granting, extending, continuing, or dissolving injunctions. They are laid down at length in the various books of practice, and do not admit of compression.

The judicial writ of injunction issues subsequently to a decree, and is a direction to yield up, to quit, or to continue the possession of lands, and is described as being in the nature of an execution. This writ however is virtually abolished by the statute 11 Geo. IV. and 1 Wm. IV., c. 36, sec. 11, rule 9, which gives the writ of assistance at once, in supplanting the intermediate steps by injunction, attachment, &c. unnecessary.

The Roman Interdictum was in many respects similar to the injunction. [i.e., the process to which it is applied, is composed of very dissimilar ingredients. It may be treated of under the heads of Writing Ink, Printers’ Ink, Indian Ink, Marking Ink, and Sympathetic Ink.

Writing Ink. The writing ink of the ancient was essentially black ink, which is now employed. Its basis was finely-divided charcoal, mixed with some mucilaginous or adhesive fluid: it was much less destructive than modern writing ink, and more resembled printers’ ink, both in the nature of its colouring ingredient and inestimability.

Writing ink is now a chemical compound, and not a mere mechanical mixture. Its basis is proto-gallate and protoprotocatechuate, which by oxidation becomes per-gallate and per-tannate; and it is owing to the oxygen of the air effecting this change gradually that recent writing is of a comparatively light colour, and that it subsequently becomes black.

Many processes have been given for preparing writing ink: the common ingredients are gall and sulphate of iron; in fact, while printers’ ink may be considered as a lower grade, writing ink may be regarded as a black grade. We shall copy the different modes which have been adopted. The following, which is recommended by Mr. Brande, gives, he says, an excellent ink, and it possesses the merits of greater simplicity than most others—Aleppo galls, black oxide of iron, and gum guaiacum; in five ounces; water, 6 pints. Boil the galls in the water, then add the other ingredients, and keep the whole in a well-stopped bottle, occasionally shaking it. In two months strain and pour off the ink into glass bottles, to be well corked. To prevent mould, add one grain of corrosive sublimate, or three drops of cresote, to each pint of ink.

Mr. Brande observes, that, ‘In making good writing ink the great object is to regulate the proportion of sulphate of iron to the galls. If it be in excess, although the ink may at first appear black, it becomes subsequently brown and yellow. Hence some time should elapse before ink is used after the ingredients are put together, in order to be tested from time to time, and the combinations perfectly regulated. Gum is added to retain the colouring matter in suspension, to prevent too great fluidity in the writing, and to protect the vegetable matter from decomposition. Logwood and other vegetable striguments have been tried, but do not yield a permanent ink.

When writing has through age become yellow and very indistinct, it is because the vegetable matter has decayed, and has lost all or part of its black color. By carefully applying infusion of galls the writing may be rendered bleaker and more legible. This method was successfully adopted in deciphering the M.S. of Gaus. [Garius]

Unlike the present, it is readily destroyed by chlorine, soda, and alkalis. Indeed, according to Mr. Brande, if paper has been made from inferior rags bleached by excess of chlorine, the ink, however good, will be ultimately discoloured.

Sulphate of copper is occasionally added to ink, and some district it is prepared with the addition of vinegar; but these substances are rather injurious than otherwise.

A blue writing ink has lately been introduced: its exact composition we are unacquainted with; but the basis appears to be different. [i.e., it is composed of a different material. In some districts it is prepared with the addition of vinegar; but these substances are rather injurious than otherwise.]

Indian Ink. The cakes of this ink are made of lamp-black and size, or animal glue, with the addition of perfumes or other substances not essential to its quality as an ink. It is used in China with a brush, both for writing and for painting upon paper of Chinese manufacture. It is used in Europe for designs in black and white, in which it possesses the advantage of affording various depths of shade, as well as the means of securing degrees of dilution. The common lamp-black of the shops is not sufficiently fine for the purpose; it requires to be made with peculiar care.

Printers’ Ink is of two kinds: for letter-press printing and for copper-plate printing. Printers’ ink is prepared by boiling linseed or nut oil and iron pot; and if it does not take fire of itself, it is kindled, and suffered to burn for about half an hour; the flame is then extinguished by closely covering the vessel, and the oil is by this operation found to have assumed the necessary drying quality, after being again boiled. It is then mixed with a proper quantity of lamp black, when black ink is required; if red ink be required, the colouring matter employed is vermilion, for finer works. Common printers’ ink is made with oil which is less boiled, and the charcoal used is stated to be Frankfort black, made from vine twigs.

Marking Ink is employed for marking linen: it is a solution of nitrate of silver, written upon the fabric to be marked after it has been moistened with an alkali solution, as potash or soda. By this process oxide of silver is precipitated upon and combines with the cloth so as to be scarcely removable by any reagent which does not also destroy its texture.

Sympathetic Inks are such as are visible only until heated and applied, and then, by the chemical change induced, the writing becomes visible. The most remarkable of these is that prepared from cobalt, called Heliot’s sympathetic ink, which is a chloride of the metal. When the written paper is held to the fire so as to evaporate the water, the letters become green. [CoHalt.]

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INNOCENT I. succeeded Anastasius I. as bishop of Rome in the year 492. He wrote to the emperor Arcadius in favour of St. John Chrysostom, who had been deposed and sent into exile by Constantine. When Alaric marched from Italy to Rome, Innocent I. sent a letter to Honorius in order to induce the emperor Honorious to make peace with him, but meantime Alaric entered Rome and plundered it. He urged more than any of his predecessors the claims of the See of Rome over the whole Western Church, and the style of his letters in addressing bishops is remarkably imperious. He also issued a decretal against the marriage of priests. The bishops of Africa having applied to him to confirm their decrees against the Paganists, he willingly complied with their request. He died in the year 417, and was succeeded by Zosimus. Innocent’s letters and decretal have been collected and published by Constant.

INNOCENT II. Cardinal Gregorio Papi, was elected by his party, after the death of Honorius II. in 1130, but another party elected a candidate who took the name of Anacletus II. An ally between the adherents of the two followed this double election, and Innocent was obliged to leave Rome and repair by sea to France. That kingdom as well as several Italian states acknowledged him as pope, but Roger of Sicily, the conqueror of Apulia, took part with Anacletus, who in return crowned him king of Sicily and Apulia, in 1130, at Palermo. Innocent meantime crowned the king of Germany, Lotharius, at Liege, as king of the Romans, and Lotharius in 1133 marched with troops from Italy to put an end to the peril which threatened on the sea of Rome, which he entered, and was himself crowned emperor by Innocent in the Basilica of the Lateran. Anacletus however shut himself up in the castle St. Angelo, and the exiled pope was being unable to dislodge him from those left, Rome, followed by Innocent in the Pisan, where he held a council, at which St. Bernard was present.
and in which Anacletus and his partisans were excommunicated. In September, 1136, Italy was invaded by the pontiff, followed by a number of German bishops and archbishops, and after having hold his court in the plains of Roncaglia, where he published a law concerning the tenure of fiefs, he fought his way in the following year into the Tyrol, where he was received by the Oberrhein, and invited him to withdraw to Sicily, took Capua, Benevento, Bari, and other towns, while Innocent entered Rome and again took possession of the Lateran. Lolarius however soon after died and left two luminous men, the latter, supported by Roger, elected another antipope styled Victor IV., who was soon after persuaded by St. Bernard to resign his claims, and thus restore peace to the church. Roger, however, taking possession of the church, which had been excommunicated in the second council of the Lateran, but Innocent, having gone as far as San Germano with a body of troops to meet Roger, was surprised and taken prisoner by him. This led to a peace, by which Innocent acknowledged Roger as king and his son as duke of Apulia. It was then that the city of Naples first acknowledged Roger as its sovereign. In 1139 Arnaldo da Brescia began to preach at Rome, but being banished from that city, he repaired to France. [ARNALDO DI BRESCELA.] The remaining years of Innocent's pontificate were disturbed by a war between the Romans and the people of Tibur, and by a revolt in Rome itself, when the people, excited perhaps by the partizans of the new pope, elected an anti-pope, who obtained the senate, and asserted their independence. In the midst of these troubles Innocent died, in September, 1143, and was succeeded by Celestine II. 

INN

CELESTINE II. Johann Lotharius, son of Trasimund, count of Segni and of Claricia, of a noble family of Rome, was unanimously elected in 1149, after the death of Celestine III. He ascended the papal throne at the vigorous age of twenty years, and proceeded to establish a new state, industry, and a firm resolve to raise the papal power, both temporal and spiritual, above all the churches, principalities, and powers of the earth; and he very nearly accomplished his purpose during his pontificate. His death was not lamented by himself while he was living; but on his death it was evident that he had lived in a manner disinterested than his prototype, Gregory VII. His interest was totally merged in what he considered the sacred right of his see, ' universal supremacy,' and the sincerity of his conviction is shown by the steady uncompromising tenacity of his course, and by a like uniformity of sentiments and tone throughout his writings, and especially his numerous letters. (Innocenti III. Opera, and his Epistulae and Decretala, published separately by Baluze, in 2 vols. fol., Paris, 1662, with a fairly written biography of Innocent by an anonymous contemporary.)

External circumstances favored Innocent's views. The emperor Henry VI., king of Italy, and also Sicily, had been disdaining the crown of Germany; whilst Constable of Sicily, Henry's widow, was left regent of Sicily and Apulia in the name of her infant son Frederick II. Innocent, asserting his claim of supremacy on the death of the last Sicilian monarch, offered himself as successor to the Sicilian crown, and by the same time obtained from her a surrender of all disputed points concerning the pontifical pretensions over those fine territories. Constable Frederick, hearing himself assumed the regency during Frederick's minority.

At Rome, availing himself of the vacancy of the Imperial throne, he bestowed the investiture on the prefect of Rome, whom he made to swear allegiance to himself, thus putting an end to the former, though often eluded, claim of the Imperial authority over that city. In like manner, being favored by the people, ever jealous of the dominion of foreigners, he drove away the Imperial feudatories, such as Conrad duke of Spoleti and count of Aeord, and Marcellino marquis of Ancona, and took possession of those provinces in the name of the Roman see. He likewise claimed the exarchate of Ravenna; but the archbishop of that city asserted his own prior rights, and ' Innocent,' says the anonymous biographer, ' prudently deferred the enforcement of his claims to a more fitting opportunity. The towns of Pisa, Pavia, Cremona, with large parts of the Po valley, the duchy of Modena, and the whole of the warlike province of the Emilia, and formed a league with Innocent for their mutual support. It was on this occasion that Innocent wrote that famous letter, in which he asserts that 'as God rescued the divided Italian forces from the hands of the alien, if he had been the subject for the last night's delights, it might not only have lost its splendour entirely to the first, so he has disposed that the regal dignity should be but a reflection of the splendour of the papal authority and excretion to the whole world.'

In Germany, Innocent, acting as supreme arbitrator between the rival aspirants to the Imperial crown, decided at first in favour of Otto, a Welf, on condition of his giving up to the Roman see the disputed succession of the counts Mathilda's, but as the arrangement between Otto and his rival Philip, whom he acknowledged as emperor. Philip being murdered in 1208, Otto resumed his claims, and was crowned by the pope at Rome, but having displeased Innocent in the business of the countess Mathilda's succession, the pope quarrelled with him, and Otto having invaded part of Apulia and of the Papal territory, Innocent excommunicated and deposed him, and proceeded to the election of his successor, who was chosen from the counts of Anjou, who repaired to Germany, and after a gallant struggle obtained the crown shortly before the death of his late guardian the pope.

Innocent, at the beginning of his pontificate, wrote a long epistle (209 of B. 11) to the patriarch of Constantinople, and other letters to the emperor Alexius, with the view of inducing the former to acknowledge the supremacy of the pope over Rome, and the latter to accept the pope's authority in the empire. With these views he failed to carry the day, and was, after, by an unexpected turn of events, the satisfaction of consecrating a prelate of the Western church as patriarch of Constantinople.

The Crusaders, whom Innocent had sent forth, as he thought, for the conquest of the Holy Land, after taking Zara from the king of Hungary, for which they were severely censured by the pope, proceeded to attack Constantinople, and overthrew the Greek empire. [Baldwin I., Emperor.] All this was done without pertaining to the pope, and as Baldwin wrote to him acquainting him with the full success of the expedition, Innocent, in his answer to the marquis of Montferrat, forgave the Crusaders in consideration of their having brought about the triumph of the cross over the Eastern empire. Innocent sent also legates to Calo Johanes, prince of the Bulgarians, who acknowledged his allegiance to the Roman see. (Innocenti III. Epit.)

Leo king of Armenia received likewise Innocent's legates, who bestowed upon him the investiture of his kingdom. Innocent also excommunicated Sverecum, who had usurped the kingdom of Norway, and he had repudiated his wife Ingerburga of Denmark, and had married Agnes de Meranie; and after a long controversy the pope obliged the king to dismiss Agnes and to take Ingerburga back. The king of Leo, who married his cousin, the daughter of the king of Portugal, was excommunicated, and as he would not submit, and was supported in his resolution by his father-in-law, Innocent, by means of his legates, laid both kingdoms under an interdict.

John of England having appointed John de Gray, bishop of Norwich, to the vacant see of Canterbury, Innocent would not approve of him, and bestowed the canonical investiture upon Stephen Langton, and the monks of Canterbury would receive no other archbishop. In a fit of rage John drove away the monks and seized their property, for which the whole kingdom was laid under an interdict; and as John continued refractory, the pope excommunicated Robert of Normandy, released his vassals from their oath of allegiance, and called upon all Christian princes and barons to invade England and dethrone the impious tyrant, promising them the remission of their sins. In 1219 Philippe Auguste prepared an army for the purpose; John however had also
a gallant force ready to repel the foreigners, but dastard as he was, and conscious of the little attachment he deserved from his subjects, he allowed himself to be frightened, and he subscribed an instrument laid before him by Innocent's Italian envoy Pandulf, purporting that John would submit to the pope's will in all things for which he had been excommunicated, and pay damages to the banished clergy. This was on the 13th of May, but on the following 15th, John having been meantime closely invested by Pandulf, he became much more extraordinary in his conduct. On that day John repaired to the church of the Templars at Dover, and on his knees before Pandulf took an oath of fealty to the pope, the same oath that vasco had taken to the council at Troyes at the same time that he was to convey a charter testifying that he, the king of England and lord of Ireland, in atonement for his offences, &c., not compelled by the interdict or any fear or force, but of his own free will and of his own accord, delivered to Pandulf the seal of England and 300 for Ireland. Pandulf then undertook to forbid Philip of France attempting anything against a faithful vassal of the church.

Innocent III prepared themselves from the body of the Roman church, Innocent was stern and uncompromising. He considered hisesy as the deadliest of sins, and its extirpation as the first of his duties. He sent two legates of excommunication to private herto France. One of them, Cestelma, having become odious by his severities, was murdered near Toulouse, upon which Innocent prescribed a crusade against the Albigenses, communicated Raymond count of Toulouse, for assisting the Albigenses in the dominion of Simon count of Montfort. He addressed himself to all the faithful, exhorting them "to fight strenuously against the ministers of the old serpent," and promising them the kingdom of heaven in reward. He sent two legates to attack the crusade, and their letters or reports to him are contained in the collection of his Epistles, especially "Epistola 108 of B. XII," in which the legate Arnoldus relates the taking of Beziers and the massacre of 30,000 individuals of every age, sex, and condition. [ALBIGENSES] Innocent however did not live to see the end of the confrontation he had kindled. He held a general council at the Lateran in 1215, in which he inculcated the necessity of a new crusade, launched fresh anathemas against heretics, determined several points of doctrine and discipline, especially concerning the auricular confession, and sanctioned the establishment of the two great mendicant orders, the Dominicans and Friars Preachers, the former to extirpate heresies, and the latter to preach sound doctrines and to assist the parochial clergy in the execution of their duties. In the same year he caused his letter to be written to the pope, to give the arm of the king of France in his attempt upon Rome; and Innocent, having returned to his capital, excommunicated him. Innocent died at the end of 1460, after having made his peace with Laisiais.

INNOCENT VII, Cardinal Camillo da Mefiori, of Sulmona, was elected at Rome, after the death of Boniface IX., in 1403. This was the period of what is called 'the Great Western Schism,' when there were two or sometimes three rival popes, each acknowledged by a part of Europe. Innocent's rival was Benedict XIII, who held his court at Avignon. [BENEDICT, ANTIPOPE.] After the election of Innocent a tumult broke out in Rome, excited by the Colonna and by Laisiais, king of Naples, who obliged the pope to leave the city. Innocent died at Avignon, a prisoner of the emperor, in 1362. Inigo de Loyola, successor of the great St. Francis, of the order of the Jesuits, was created cardinal when only fourteen years of age. Innocent died in 1491, and was succeeded by Alexander VI. He enriched his natural sons; and the family of Gibo, which was already possessed of great territories, was greatly increased by his marriage alliance with the family of Malaspina possessed also of that of Carrara, which their descendants have retained till within our own times. [CARRARA.]

INNOCENT VIII, Cardinal Giovanni Battista Panfili, was elected in September, 1494, after the death of Urban VIII. He was then seventy-three years of age, and is said to have
been in great measure ruled by his sister-in-law Donna Olimpia Mascherini Pandolfo, whose account was an unprincipled woman, very fond of money, and of aggravating her relatives. Innocent however displayed in several instances much firmness and justice and prudence, and a wish to protect the humble and poor against the oppressions of the powerful. Having remained at Rome but a short time, he attached himself to the Emperor; and although at first the Florentines did not at all approve of him, he soon gained over them. Having no other object than to secure his throne, he was not particular in the means he used to attain it. He was a man of great firmness and courage, austere in his morals, and inflexible in his resolutions. He took pains to reduce the pomp and luxury of his court, and to suppress abuses. He was fond of country life, and liked to spend the spring and summer in his own: and his pleasures and amusement, and also his economy, were modelled after the example of the Emperor Louis XIV. of France, on the subject of the immunities enjoyed by the foreign ambassadors at Rome. As this incident exhibits in a singular light the character of Louis XIV. of France, I shall not omit to notice the part played by the Pope in the struggle for these rights. The Pope, indeed, was no stranger to the struggles of the French for the maintenance of their privileges, and the protection of their property in Italy, and also the sovereignty of its governments, and of the Roman see among the rest. The Pope protested against the edict, and advised the other Italian powers to resist such obsolete pretensions, and to support the cause of the Papal States. Innocent was of regular habits, attentive to business, a lover of justice, and averse from nepotism. He died in September, 1700, at the age of eighty-six, and was succeeded by Benedict XIII.

INNOCENT XII. Cardinal Michelangelo Consi, succeeded Clement XI. in May, 1721. He was a man of prudence and experience of the world, and less wilful and headstrong than his predecessor. He was the son of King Edward I. They purchased at various times certain houses between the city of London and the palace of Westminster, for the combined advantage of ready access to the latter and of obtaining provisions from the former. For their liberties and privileges (observes Mr. Agard, in an essay written in the end of the seventeenth century), I never read of any grant to them or their houses: for having the law in their hands, I doubt not but they could plead their cases with the utmost vigor (and that rightly), that it is not convenient that a judge should seek his lodging when he cometh to serve his prince and his country.

In Fortescue's time there were four inns of court and ten inns of chancery, the former being frequented by the sons of the nobility and wealthv gentry, and the latter by merchants and others who had not the means of paying the greater expenses. In 1604, the heads of the inns of court (innum) of the inn of court. The first were called appren- titici nobiliorum, the latter appretitici only.

On the working days, says Fortescue, in his De Laudibus Legum Angliae, most of them applied to the study of Holy Scripture. But it appears that they did not entirely neglect the study of law; and on the holy days to the study of Holy Scripture. But it appears that they did not entirely neglect the study of law.
lighter pursuits, for, says the same learned author, they learn to sing and to exercise themselves in all kind of harmony, and they also practise dancing and other noblemen's pastimes. He says they did every thing in peace and amity, and although the only punishment that could be inflicted (as in the case of the grooms of the house) was to starve them, they dreaded that more than other criminal offenders fear imprisonment and prisons.

The inns of court, formerly called "hostels," are Lincoln's Inn, the Inner Temple, the Middle Temple, and Gray's Inn. Lincoln's Inn was formerly the mansion of one William de Haverbury, treasurer of King Henry III, and subsequent to the hands of the bishops of Chichester, from whom the students rented it. It appears to have taken its present name from Henry Lucy, earl of Lincoln, whose house near Holborn had been for some time inhabited by students of law. In 1671 the society of Lincoln's Inn were honored by the visit of his Majesty Charles II., who, together with the Duke of York, Prince Rupert, and many of the principal nobles of the land, was entertained in the hall of the inn, and subsequently they all became members of the society. The hall, having 71 feet long by 23 feet, was built in the reign of Henry VII; on the windows and pannels are painted the arms of various dignitaries of the law, who have been members of the society. At one end of the hall is a magnificent mahogany screen, on the other a marble statue of Lord Erskine by Westmacott. The hall is used as a dining-hall for the bachelors, barristers, and students in term-time, and as the lord chancellor's reception chamber. There is a chapel, a Great Hall, a common room, a library, a garden, and a house on the windows, on the whole a very chaste and solemn appearance. Service is now performed here every morning at eight o'clock. A course of lectures was founded in 1768 by Dr. Warburton, bishop of Gloucester, for proving the truth of the Christian religion from the comparison of the peaceful and the non-Christian religions. These lectures are delivered three times a year. A studentship, worth about 100l. a year, to be held for eight years, was founded by Christopher Tancred, Esq., for four students, to be educated in the study of the law at Lincoln's Inn. They are elected by the trustees for the time being of the Tancred Charities. A preacher and a chaplain are appointed by the bachelors of the society. The library, which is open to all, contains a vast number of books, especially of law books, is very valuable. The library of the society of the Middle Temple is much inferior to that of the other societies; but the hall greatly surpasses the others both in size and splendour. It was begun in 1562, and finished in 1598. It is 130 feet long, 40 feet wide, and upwards of 60 feet in height. The roof and pannels are finely decorated, and the screen at the lower and is beautifully carved. The windows are of stained glass, representing the armillary bearings of different nations, and having the sun rising in each, the one at the east, the other at the west, and two cross aisles. The tower is supported by six pointed arches, resting on four round pillars. The interior of the choir is fitted up with pews, which are equally divided between the members of the two inns. The room is supported by pillars, which are striking for their simplicity and elegance. In the tower are tombs of eleven of the Knights Templars, but with the exception of one, Geoffrey de Magnoville, who is placed in a canopy, the others are without effigies represent. The organ is one of the finest toned in Europe.

The principal clergyman of the Temple is called 'The Master of the Temple,' and is constituted such by the king's letters patent, without institution or induction. There are also a reader, who likewise holds the office of librarian, and a lecturer. The offices of preacher of Lincoln's Inn and Master of the Temple are almost sacerdotal, and are generally considered as stepping-stones to a bishopric. The garden of the Inn is small, but from their situation on the banks of the river they form a delightful promenade to which the public are admitted in summer after six o'clock; and the evening service is performed here every evening at eight o'clock.

Gray's Inn is on the north side of Holborn. It takes its name from the Lords Gray of Wilton. Dugdale says that it was purchased from the Gray family by the prior and convent of Shene, in Surrey, and demised by them to the students in law, until their dissolution, when it was granted to the latter by the crown, at a fee-farm rent of £13 4s. 4d. The hall is very antient, and has a fine wooden roof. It is used in vacatio as a court for the chief baron sitting in equity. The chapel is a neat little building; and the garden forms, with the exception of the parks, one of the finest walks in London.

In each inn of court, there are eight inns of chancery, which are a sort of daughter inns to the inns of court. They are now only used as chambers, and are principally inhabited by solicitors and attorneys. Two belong to Lincoln's Inn, whence the name of Inns of Chancery is derived; the other six inns of chancery belong to these two inns. The Inns of Chancery are, therefore, in great part managed by the students of the inns of court. The remaining two, Staple Inn and Bernard's Inn, belong to Gray's Inn. Most of the inns of chancery have a hall, in some of which dinners are provided and terms kept, as in Lincoln's Inn. These terms do not qualify the student to be called to the bar.

Each inn of court is governed by its own bachelors, or "antients," as they were formerly called, who fill up the rooms on the floor above the chambers of the inns of court. An antient standing may be a member; but that honour is now usually conferred only on queen's counsel. At Lincoln's Inn the governing body is called the council, at the Temple the council's clerk, at the Inner Temple the master, at the Middle Temple the president. Each of these offices is hereditary, and the inns are governed by a system of antients. At the Middle Temple the president is succeeded by the dean, and at the Inner Temple by the dean and chapter, and at the Temple by the dean, chapter, and council. At Lincoln's Inn the governing body is called the council, at the Temple the council's clerk, at the Inner Temple the master, at the Middle Temple the president. Each of these offices is hereditary, and the inns are governed by a system of antients. 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All buds have their origin in the medullary sheath, and are situated in the axils of leaves or of leaflets that have existed; but when a bud has developed itself beyond the external bark, it begins to produce and send down layers of liber, and its connection with the medullary sheath is at that time destroyed. If the bud so detached be placed in favourable circumstances on the albunum and is a hardy species, it will derive moisture from the cambium, and continue to vegetate till the granulations of cellular matter resulting from the effort of the stock to cover with fresh matter the part so detached by the injury inflicted, meet with the albunum elaborated by the inserted bud; the similar substances then osleose, and the union may be termed complete. It may be here observed that the operation of breaking the bark in order to insert the bud, must be too large, for the smaller the portion of bark raised the sooner will it become covered with fresh matter, and meet with that which is forming at the base of the bud.

The season for performing the operation is generally speaking, from the beginning of July to the middle of August, the particular time varying according to the season. The best criterion is the state of the buds and the degree of cohesion between the bark and albunum of the stock. If the buds on the young shoots have become so far perfectly formed outside as to bear separation from the branch, and if the bark of the stock can be freely raised, and exhibits an abundance of cambium in a fluid state, the operation may be performed with the bark moderately split rigidly to the albunum, or is said, as it is technically expressed, there is little chance of success.

In the selection of buds it is necessary to distinguish those that are hardy and which may produce shoots of blossom, from those which would produce shoots in the following season. For example, in the case of peach-trees trained against walls, no buds with only a single leaf at their base should be taken, for if the tree be injured at all the bud will not produce blossoms, even if it should remain on the tree; and if transferred it will either perish in winter or die after an imperfect development. On vigorous young trees in the garden, when the ground is early dried, the signs of the buds may be readily found, and they are preferable to all others. When a bud on a wall has two leaves at its base it will produce from thence one wood-shoot and a blossom-bud: it is, in fact, although one bud is only apparent, yet there exist two; since every leaf has in its axil another bud on the rudiments of one. Thus a shoot having buds with three leaves at their bases develops itself in the following spring, in the form of two blossom-buds and a wood-bud in the centre.

The operation of budding, or inoculation, is performed in various ways; but the best and most general is that called shield-budding, or T budding, from the resemblance of the bud to a shield. A straight cut is made which is about the width of the bars of the Roman letter T. In a smooth part of the stock a horizontal cut is made through the rind down to the albunum; but care is taken that the incision only just reaches the albunum. From the middle of this another cut is made downwards. The bud is then shaved off the shoot by entering the knife below a half inch below it, thus cutting nearly half way through the branch immediately below where the bud is seated, and finally by slanting the knife outwards about half an inch above the bud. A portion of bark and young wood will thus be taken along with the bud; but the wood must be carefully separated by being dexterously jerked off downwards in the direction of the caudex, as the woody fibres between the bud, cambium, and stock form the lines which, in the artist's term, are the 'vinculae' of the base of the leaf. The wood is detached by pulling upwards, this minute formation of albunum belonging to the bud would likewise be removed, and with it the sheath, as it is called, that is, it is a kind of husk, and sometimes happen, whichever way the wood is removed, and may be known by the appearance of a small hole below the external convexity of the bud. When this happens the operation must be immediately recommenced, and the tree pared, and its bark pared so as to be easily introduced below that of the stock, and as much reduced as its immediate connection with the bud will permit, the bark of the stock is raised with the thin peeling or shaving knife by entering it at the angles formed by the transverse and perpendicular incisions above described, taking care not to disturb the bed of cambium; on the latter the bud, with its shield-like portion of bark, is placed, its upper part being then cut off, so as to coincide with the transverse...
ruplement by fits of violence and preternatural excitement of the mind, as if to force it to do the work of a morbid character, and to characterize the disease. There is then a want of self-government, the expressions are unguarded and the conduct violent. M. Pinel records a characteristic instance of this, which he terms 'emportement maniaque sans danger.' It is a good example of mental insubordination and accommodation of the intellect. 'A youth, the only son of a weak and indolent mother, was the subject of uncontrolled caprice and passion. He was excited to acts of fury by any kind of provocation, and did everything to remonstrate against anything but inexcusable: horse, or any other animal which offended him; and excited broils in every public meeting which he joined. But when not led by his passion he enjoyed sound judgment, was fully capable of self-control and did not even beg to be confined lest they should injure others. The propensity to theft also sometimes constitutes a marked feature of insanity. Dr. Prichard mentions having seen a youth whom he described as a dupe, and whose keeper made it a constant practice to put into some corner within his reach various articles intended for his sustenance, in order that he might take them gratuitously. This propensity to steal is well known but it must be observed that many of the unfortunate persons who are described in the Old and the New Testament as possessed by evil spirits were the subjects of insanity. The same may also be said of the soothsayers and ecstatic priests among the Greeks and Romans. In the state of insanity a disease of the mind is often associated with the disease of the body, and this may be seen in the insane state, or of its seat and instrument, the brain, has been generally recognized, but the sense of horror originally excited by the idea of the demon by a demon, still influences in some degree the feelings with which the insane are regarded. But it is gratifying to find that, with the extension of real knowledge, views at the same time more philosophic and more humane are beginning to be adopted in relation to lunatics.

The variety of the forms of insanity is almost endless, but they may conveniently for the purpose of description be collected under the following heads:—

1. Disorders of the feeling.

2. Delusions.

3. General derangement of the reasoning faculties.

4. Mixed forms, in which two or more of the preceding are combined; and

5. The state of imbecility or fatuity in which other kinds of mental disorder frequently terminate.

The first principal form which we have indicated constitutes what is termed 'moral insanity' by Dr. Prichard, who describes it as 'consisting in a morbid perversion of the feelings, affections, and active powers, without any illusion or erroneous conviction impressed upon the understanding; sometimes co-existing with an apparently unimpaired state of the intellectual faculties.' The character of the affection varies with the degree in which the different feelings are affected: sometimes jealousy and suspicion are the prevailing passions, causing their subjects to shun their dearest relatives and to live in constant misery, though at times they are able to reason correctly on any topic, and at times confess that their suspicions are groundless. Other persons are tormented by a constant fear and apprehension of some defined danger or misfortune; and with this there is often a feeling of despair, a settled melancholy, frequently of a religious character. This state of despondency (combined with delusions, one of the most frequent kinds of insanity) is at its commencement often in a considerable degree under control, and may be removed from time to time by the substitution of more cheerful feelings; but if the circumstances to which the individual is subjected be of a nature to depress or alarm, it becomes so aggravated as to lead to a loathing of existence and to suicide. The states which we have considered are generally marked by depression, but they are not unfrequently inter-
they have the devil or some animal within them, that they are dead or that they are changed to some other form, etc. Monomaniacs subjects of the last delusion are thus described by Pope,—

"Unnumbered thrones on every side are seen, 
Penned up to the edges of every form or size; 
Here living tea-pot stand, one arm held out. 
One has its top at the base of the board, and that last: 
A pigkin there, like Homer’s tripod walkis; 
A bottle here, the ships and the seas below."

It is probable that in many cases of delusion regarding the condition of the body there is some morbid state of the nerves, causing a sensation which excites in a mind prone to insanity an idea which the reason is unable to correct. Another result is the tendency to the idea of being possessed of a demon or demone (a demon) of some writer. It consists in a belief in the presence of invisible beings whom the lunatic sees, hears, and converses with. Religious delusions are frequently of this character: the maniac sees and communes with the Almighty in various angelic form, and they being very often combined with despondency, lead to suicide. Others who are subjects of such delusions fancy themselves constantly followed by some person who has the purpose of injuring them. This degree is varied to some extent, but the distinguishing feature is that the individuals believe to have occurred, or consists in a belief of some absurdity which has no foundation except in the patient’s imagination. Such a monomaniac is one who believes he has been confined for twenty years in a castle, and corresponded with a princess by writing letters in cherry-juice. The delusions which most frequently take possession of the thoughts of the proud or vain maniac are those which arise from insanity, which he generalizes and elaborates into abstract ideas conceived in the mind being mistaken for realities. An ambitious dreamer may for a moment imagine himself a king, but it is only a lunatic who fails soon to confine his thoughts within the limits of his own powers.

There is generally some connexion to be traced between the nature of the illusion and the former occupation of the monomaniac or the ideas which have chiefly engaged his mind. A lawyer, for example, has to have fancied himself to be a leg of mutton hanging from his nose, a young lady, the son of an attorney, fancied himself suspected of a horrible crime, and that the officers of justice were following him; persons who have had their thoughts much directed to religious subjects imagine they have received a charge from the Almighty; that they are persecuted by the devil, etc. &c.

5. General derangement of the intellect presents many forms, and is most certainly curable. Amitis is decy of the mind generally are disorders; the patient will not speak on any subject long without betraying the defect of his reasoning power. This will in one person manifest itself at the age of eight, or another at the age of thirty; —its necessary consequences; in another it will be attended with loud and violent raving (mania); in a third there will be singing, and a gay cheerful air; while a fourth case will be characterized with a fixed and vaporous insanity. The symptoms of mental excitement frequently increase in violence for a short time, then gradually subside into a more quiet state, which too often terminates in mental imbecility.

4. The mixed forms of madness are by far the most frequent. Moral insanity, the disturbance of the moral feelings and propensity, is generally attended with some degree of weakness of the reasoning powers, or with some delusion. The general derangement of intellect has combined with it an excited state of some of the feelings; and morally insane persons present a pure form, a mental delusion without further disorder of intellect, is very rare.

5. The duration of insanity has no certain limits; the attack may last but a few weeks, or it may continue many years; it is not uncommon to meet in lunatic asylums persons who have been ill forty and fifty years. When the disordered state of the mind is thus protracted, it usually terminates in loss of the intellectual faculties. The set of imbecility, dementia, or futurity, which then succeeds has many degrees. It commences by the loss of memory, particularly for more recent events; the mind receives impressions and perceives them, but the faculty of retaining them seems to be lost. It is this state which so frequently and generally accompanies the mental derangement, which is a preludium to the proaching decay, when the mind is otherwise sane. In the latter instance the faculties are exercised in a sound manner when the attention is roused, but frequently the words which were spoken but a few minutes previously are forgotten, though the memory for the events of youth is quite distinct. In a second degree of imbecility the power of directing the thoughts is lost; ideas come and go without order and insensibly of the will; the sense of touch is heard and attempts are made to reply to them, but before the answer is half completed the train of thought is lost, and the mind and tongue wander to other subjects. In proportion as the mind is more morbid the powers of the external senses also become deadened; there is a carelessness of all that is going on around; life is reduced to the state of that of brute animals; the instincts alone guide the actions. The expression of the countenance is vacant, the eyes wandering. At last these ever changing instincts are lost; the miserable creatures seem almost unconscious of life; careless of the calls and wants of nature, they sit or lie motionless in one position, and frequently lose even their sensations from temporary cerebral excitement, is nearly equally unfavourable. It appears that the general derangement of the intellect is more curable than monomaniac, more especially in men. The state of imbecility is almost certainly curable. A period of illness is not to which it is brought under treatment has a very important influence on the chance of recovery. Of those who enter asylums soon after the commencement of the malady seven out of ten recover, but if illness is of twenty years and more, out of ten, six are likely to recover, and seven more than ten years. Of those in Salpetrière seven cases had been admitted from 50 to 57 years. It is difficult to ascertain the proportion of recoveries in many of the asylums. The information is either imperfect or precluded by the different writers. While some authors have reported the cure of nearly 5 in 6 cases, others have estimated the proportion cured as less than 5 in 10; some have stated it to be only as low as 5 in 20. The fact that the proportion varies very much according as the insanity is complicated or not with other disease; it is also influenced by the form of the disease, the period of its course, the age, sex, and temperament of the patient. Of the complications, epilepsy and paralytic are the most important. Whether paralytic affect the motion of the limbs or the speech only, the case is generally considered hopeless. The complication with true epilepsy, not mere convulsions from temporary cerebral excitement, is nearly equally unfavourable. It appears that the general derangement of the intellect is more curable than monomaniac, more especially in men. There is more hope of recovery when some secretion of the body is suspended which may be restored by medicine, or when a critical period, such as that of the appearance or cessation of the catatonia in women, is at hand; at such periods as those last referred to insanity has ceased having persisted for many years. During the period of convalescence there is great liability to relapse, but this diminishes with the increasing length of time during which the patient manifests no symptoms of unsoundness of mind. The more complete the recovery the more likely is it to be permanent; if the judgment be strong and the feelings neither depressed nor irritable, relapse is much less to be feared.

Causes.—Some individuals appear to be so prone to insanity that very trifling causes are sufficient to induce it in them; or it is probable indeed that there is always some peculiarity in the constitution predisposing to it, since the apparent causes do not differ from those which, acting on other persons, produce other diseases and not insanity. This as it may, a tendency to mental and other cerebral affections is often observed to prevail in families, and to be transmitted from parents to offspring. An attack of insanity not only greatly diminishes the vitality, but renders it more prone to the disease than before, but the condition of the body, or rather of the brain, thus induced
may be transmitted to the children. This fact is so well known that it is unnecessary to insist further upon it. The hereditary predisposition is said to be stronger when both parents have been insane. A remarkable circumstance relating to the hereditary transmission of insanity is that the form of the disease which affects different individuals of a family is often the same, and that it attacks them about the same age. It is an opinion generally adopted that intermarriage in families gives rise to the predisposition to mental disorder, as it certainly does to weakness of body and mind. Intermarriage must tend to strengthen or maintain the tendency which makes for mental disease, and this is not to be determined by the marriage of the insane. The transmission of insanity from physical causes was connected with parturition or nursing. Insanity occurring under such circumstances is termed puerperal mania, the frequency of which is not easily explained. Reiteration of the appearance of the disease in successive generations, and the increased frequency of insanity in females. The frequent dependence of mental disorder on intermarriage, particularly in men, is a fact demanding much attention. Drunkenness is unfortunately prevalent in many parts of England, and there is a much larger number of insane from that cause in the pauper lunatic asylums of this country than in those of France, where the abuse of intoxicating liquors is less general. Next to intermarriage, the causes which act more directly on the brain itself, and give rise to inflammation or disturbance of the circulation in it, are the most influential in producing the predisposition to insanity, or in exciting it; such causes are blows on the head, fever, coup de soleil, &c. Epilepsy and, less frequently, apoplexy also lead to insanity. Lastly, any influences acting prejudicially on other parts of the body may indirectly affect the mental organ and disorder its operation.

Close connected with the subject of the causes of insanity, and of equal importance, are the statistics of the disease. If we could ascertain all the important circumstances which accompany its greater or less prevalence in different localities, we should have some measure of the evil, by adopting preventive measures. A general result, which appears to rest on correct information, is, that insanity is extremely rare in uncivilized nations, among the natives of Africa and America. This cannot arise solely from passion less frequently disturbing their moral feelings and affections, though this is undoubtedly an influential circumstance. There seems to be an absence of a religious influence in the diseases among the uncivilized races. A less highly developed and less active condition of the brain may render it less prone to disease.

In Turkey, Spain, and Italy, insanity is considerably less prevalent, if we may judge from the imperfect reports obtained from those countries, than in the more northern European nations and the United States of America. The proportion of lunatics to the population in England and France is about 1 in every 1000, and in Italy and Spain, about 1 in 1000. In Prussia the proportion, as stated by M. Jacobi, is about the same. But in Wales the proportion of insane to the population was estimated in the year 1836 at 1 in 1591, and in Scotland 1 in 574. In Norway too, a country somewhat similar in its physical character and in the condition of its inhabitants to Scotland, the estimate of the proportion of lunatics given by Dr. Holst is 1 in 551. A great and surprising difference is found to exist in the proportionate number of insane in manufacturing and agricultural districts of England; the number being greater in the agricultural counties. This is an analogous fact to the prevalence of the disease in Wales and Scotland. There is certainly less call for the exertion of the intellectual faculties in the agricultural than in the manufacturing counties, and in Wales than in England; an explanation of the facts must therefore be sought in the difference of climate. The lunatic institutions are included not merely the insane, but the idiotic from birth, and the excess in the number of the insane in mind in Wales, Scotland, and Norway, as compared with France and England, is accounted for in part by the fact that large numbers of the insane have been removed from other parts of the country, and also by the influence of which we can find some explanation in the hardships to which the poor of those mountainous and partly barren countries are exposed; idocy being a disease dependent on mental disorder. The number of insane is of some importance, but much greater than the number of the higher classes of society, is another important consideration. One cause of this is undoubtedly the much less check which is put upon the spreading of the disease by marriage with individuals whose families have the predis-
position in the lower than in the higher classes. Another may be the deprivations to which parents, and particularly pregnant females, are exposed. A third is the prevalence of intemperance among the poor. The opinion has prevailed in France as well as in England, that insanity is on the increase, but the data on which this supposition is founded cannot be impartially trusted. There is a peculiar number and better management of lunatic asylums at the present day cause more persons to be conveyed to them, and thus placed within the reach of statistical research, while formerly many lunatics were allowed to wander about as beggars, or if retained, were housed in family, and even the horrors of the asylums, were concealed in private families; and some, from ignorance, were punished as criminals.

The principal means of checking insanity, which the facts actually demonstrate, can be stated in these terms: 1. The marriage of individuals predisposed by inheritance to the disease; 2. The improvement of the physical condition of the poor; 3. The encouragement of intellectual cultivation and amusements among the lower classes, as a means of checking intemperance and sensual indulgence generally; 4. A better education of the moral feelings in all classes of society, so as to discipline the passions and enable the mind to resist their disturbing influence.

Before entering on the consideration of the mode of detecting insanity, it will be necessary to inquire into the probable nature of the disease. We will first state the facts in order, and then try to deduce the phenomena from them. As a disease of the brain, it is not requisite to offer any proof that the brain is, in the healthy state, the seat of the mental operations, the organ or instrument by which the mental principle, whatever it be, acts. Admitting this, we may be sure that to all the functions of the mind has its seat in the same organ. Then again, although in many cases no change of structure can be found in the brain after death (which cannot surprize us if we remember the delicacy of the organ and the slight change that would be sufficient to disorder its action), yet it is certain that morbid appearances are found much more frequently in the brain than in any other part of the body of the diseased individual. The disorder in the brain is generally accompanied by pain and other symptoms of inflammation or vascular fulness of the head. In some cases we perceive a distinct connection between marked disease of the brain and insanity, as where the latter affections supervene on epilepsy or apoplexy. The physical causes too are in many instances such as act directly on the brain; we allude to blows on the head, inflammation of the brain, convulsions; and all the causes which suggest an argument in favour of the cerebral origin of the disease; for the inordinate action of the brain which must attend the long continuance and great violence of a particular passion would be likely to excite diseased structure of the brain which could not fail to produce symptoms of those of the abdomen for example, can only be regarded as consequences of the insanity, or as accidental complications, or if they stand at all in the relation of causes, as acting only through the medium of the brain.

It being thus premised that the brain is the seat of the disease, can we recognize any particular character in the disordered reasoning and feelings of the insane which will afford us a means of defining it, and enable us to distinguish it from other disturbed states of the mind and senses? Many writers, led by some observations of Mr. Locke, have said that 'the insane reason correctly from erroneous premises, and act with the most rational prudence.' This opinion is founded on Mr. Locke's remark, applies very well to the state of mind of many monomaniacs, who frequently act quite reasonably on the supposition of the subject of their delusion being a fact; it is in their believing what a sound man must be in his senses that they fall. Thus many persons under the influence of particular states of the brain or the senses of vision have seen spectres, but, not believing in their actual existence, were not mad. The belief, however, that the things are real, and perfectly so, with the combined evidence of all our senses, or with other known facts, shows a want of reasoning power, or, according to Dr. Conolly, a want of 'the comparing power;' the lunatic does not compare the evidence of one sense with that given by other senses, or with past impressions; if he did so, he would detect his error. A madman fancies his legs are made of butter, and accordingly protects them from the sun and external force; but if he used his senses of touch and sight, and compared their evidence with the sensation which excited the erroneous idea, or with the idea itself, he would perceive its falsity. There are however, as we have said, many other cases in which, whether combined with delusions or not, there is a defect of the reasoning power, the degrees of which vary from the state of the persons who are regarded merely as somewhat silly, to that of the imbecile, or the idiot, and of the morbidly guilty, in whom, however, the horrors of the asylums, were concealed in private families; and some, from ignorance, were punished as criminals.

The principal means of checking insanity, which the facts actually demonstrate, can be stated in these terms: 1. The marriage of individuals predisposed by inheritance to the disease; 2. The improvement of the physical condition of the poor; 3. The encouragement of intellectual cultivation and amusements among the lower classes, as a means of checking intemperance and sensual indulgence generally; 4. A better education of the moral feelings in all classes of society, so as to discipline the passions and enable the mind to resist their disturbing influence.

In deciding what is and what is not insanity there will not be much difficulty if any illusion exist in the patient's mind, known to us, and its effects in the common mind; but when there is general derangement or defect of the reasoning powers, a careful examination will surely detect it. It is much more difficult to decide as to the existence of moral insanity when unattended with delusions or defect of the reasoning faculty, though the defect is here of the greatest importance, as the honour or life of the individual depends upon it. No rules can be laid down for determining whether eccentric acts, or the commission of homicide, or any other crime, implies the existence of insanity. In such cases however, the history, the dress, gestures, and manner of speaking, and the expression of the features of the individual, should be carefully attended to. In almost all insane persons these symptoms are necessarily accompanied by symptoms of vascular excitement about the head, or an unhealthy state of the skin and of the different secretions.

There are however, as Dr. Conolly observes, two questions to be decided in every inquiry relative to the sanity of an individual. The first relates to the existence of unsoundness of mind; the second regards the treatment required, and especially the necessity of restraint, and the degree and nature of its restraint. With reference to the second question, the chief point to be considered is whether the patient be likely to injure his own person or that of others, or his own property or that of others. Medical treatment may be required in cases of mance but the necessity of confinement that so much injustice has been committed; to prove a man insane has been synonymous with condemning him to imprisonment. But though a man believe his legs are not his own, or that he was present at the destruction of Jerusalem, he may be a perfectly harmless and even useful member of society: shall he therefore be deprived of his liberty and of the management of his property merely on account of a single delusion? (Lunacy.)

The treatment of insanity reaches itself into the medical and the moral. The medical treatment indicated and required at the commencement of the disease consists chiefly in the attempt to reduce increased vascular excitement or slight insanity, or insanity, or that which constitutes, by sound analogous measures are required. The same treatment may be called for during the course of the disease if the symptoms of cerebral excitement or inflammation return. Sometimes the want of sleep is the most marked symptom, and opiates may be used, but in the presence of chronic conditions of the disease the medical treatment is chiefly directed to the restoration and maintenance of a healthy state of all the functions of the body, particularly of the secretions, and of clean, fresh air, and exercise in all. The best asylums afford the means of employment for the insane in the open air; but this important requisite is still neglected in some large public institutions.
The moral treatment is now recognised as an important part of the management of the insane. Formerly a lunatic was regarded with horror, as a being who had lost all relation to society, and was to be treated as a wild beast; he was confined in a gloomy filthy cell, was loaded with chains, and shut out from all influences which could cheer his mind or lead it from the subject of its delusion. The first step in the great amelioration which has taken place was effected by the efforts of M. Pinel in France and the Quakers in England. The insane are now treated with humanity. The power of moral influences in restoring the healthy tone of the mind has been recognised as a principle, in carrying out which the chief means adopted are the following:—1. In many cases seclusion from society, chiefly with a view to remove the patient from the influence of circumstances which produced the disorder, or which might keep up unhealthy trains of thought; but when the insanity is partial, consisting in a single delusion, this measure is not of much service; 2. By shock, in one way or another, to the mind, increase the malady. 2. Occupation and amusement of the mind in various ways, so as to divert the thoughts; this is an important circumstance in the treatment, and one of the degrees of idiocy. 3. The moral influence of the physician has a powerful effect on the mind of the insane; kindness will gain their confidence, while a firm and mild manner is often sufficient to restrain the most violent outbreaks of rage, and render other exertions more effectual. Chains are generally discarded from the apparatus of the lunatic asylum, and even strict waistscoats and straps are seldom required. But while measures of bodily restraint should be avoided as much as possible, it is a safe and imperious rule to remove hurtful weapons and means of mischief from the reach of the insane. All irritation of mind by threats, &c., should be avoided. 4. The convulseant should be separated from the other patients in the asylum. The insane should be classified, so as to separate the quiet and timid from the noisy and violent.

In the preceeding portion of this article we have not made idiocy the subject of separate consideration. It is scarcely necessary to say that while idiocy is the state of defective intellect produced by disease late in life, idiocy is the original want or deficiency of mental power. Just as the imbecility of old age has various degrees, so there are various degrees of idiocy. One of the worst forms in this respect is that presented by the Cretins, the deformed and imperfectly organized idiots met with in the valleys of Switzerland. Idiocy generally depends on congenital disease, but sometimes upon diseases affecting the brain in early infancy. The more remote causes are probably imperfect nourishment of the parents, or some noxious influences acting on the mother during pregnancy; the same happens in infancy. These idiocies are also sometimes to be productive of idiocy. The form and size of the head in idiots may be quite natural; in many cases however it is large and deformed; in others remarkably small, particularly in the region of the forehead. The bones of the head are sometimes very thick; the brain itself disorganized, or its cavities distended with fluid. [HYDROCERPHALUS]

Frichel, Conolly, Burrows, and Haslam, On Insanity; Pinel, De l'Anniation mentale; Esquirol, Sur les Maladies mentales; George, Sur la Folie; Heinroth, Die Störungen des Seelenlebens; and Jacobi, Sammlungen für die Heilkunde der Gemütherkrankheiten.

The Latin term insecta, like the Greek entoma, which has been applied to these animals, has reference to the insected, or divided, appearance of the body; hence the English name divided insects. Invertebrate animals are divided by Lamarck into two groups, which he calls animaux apathiques, and animaux sensibles. The latter, or the sensitive animals, contain 1,293, or one in which insects are the first. According to Latreille's arrangement in the Règne Animal, the class Insecta forms the third great division of articulated animals.

True insects may be thus defined:—Articulated animals possessing six legs, two antennæ, two compound eyes; a 

* Histologie des Animaux sans Vertèbres, tom. I., p. 381.

small bram at the anterior extremity of a double median larv. Circulation effected by a pulsating dorsal vessel provided with numerous valves. Respiration by trachea, which form two lateral trunks, and ramify through the body; generation oviparous; two distinct sexes; adult state attained through a series of metamorphoses.

Insects generally possess two pairs of wings; the trunk in the adult animal is usually composed of three chief parts, the head (caput), thorax, and abdomen; or the trunk of an insect may be described as consisting of thirteen segments, of which one constitutes the head, three form the thorax, and the remaining nine compose the abdomen. The head includes the organs of sensation and manipulation, and its principal parts have received the following names:—the Clypeus, vertex, occiput, gena, canthus, gula, occlus, stemmata, antennæ, and the trophi.

The Clypeus is that part of the upper surface of the head which joins the labrum. It is called by Kirby Natus, and in the Lamellicornes it is usually the foremost part of the head when viewed from above. The Clypeus is the hinder part of the head, or that adjoining the thorax.

Genus (the cheeks). Those parts which lie on the outer side of the anterior half of the eyes, and intervene also between them and the mandibles.—Kirby.

Canthus, a name applied by Kirby to a process of the head which encroaches upon the eye.

Oculi (the eyes). These are almost invariably two in number, placed one on each side of the head, and composed of hexagonal lenses.

Stemmata (the eyelets). Minute simple eyes. They may be seen in the orders Hymenoptera, Orthoptera, and Hemiptera, and are generally placed vertically on the head. The larvae of Coleopterous insects generally possess them, and they are usually placed on each side of the head close to the antennæ.

Antennæ. Jointed organs, two in number, most commonly springing from the upper surface, or side of the head near the eyes. These organs vary much in every way, not only in the various species of insects, but in the sexes of the same species they often differ.
There is much difference of opinion as regards the use of these organs. Some have come to the conclusion, from anatomical researches, that they are organs of hearing, whilst others maintain they are organs of touch or smell. When, however, we see so much difference in the structure of the antennae in insects, and perceive that some use them in touching surrounding objects, as is the case in many of the Hymenoptera (particularly the Ichneumonidae, Bees and Ants), whilst others carefully avoid so doing, we are naturally led to the conclusion that they are used for different purposes in different insects. It is certain that insects possess the sense of smell, but in those insects which possess it apparently in the highest degree we can trace no similarity in the structure of the antennae. A Silpha, a Staphylinus, and a common fly, appear to be equally attracted by the scent of a piece of putrid flesh, and yet their antennae bear no resemblance. The same remark will apply to the antennae of those insects which emit sound: the Grasshopper, the Sphinx streps, many of the Cerambycidae, and numerous other insects might be enumerated which emit voluntary sound, but their antennae do not differ from those of the species to which they are most closely allied, and which emit no sound that we can perceive. As regards touch, there can be no doubt that the antennae of many insects are used as organs of touch, and it appears highly probable that, through the means of the antennae, some insects can perceive the state of the atmosphere. The delicately plumed antennae of the gnat, and of the nocturnal

In describing the species of the Cercidionidae, the term *Puniculus* is often used to designate that portion of the antenna between the long basal joint, or scapus, and the club (called *capitulum* or *clava*), which in these insects usually terminates the antenna.

The principal modifications in the form of antennae are figured and described in the article Coleoptera.

The trophi, or parts of the mouth (called by Fabricius *Insectum Cibarium*), consist of six principal portions:—

1. The Labrum, Labium, Mandibles, and Maxillae.
2. The Labrum, or upper lip, is a conical plate, which terminates the head anteriorly, and covers the mouth above, its posterior margin is united by a membranous hinge to the Clypeus.

The most common form of the labrum is represented in fig. 8; it is however very variable in shape, and in the Lamellicornes, a tribe of Beetles which feed upon vegetable substances, instead of being of the ordinary horny texture, it is soft and membranous, and hidden beneath the clypeus (fig. 9, a). In some of the Cimicellidae (predaceous insects) it is more or less elongated and notched at the sides and apex (see fig. 10). In the genus Cimicella a small projecting tubercle may be observed on the anterior margin.

An antenna may be divided into the following parts:—

1. Scapus, 'The first and in many cases the most conspicuous joint of the antenna.'
2. Pedicellus, 'The second joint of the antenna.'
3. Clavula, 'The remaining joints taken together.'

**Fig. 4.** Parts of the Mouth of a Water-beetle (*Dyticus marginalis*). *a*, the labrum; *b*, labium; *c*, palpi; *d*, mesothorax; *e*, metathorax; *f*, maxillary palpi; *g*, labium. **Figs. 5 and 6.** The Pupa, highly magnified; (a, front view; b, side view); c, d, d.4, pectinaries; e, palpi-labial. **Fig. 7.** Parts of the mouth of *Amphipinax arteriosa*. Corresponding letters refer to the same parts as in Figs. 4, 5, and 6.

Lepidopterous insects, seem to be well fitted for receiving impressions of this nature.

**Fig. 9.** Labium and Maxilla of the Hornet. **Fig. 10.** Labium of Cerambyces morimus. **Fig. 11.** Maxilla of the same insect. **Fig. 12.** Labium of Morimus of a Locust. **Fig. 13.** Labium of another species of Locust. In all three figures the letters & refer to the *Pleopods*; a, *Lagina*; b, *Parsinae*; c, *Polype-labiales*; d, *Mesom*; e, *Cerata* of *Mallia*; f, *Singes* of *dilo*; g, *Papillae*; h, *Locana*; i, *Oales*; j, *Polype-Maxillae.*
of the labrum. In the Hornet (Vespa enbus) the labrum is produced in front into an elongated pointed process (fig. 11). In the Lepidoptera it is extremely minute, and the Hemiptera possess a long, slender, and pointed labrum.

The labium, or under-lip, is opposed to the labrum, and generally serves to close the mouth beneath.

The labium is a very complicated organ, consisting of several parts which are variably developed in the different tribes of insects, &c. There is much confusion in the nomenclature of these parts, especially as regards the portion which is to be considered the true labium; for although the whole apparatus is often called the labium, yet when treated of in detail under different genera, this term to some particular portion, but differs as to which particular portion the term shall be applied, and consequently the neighbouring parts are differently named. The confusion has arisen from the circumstances of entomologists applying the name labium to the whole apparatus, and likewise to a particular part of it. We shall therefore use the term labium to express the whole apparatus, and describe the several parts under the three heads Palpiger, Mentum, and Stipes.

Pulpiger, or palpi-bearer. This name was first applied by Mr. Newman* to a portion of the part called Lingua by Kirby, and Labium by MacLeay and others. It will be used in this article as the name of the whole apparatus to which the labial-palpi are attached, including the lingua, paraglossae, and palpilabiales.

The several parts of the labium therefore will be thus divided:

<table>
<thead>
<tr>
<th>Labium</th>
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<tbody>
<tr>
<td>Palpiger (b).</td>
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If we examine the underside of the head of any insect in which the various parts of the mouth are well developed, the palpi will be readily distinguished from the other two portions of the labium by its bearing a pair of palpi, the palpiger, and the common water beetle, the palpi is of a square form, or nearly so. The broad piece furnished with bristly hairs along its anterior extremity is the lingua. On each side of this piece there is a small plate (apparently divided), which has its posterior margin recurved, so as to lie close to the underside of the lingua, and furnished with a fringe of hairs. These small pieces we conceive to be the analogue of the parts called by Kirby paraglossae, and which are distinct in the bees, wasps, &c. They also appear to represent the two leaf-like appendages at the apex of the palpi in Cerambyx, the lingua here being nearly obliterated, and consisting only of an extremely minute divided process furnished with hairs.

The palpi is not very distinct in the Hymenoptera; its appendages however are often greatly developed. In the hornet the lingua is very large, broad, and divided at the extremity; the paraglossae are also large. The labial palpi are long, and composed of four joints. The lingua in many bees is of great length, and the paraglossae are often long. The labial-palpi in the typical bees are flattened, and have the basal joint long.

Orthopterous insects have a well-developed palpiger: the lingua, paraglossae, and palpi are distinct.

Mentum, or chin, by which we mean the part so called by MacLeay, Westwood, and indeed most modern authors, but which is the Labium of Kirby and Newman.* The Mentum is the piece below the palpiger, and generally articulated to the stipes by a membranous hinge. This part is very variable in shape, and is consequently often referred to in the keys of other insects, or noted in descriptions of the genera. It is generally distinct in Mandibulata insects. In Dytiscus marginalis it is of a transverse form, and emarginated on the fore part. In the hornet, as well as in the mantis the mentum is long, and nearly lenticular.

Stipes. This name is applied by MacLeay to that piece which is below the mentum. It is the Mentum of Kirby, the 'piece pro sensuali' of Straus-Dürckheim, and the Insetum of Mr. Newman.

The stipes is generally splayed to the jugulum, so that its boundaries cannot be detected. Such is the case in the water-beetle, the head of which is selected to illustrate this

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† We are not aware of any appearance of the labium to any part of the label apparatus, we should certainly follow Meares, Kirby and Newman in using it for the part above called mentum.

article. Its lower boundary is indicated in the figure by a dotted line. In the common cockchafer (Melolontha vulgaris) however it forms a well-defined piece. In Amphipalpus suboceletalis (Bed.) a similar allied insect, it is also distinct. In the Hymenoptera the stipes is small, and generally of a triangular shape.

The Mandibles (Mandibulæ) come next under consideration. The term 'mandible' is applied to jaws, are situated immediately below the labrum. They are two in number, and have a vertical motion.

In the Mandibulata the mandibles are almost invariably of a hard horny nature, often of a triangular form, or nearly so, and furnished with a number of bristles (which have been compared to teeth) on their inner side.

In Carnivorous insects the mandibles are usually of moderate length, sharply pointed, and armed internally with acute processes. Wood-boring insects, such as the Cerambycidæ, have short stout mandibles, and in those insects which feed upon vegetable substances (the Pityoglychagori, &c.) the mandibles often present a broad grinding surface on their inner side near the base.

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The Maxilee, or oeder-jaws, like the mandibles, under which they are placed, are opposed to each other horizontally. They are joined at their base to the labium, and distinguished by their giving attachment to the maxillary palpi, on which account Mr. Newman has applied to them the name of 'Feder-jaws.' The maxillae are variable in form, and belong to the latter genera of orders, and are not unfrequently derived from them. A perfect maxilla presents five distinct portions: the Cardo, Stipes, Pulpfer, Lacinia, Galea, and Palpi-maxillales.

Cardo (the hinge) is a small piece, often of a triangular form, upon which the maxilla sits. It is the inserio of Newman.*

Stipes (the stalk). Kirby applies this name to the 'cornaceous base of the maxilla, below the palpi,' and in his detailed account of this part refers both to the palpifer and another portion which is generally situated within the palpifer. We shall confine the name stipes to that part of the maxilla which is joined to the cards, and is either within or below the palpifer. It is the maxilla, or disc, of Mr. Newman.†

Pulpfer. This part, to the summit of which the maxillary palpi are always attached, is usually a narrow piece running parallel with and joined to the outer side of the maxilla at the base.

Lacinia (the blade). This is the chief part of the mxxillæ. It is situated above the stipes, is usually of an elongated pointed form, and furnished with bristly hairs along its inner margin, and generally has one or more pointed claws at the extremity—these claws are called the Ungues. The name lacina is applied to this part by Mr. MacLeay, and according to Kirby it is the Labio inferior.

Galea (the helmet), or the Lobus superior of Kirby, is a lobe which is attached to the palpifer, and lies between the galea and the maxillary-palpi. It is joined in the predaceous beetles, and resembles a petiole.

Palpi-Maxillares (the maxillary-palpi), joined organs, in two, number, one to each maxilla, situated on the outer side of the maxilla and springing from the palpifer.

In the Hemiptera the maxilla has the maxillary labium, and pointed. In the Hemiptera they are still more slender, resembling bristles. The long slender proboscis of the Lepidoptera consists of the maxilla. In the order Hymenoptera the maxilla is connected with the maxillary-palpi.

* Mr. Newman has applied a new name to this part without sufficient reason, since it is generally and correctly called the mandible, introduced by Kirby. The name maxillæ is also objectionable, since it might cause confusion, the same name having been also applied by Mr. Newman to a part of the labium.

† By the same rule that we do not apply the same name to both the whole label apparatus and at the same time to a part, we reject the name maxila as applied to a part of the maxillary apparatus.
noptera the maxillae are usually large, and when closed form a sheath which covers the various parts of the labium.

The oval apparatus, or trophi, of the various Haustellate orders of insects have each received names from Mr. Kirby. In the order Hemiptera the oval instrument is termed the Promucus. The same part is termed the Proboscis in the Diptera, Anthia in the Lepidoptera, and Rostulum in the Aphanipoteran. The several parts representing the Mandible, Maxilla, Labium, &c., have also received additional names in each of these orders, but we have already sufficient.

The term Thorax is applied to all that part of an insect which lies between the head and the abdomen, and to which the legs and wings are attached.

![Fig. 21. Larva, showing the three segments of the thorax and the nine segments of the abdomen: a, the thorax; b, the abdomen.](image)

We have before said that the thorax is composed of three segments; these are generally distinct in those larvae which do not resemble the perfect insect and which possess legs—such as the larvae of the Lepidoptera, Coleoptera, and certain Hemiptera (the Tentaculidinae); here each of the segments in question possesses a pair of legs.

![Fig. 22.](image)

![Fig. 23.](image)

![Fig. 24.](image)

![Fig. 25.](image)

Parts of thorax of a Wasp-bother (Diptera, Anthidae).—Fig. 23, the under-side of the Mesothorax, called Metanotum; a. the scutellum; b, b, basal portions of the elytra. Fig. 24, posterior view of the same. c, one of the middle pair of legs. Fig. 25, under-side of the Metanotum, called Metanotum.

The term Prothorax is applied to the foremost of the thoracic segments, Mesothorax to the next, and Metathorax to the hinder one, or that which joins the abdomen. In the perfect insect we find the three simple thoracic-rings of the larva replaced by the same number of segments, but each divided into several distinct parts; these three segments however are never uniformly developed, but generally two of them are more or less perfected and exert an inverse influ-

ence on the third, and sometimes one of the segments is greatly developed at the expense of the remaining portions.

The Prothorax bears the anterior pair of legs and is articulated to the head. It is large in the Coleoptera, and the part called thorax in descriptions of insects of this tribe; it is likewise well developed in the Orthoptera and Hemiptera. In the Lepidoptera it forms a narrow ring, which is easily distinguished by the scales with which it is covered being erect, those on the next segment being pressed. In the Hemiptera the prothorax sometimes forms a distinct neck, but generally it is a narrow plate and extends back on each side to the base of the anterior wings.

The upper surface of this segment in termed by Burmeister the Premarginal, and by Audouin and MacLeay the Tergum of the Prothorax. The latter authors state that the tergum, when perfect, is composed of four parts, to which M. Audouin gives the names Proscutum, Scutum, Scutellum, and Postscutellum, so named according to their succession, commencing at that nearest the head of the insect. These parts however are seldom to be seen, unless it be in certain Orthopterous insects.

The underside of the Prothorax is called by Burmeister and Kirby the Protergum, and by Audouin the Pectus of the Prothorax. To the Protergum the legs are attached, and hence this part is always tolerably well developed.

Besides the above parts there is an internal piece called the Antefascia.

The Mesothorax, or middle segment of the thorax, is more complicated than the Prothorax, owing to its giving attachment to the anterior pair of wings in addition to a pair of legs. The mesothorax is well developed in nearly all insects, and in the order Diptera attains its largest size, and indeed forms the principal part of the thorax. Its upper surface is termed by Burmeister the Metazoton (Tergum of Audouin), and the under part the Metanotum (Pectus, Audouin).

![Fig. 26. Upper view of thorax of Vespa Crabron. 1, Prothorax; 2, Mesothorax; 3, Metathorax; 1, a, propleuron; 2, a, mesopleuron; 2, b, scutellum; 3, a, scutellum; 3, b, metapleuron; 3, c, postscutellum.](image)

![Fig. 27. Side view of thorax of Vespa Crabron. The figures and letters refer to the same parts as in Fig. 26, b. 1, a, propleuron; 2, a, mesopleuron; 2, b, scutellum; 2, c, situation of the middle pair of legs; 2, d, situation of the anterior pair of wings; 2, e, situation of the posterior pair of wings; 3, f, insertion of posterior pair of legs; 4, abdomen.](image)
At its maximum of development it consists of four pieces above and eight below, to which Audouin applies the names Presecutum, Scutum, Scutellum, and Postscutellum, to the upper pieces, or 

| Cuprum, or | Præsecutum. |
| Prosternum. | Scutellum. |
| Prosternum. | Postscutellum. |
| Pectus, or | Scutum. |
| Prosternum. | Postscutellum. |
| Scutellum. | Postscutellum. |
| Episterna. | Scutellum. |
| Epimera. | Postscutellum. |
| Furca, called | Ante furca. |
| Mediofurca. | Postscutellum. |
| Mesothorax. | Postscutellum. |
| Pectus, or | Paraptera. |
| Metasternum. | Sternum. |
| Episterna. | Epimera. |
| Furca, called | Mediofurca. |
| Metapostum. | Postscutellum. |
| Scutellum. | Postscutellum. |
| Episterna. | Sternum. |
| Epimera. | Epimera. |
| Furca, called | Postfurca. |

From the thorax we are naturally led to the wings and legs of insects.

The greater portion of the insect tribe possesses four wings, some however only possess two, and others are quite destitute. These organs consist of two membranes* applied closely together, and enclosing numerous nerves or hollow tubes which contain trachea.

The various descriptions of wings may be described under the following heads:—Elytra, Tegmina, Hemelytra, and Halteres. The term Elytra is applied to the anterior wings; 'when they are without nerves and uniformly of a thicker and harder substance than membranous. They are peculiar to the Coleoptera. [Coleoptera.]

Tegmina is the name applied to the upper organs of flight when of a uniform coraceous texture, and furnished with nerves as in the Orthoptera. [Orthoptera.]

Hemelytra, the upper organs of flight when they are coraceous at the base and membranous at the apex, as in the Hymenoptera. [Hymenoptera.]

The Halteres are two minute organs situated behind the wings of Dipteroes insects, and supposed to represent the posterior wings; they consist of a slender stalk with a round or oval knob at the extremity. [Diptera.]

The legs in true insects are invariably six in number, but in certain butterflies the anterior pair are minute. Each leg consists of a Coxo, Trochanter, Femur, Tibia, and Tarsus, all of which parts are figured and described in the article Coleoptera.

The Abdomen.—Although the nine segments which compose the abdomen are generally distinct in larvae, we seldom find more than seven or eight visible joints in the perfect insect, the remaining one or two being generally hidden, and in fact converted into parts of the organs of generation.

The number of segments to the abdomen sometimes differs in the males and females of the same insect, as in the Aculeate Hymenoptera. As these segments in the perfect insect bear no organs of locomotion, they are of a more simple structure than those of the thorax, consisting chiefly

of an upper plate called the dorsum, and an under plate called the venter.

The substance of the abdominal segments is almost invariably less hard and more flexible than that of the head and thorax.

In the Coleoptera and Hymenoptera where the upper parts are protected by Elytra or Hemelytra, they are softer than on the under surface which is exposed. In certain species however where the elytra do not cover the abdomen they are of the same substance throughout, as for instance, in the Staphylinids and several minor groups of Coleopterous insects. The articulation of the abdomen to the thorax offers some curious modifications, some of which are constant throughout whole groups, and hence afford distinguishing characters. When the abdomen is closely applied to the thorax it is termed sessile; and when the first segment, or more, is narrow and elongated, and forms a kind of stalk, it is termed petiolate.

The abdomen is often furnished with appendages at its extremity; thus in the earwig (in which Mr. Westwood discovered one more than the usual number of segments) there is a pair of forceps which serve as weapons of defence, and in the male sex of Funeraria, where the apex of the abdomen is considerably elongated, there is also a pair of forceps. In the Dragon-flies there are small flattened appendages, and likewise in the Staphylinids, which are called stylets. Indeed the various kinds of appendages are too numerous to be here described, but are noticed in the accounts of the various groups of insects contained in this work. The modifications of the ovipositor are likewise noticed where they occur in the different groups. When it is of a long and compressed form, it is termed ensate; and when it consists of several tubes united to each other, like the pieces of a telescope, it is called telescopiform. The term aculeiform is applied to this organ in the Hymenopterous insects.

We now come to the internal anatomy of insects.

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* Immediately after it has left the pupa case the two membranes of the wings are distinct.

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Fig. 28.

Fig. 29.

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Fig. 28, Nervous System of the Common Cockchafer (Melolontha vulgaris). Fig. 29, nervous system of a Coleoptera, or Larvo.

First in importance is the nervous system. The nervous system in insects consists of a double nervous chord, which is situated in the ventral portion of the body (being the reverse in this respect to the vertebrate animals). This double chord is joined at intervals by ganglia, which in larve correspond in number to the joints of the body, i.e. thirteen. As the larva is about to assume the pupal state, the abdominal ganglia gradually approach the thorax, and consequently the nearer to each other, a circumstance owing to the longitudinal contraction of the segments at this time, at least such is the case in Lepidopterous larvae. In the pupa state the ganglia are still more approximated, and the nervous cords are curved and distorted; the same number of ganglia however are generally to be found; but in the imago state of Coleopterous insects several of the ganglia have become confluent, so that the
number is considerably reduced. In the common cockchafer (Melolontha vulgaris*), which may be taken as an illustration of the general character of the nervous system in insects, there is one large transverse ganglion in the head, consisting of two chief portions joined laterally, and which are expanded on their outer side to form the optic lobe. From this large transverse ganglion the two nervous chords extend downwards and backwards, and form a ring which encircles the esophagus, beneath which they are unirnted by the second ganglion. These two ganglia together send off the nerves which supply the various parts of the head and its appendages, the trophi, antennæ, &c. From the lower part of the second ganglion the nervous chords are continued to the thorax, where we find three large ganglionic masses, from which all the nerves which supply the thorax and abdomen have their origin.

For a detailed account of the nervous system the student must refer to the works of Lyonnet, Straus-Dürckheim, L. Dufour, Burmeister, M. Herold, in the common white butterfly (Papilio brassicae), and Newport. ‘On the Anatomy of Sphinx ligustra.’

The muscular system. To enter into a detailed account of the muscles of insects would of itself require a long article; we will only observe at present, that the muscles in these animals, as in the higher orders, consist of a contractile portion and tendon.

The digestive system of insects is well developed, and consists of an intestinal canal, in which a crop, gizzard, stomach, and small intestine are generally distinct; but, as in the higher orders of animals, these parts vary according to the nature of the food.

The next subject connected with the definition of an insect is the transformations which it undergoes before arriving at maturity.

All insects are true oviparous animals, with the exception of a few instances where the egg is hatched in the body of the parent, and again where they are born in the pupa state, both of which cases occur in certain species of the order Diptera.

From the egg the larva is hatched; this of necessity casts its skin several times during its progress to maturity, since this part never grows. See article Bombycidæ, where an account of the transformation of the silkworm is given.

When full grown the larva casts its skin for the last time, and in so doing comes forth in the pupa state; and after a time the skin of the pupa is burst by the animal within, which is now in what is termed the imago or perfect state.

The eggs of insects are extremely variable in shape: the more common form is oval; they are however often round, sometimes cylindrical. Those of the common white butterfly are conical. In many moths they are lenticular. The eggs of Hemerobius and several other insects are placed upon fragments.

The surface of eggs is generally smooth or nearly so, but it not infrequently happens that they are uneven, and display a great variety of sculpture.

White, yellow, and green are the predominant colours of the eggs of insects: they are deposited in various situations, but always where the young larva may find appropriate food when hatched. Thus we often find them attached to the leaves or stems of plants. The Ichneumonidæ deposit their eggs in or on the bodies of caterpillars, and their larva when hatched feed upon these animals.

The principal variations in the larvae of insects have been arranged in the following tabular form by Messrs. Kirby and Spence. *

<table>
<thead>
<tr>
<th>Larva without legs</th>
<th>With a corneous head of determinate shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>ii. With a membranous head of indeterminate shape</td>
<td>Coleopterous and Hymenopterous Apodæ—Culicidae. *</td>
</tr>
</tbody>
</table>

* See, *Introduction to Entomology,* vol. iii. p. 144.
Insects are divided by Fabricius into—

I.—Insects with Biting Mouths.

1. Eleuthèresæa.—Maxilla free, uncovered, and [palpi] gerous. (Coleoptera.)

2. Ulonæa.—Maxilla covered by an obtuse galea or lobe. (Orthoptera.)

3. Synistæa.—Maxilla genculate at the base, and connected with the labium. (Neuroptera, &c.)

4. Pizeæa.—Maxilla cornes, compressed, often elongate. (Hymenoptera.)

5. Odonata.—Maxilla cornes, toothed, two palpi (Libellulae).

6. Mitoscæa.—Maxilla cornes, vaulted, not palpigerous. (Myrioptera.)

7. Unguæa.—Maxilla resembling scissors. (Arachnida, part.)

8. Polygonæa.—Palpi mostly six; many maxillæ within the labium. (Brachyurus Decapod Crustacea.)

9. Lepidoptera.—Maxilla many without the labium, covered by palpi. (Macracrus Decapod Crustacea.)

II.—Insects with Suctorial Mouths.

1. Glossata.—Mouth with a spiral tongue between re- flexed palpi. (Lepidoptera.)

2. Ryngonæa.—Mouth with a rostrum having a jointed sheath. (Hemiptera, Latr.)

3. Antææ.—Mouth with a maxillary without a cleft. (Diptera, Anoplura, and Tracheæ Arachnida, Latr.)

Burmeister’s System.

I.—Insecta Ametabola.

The larva resembles the perfect insect, yet it wants wings, if the perfect insect be winged; the pupa in this case have their rudiments. It runs about and eats.

a. With sucking mouths, which consist of four fine setae lying in a sheath; palpi are wanting; four bilary vessels, and generally free thorax.

Order 1.—Hemiptera.

b. With mandibulate mouth; mandibles and maxilla distinct, the latter having palpi, and generally distinct large superior lip.

a. Four unequal wings; the anterior pair leathery, or like parchement, the posterior pair folded longitudi-

nally, and also once transversely; thorax always free; many biliary vessels.

Order 2.—Orthoptera.

b. Four generally equal and rarely unequal wings, never folded; or sometimes none at all. In the first case the nervures are usually reticulated, and there are generally many biliary vessels; in the latter case there are four biliary vessels attached to the intestine; thorax sometimes free, sometimes not.

Order 3.—Diptera.

II.—Insecta Metabola.

The larva consists of thirteen segments, either with or without legs; the pupa is inactive, or if it moves, it takes no food.

a. Four equally large or equally long wings with reticulated nervures; mandibulate mouths; few bilary vessels, rarely more than eight; thorax always free.

Order 4.—Neuroptera.

b. Wings always unequal, the posterior pair sometimes wanting, rarely all.

a. Mouths adapted to sucking.

a. Instead of posterior wings there are pediculated knobs; yet the wings are sometimes wholly wanting; four biliary vessels; larva without feet; a soft proboscis with several setae and a pair of palpi; thorax not free.

Order 5.—Diptera.

b. Four wings generally covered with scales; six biliary vessels; larva with feet and a distinct head; maxilla forming a spiral tongue; thorax not free but small, and closely connected with the mesothorax.
Order 5.—*Legionoptera*.

* a. Four naked wings traversed by ramose nervures; larvae generally without head and feet, but sometimes with both; many biliary vessels; protonox not free.

Order 7.—*Hymenoptera*.

* b. Anterior wings in the form of horny elytra; larva with head, with or without feet; four or six biliary vessels; protonox always free.

Order 8.—*Coloptera*.

The first and second of the above classifications are by no means natural, nor were they intended so to be by their respective authors. The former was established when entomology was comparatively speaking, in its infancy; and although Fabricius possessed a more intimate acquaintance with insects, yet he contended that an artificial classification should be adopted till further discoveries had cleared the way for their satisfactory development.

We cannot feel surprised therefore that these systems should have been superseded by others more modern.

The system of Burmeister is founded upon philosophical principles; we are not prepared to agree with him in all instances. We allude more particularly to his order *Dictoptera*, the species of which, we think, to be incorporated with the Orthoptera.

The mutual affinities and likewise the grade of perfection of the various orders, it appears to us, may be best expressed by arranging them in the following succession:—

1. *Hymenoptera*.
2. *Coloptera*.
3. *Orthoptera*.
4. *Neuroptera*.
5. *Diptera*.

Geographical Distribution of Insects.

Guided by animal forms, the globe may be divided into five portions: 1st, all that part north of lat. 30°; 2ndly, Africa and Arabia; 3rdly, India, including Java, Sumatra, and Borneo; 4thly, South America; and 5thly, Australia, including New Guinea.

In each of these divisions of the globe there is a certain series of forms which predominate, and they are of so marked a character that an experienced entomologist, upon seeing a small collection from any one, would at once be able to state from which they originated, although he might be unacquainted with any one of the species it contained.

It must not be imagined however that each of these divisions contains anything peculiar to itself only, for there are many which occur in every country, although the species from any of the above-mentioned five divisions are always distinct. The following may be stated as general rules:—that elevations have an injurious influence on Insects, for instance, contained in a tropical country, but at a great elevation, do not resemble those of the plains below, but are of forms common in the first division. Water insects are not adapted to climate to the same extent as those which are not aquatic in their habits. As yet there are very few water insects from distant countries which may not be referred to European forms. Among the very minute insects from various parts of the world, extra-European forms are proportionately more rare than among the larger species.


*Insectores,* the name given by Mr. Vigors to the *Pereidae,* the sub-order of both Birds and Insects, and, as the families of which it is composed are very numerous, he classes them in comprehensive sections or tribes, which he thus denominates:—*Fissirostre* (Cuvier), *Dentirostre* (Cuv.), *Conirostre* (Cuv.), *Scorpio* (Cuv.), *Tenurostre* (Cuv.).

The *Fissirostre,* according to Mr. Vigors, include the *Meropidae,* the *Hirundinae,* the *Caprimulgidae,* the *To- doidea,* the *Haplochitonidae,* the *Hextrites*,

The *Dentirostre* include the *Muscoptera,* the *Laniidae,* the *Meruidea,* the *Sylvicidae,* and the *Pipridae.*

The *Conirostre* comprise the *Frugitoridae,* the *Sturnidae,* the *Corvdea,* the *Bucuridae,* the *Loxiidae.*

The *Fissirostre* consist of the *Rhamphastidae,* the *Pittidae,* the *Picidae,* the *Certhidae,* and the *Aullidae.*

The *Tenurostre* are composed of the *Nectariniidae,* the *Cinnyridae,* the *Trocchilidae,* the *Pomeropidae,* and the *Meliphagidae.*

Mr. Vigors finds the following parallel analogies by which the tribes of the *Insectores* represent the different orders of the class:—

| Dentirostre | Raptore. |
| Conirostre | Insectore. |
| Scorpio | Scordos. |
| Tenurostre | Grallatore. |
| Fissirostre | Natatore. |

Of these, the *Conirostre* are considered by Mr. Vigors the typical group. (See further, *Linn. Trans.* xiv. 425.)

The author of *Horse Entomologie* conceives it to be demonstrated, that so far as relates to the analogies existing in nature between the orders of *Mammalia* and *Arca*, the *Primates* ought to be placed as analogous to the *Insectores*.

Both are omnivorous. (See the memoir *On the Comparative Anatomy of certain Birds of Cuba,* by W. S. Macleay, *Ann. and Mag. Nat. Hist.* xiv. 89.)

Mr. Swainson, in accordance with his opinion that the primary divisions of every circular group are five apparently, but three actually, gives the following table as illustrating the

| Circle of the order Insectores, or Percher. |
|---|---|
| 1 | Typical |
| 2 | Subtypical |
| 3 | Alerrant |

The table of analogies set out by the same author is the same in substance with that of Mr. Vigors, differing only in the order in which the tribes and orders are placed. Mr. Swainson, who excludes *Mun* from the Zoological circle, considers the *Insectores* to be analogous to the *Quadru- mura.*

The *Dentirostre,* according to the last named author, include the families *Laniidae,* *Meruidea,* *Sylvicidae,* *Amphictenidae,* and Muscicapidae, with their subfamilies.

*His families of the Conirostre are Corvidea, Sturnidea, Frugitoridae, Musphagidae, and Bucuridea,* with their subfamilies.

Under the *Scorpio* he comprises the *Rhamphastidae,* the *Pittidae,* the *Picidae,* the *Certhidae,* and the *Cuculiidae,* with their subfamilies.

The *Tenurostre* are made to contain the *Meliphagidae,* the *Cinnyridae,* the *Trocchilidae,* the *Pomeropidae,* and the *Paradisaea,* with their subfamilies; the *Fissirostre* are composed of the *Haplochitonidae,* the *Trogodiidae,* the *Caprimulgidae,* and the *Hirundinidae,* with their subfamilies.

*Insolvency.* [Bankrupt Law of Scotland.] We reserved to this reference a notice of the commonly called the process of *cessio bonorum,* or surrender of goods by an insolvent debtor to his creditors on oath.

This process is mentioned in the earliest records of the Scotch law, under the significant name of *cessio bonorum.* It was considered in the local courts, and the benefit of it was allowed, as well by way of defence as by way of suit and action, the debtor swearing that he had not in goods or gear beyond five shillings and a place, and that of all his gains thenceforth he should assign every third penny towards payment of his debt. (*Quan. Att.* c. 7; stat. *Will.* c.)
But the erection of the court of session in the beginning of the seventeenth century, this process was withdrawn, and remained there, not merely to the exclusion of the local judicatures, but as an inner-house process, or one to be determined only by the whole judges. It then also got the name of 'cassation,' and began to be viewed through the medium of the canons and civil laws: the applicant's character was changed; he was no more a bare man, or in a condition of mere destitution; he was a dyer or spondder (from the French devorer, to squander or consume), and his state was famous.

In pursuance of these principles the Court of Session passed an act of sedentum in May, 1665, appointing a pilot to be erected near the market-cross of Edinburgh, with a seat of clay till the dyers are conveyed on market-day at noon, with a hat or bonnet of yellow to be worn by them constantly under the pain of three months' imprisonment, if apprehended at any time without the same. This, the dyer's habit, was by the same authority soon afterwards changed, and appointed to be a coat or upper garment, whereof one half shall be yellow, and the other half brown, with a cap or hood of the same. (A.S., 25 February, 1665; 23 January, 1666.) And also enacted that the pursuer of every process of cessio bonorum specially libel and prove how he became bankrupt (A.S., 1 December, 1685); and shortly afterwards, by A.S., 18 July, 1688, that the dyer had a certain seat in the hands of one of the magistrates of the burgh where he is inordinate, bearing that he had been the space of one month in prison, without which certificate the process would not be sustained.

The consequence of such an oppressive course of legislation may be anticipated. Continuance in gaol was better than delivery on such terms; and accordingly the gaols of the kingdom were in course of time filled with miserable objects. To remedy this evil an act was passed in parliament in 1696, called the Act of Grace, which, on the preamble that 'generally the burghs of the kingdom are invidious and overcharged with prisoners thrust into their prisons--with nothing to maintain themselves, but maintaining necessity either starve or be a burden on the burgh,' declared it lawful to the magistrates of burghs to liberate indigent debtors, if, after notice to them to that effect, the creditors failed to provide them aliment at the rate mentioned in the statute. But so entirely was the true source of the evil overlooked that in the same year an act was passed in parliament expressly forbidding the lords of session to dispense with the burghs. Another act in 1701 also enacted that cessio bonorum, unless the bankrupt's failing 'through misfortune' were libelled, sustained, and proved; and so late as the cases of Drysdale, 20 February, 1732, and Dick, 7 November, 1769, it was refused to dispose with the habit. Sounder and more humane notions began to obtain, and the burghs, under the necessity of either starve or be a burden on the burgh, generally the habit was in later times dispensed with by the court. These notions were unquestionably derived from England; and it is to the House of Lords, in its appellate jurisdiction, and to the English parliament, that the present state of the Scotch insolvent law, its restoration to its antient condition, is to be traced.

By 6 Geo. IV., c. 62, the Act of Grace, 1696, c. 32, was regulated and amended; and by 6 and 7 Will. IV., c. 56, the like was done with the process of cessio bonorum. The latter statute also abolished the 'bankrupt habit' entirely, and bestowed on the sheriffs a cumulative jurisdiction in cessio bonorum, in time of session.

The effect of a decree of cessio is not to discharge the debtor, but merely to relieve him from the operation of personal diligence or attachment of his person. It affords no protection at all from former creditors of any property which he may subsequently acquire by personal industry or otherwise, if the goods already surrendered fall short of extinguishing his debts.

The Insolvent Law of England was consolidated by the 7 George IV., c. 57, continued by 1 William IV., c. 39, and since by annual statutes for one year. It is now somewhat modified by 1 and 2 Victoria, c. 110. The law is administered as by commissioners appointed by the crown in a court called the Insolvent Debtor's Court, and through the commissioners from time to time make circuits and give their attendance at the assize towns or other places where prisoners may be ordered to appear.

By the 1 and 2 Vict., c. 5, no person shall be arrested upon mesne process in any civil action, except in certain cases specially provided for by the act. [Arrest.]

A person who is in prison charged in execution for any debt or demand, or otherwise committed, may be discharged in the act within fourteen days after the commencement of the imprisonment petition the court for his discharge in the manner prescribed by the act, and he must in such petition state his willingness that all his real and personal estate of a value exceeding £300 shall be exposed or sold to discharge the insolvent debtors' estates; and if within twenty-one days after the like time he does not make satisfaction to the creditor at whose suit he is so charged or committed, such creditor (or other person mentioned in the act) may petition the court for an order vesting all the real and personal estate of the prisoner in such provisional assignee. When such petition has been filed, and the court has made an order above referred to, all the prisoner's real and personal estate, and everything which he may in any way acquire before his final discharge, is vested in the provisional assignee by virtue of such order when recorded, except the wearing apparel, bedding, and household utensils, and the utensils under the house, with the amount of all the goods under the whole 20l. in value. The prisoner must also file a schedule of all debts owing by him, and of all his property. The court has power to appoint assignees for the management of the insolvent's estate, and on such assignees according to the appointment of all the estate of the insolvent, which was vested in the provisional assignee, becomes immediately vested in such assignees for the payment of the prisoner's debts. After the court shall have adjudged the discharge of the insolvent, he is entitled to payment for any debt in respect of which the adjudication was made. But any property which he may acquire subsequent to his discharge may be taken in execution, under the provisions of the act, and the court shall apportion the property of such a nature that it cannot be taken in execution, the court may imprison the insolvent till he conveys such property, as the court may direct, for the general benefit of his creditors. It is unnecessary to specify the various provisions of the insolvent laws. Their general object is to release the debtor from prison, to free his person from liability as to debts contracted previous to his discharge, but to make all his present and future acquired property available for the benefit of his creditors. Where new creditors have a claim on the insolvent's subsequently acquired property, which is of such a nature that it cannot be taken in execution, it may be necessary to apply to the court in which the insolvent is in pursuance of such a deceased insolvent, will pay the creditors subsequent to the insolvency first, and then the creditors prior to the insolvency.

In cases where it is proved that the insolvent has fraudulently disposed away with his property, or that his debts were fraudulently contracted, the court does not discharge his person immediately, but has power to order him to be imprisoned for a period not exceeding three years from the date of his petition to the court for his discharge.

There is another statute in the English law (32 George II., c. 28, generally called the Lords' Act, from its having originated in the House of Lords, also continued and extended by subsequent enactments) which, in a case of a bankrupt insolvent, deems taken in execution for a debt not exceeding 300l. to obtain his discharge upon surrendering all his effects (except apparel, bedding, and tools of trade, not exceeding 10l. in value) in the hands of the said commissioner.

INSPIRATION. [Revelation.]

INSPIRATION. [Respiration.]

INNSPRUCK (rather INNSBRÜCK, a Bridge over the Inn), the seat of the principality of Tyrol and Vorarlberg, of the Diet, and of a university which was founded in 1572, afterwards abolished, and re-established in 1626. It has 1100 students. The most remark-
able edifices are the castle, with its garden and statues, the emperor Maximilian, and other tombs of many archdukes. The grave of Andreas Hofer, and his statue by Scheller; are in this church. 47° 15' 36'' N. lat., 11° 29' 49'' E. long.

INSTINCT is a natural impulse to certain actions which animals perform without deliberation, and without having any end in view, and without knowing why they do it. (Bewick.)

That the spontaneity of instinct operates unconsciously is fully established by observation. A calf butts with its head before its horns are grown; and the hen broods over the eggs of another hen or even of young geese, more patient as over its own. Lastly, children in certain states of the body are observed to devour eagerly chalk and other earths which are the proper remedies for the disease, although they have no idea of the nature.

Generally indeed this involuntary direction of animal activity appears to be determined by certain organic states which give rise to a vague feeling of desire or aversion, whereby different species of animals are impelled to pursue or in the voice in such a maner that they cannot escape.

In the civilized state of man it is extremely difficult to distinguish the effects of habit from the operations of nature, but it is not so with the animal world. Here, the ordinary instincts of the human species are apparently few in number. In children the action of sucking is generally considered instinctive, and, in a barbarous state, the action of walking. The action of turning to the National direction, by a determined instinct, has been denied by Hartley, as the form has by Priestley, who considers it to be purely mechanical, like the action of breathing, which Reid has incorrectly classed among instinctive actions. Besides these there are certain extraordinary instincts which are evoked by diseases, in consequence, it would seem, of a change in the mixture of the organic elements of the body. It is thus that the instinctive taste for the feverish patient, and the reviving of children for chalk, &c., which has been already noticed, is to be explained.

But it is in the brute creation that we meet with the most numerous examples of this original quality. The wasp, which does not itself feed upon flesh, and which knows not that a larva is to proceed from the egg which it has deposited in the sand, collects a number of green worms, and having rolled them up in a circular form, fixes them in the hole in such a manner that they cannot escape. The number of the worms so deposited is exactly proportioned to the time necessary for the growth and transformation of the wasp-worm into a fly, when it issues from the hole and is ready to collect food. And this action, if what we have termed extraordinary instinct is afforded by the nymph of the-water-moth, commonly called cod-bait, which cover themselves by means of gluten with pieces of wood and other materials, and lie there, nor is there an instance of what they should always be nearly in equilibrium with the water in which they live. To accomplish this, when their covering is too heavy they add a piece of wood; when too light, a bit of gravel.

Mr. Smellie, from whose work on the 'Philosophy of Natural History' our examples have been drawn, distinguishes two classes of instincts: those which, independent of all instruction or experience, instantly produce certain actions when particular objects are presented, or under the influence of peculiar feelings; and those which can accommodate themselves to peculiar circumstances and situations. The former are termed instinctive, the latter active instinct of the ostrich, which, in Senegal, neglects her eggs during the day, but sits upon them in the night: whereas at the Cape of Good Hope, where the heat is less, the ostrich, like other birds, sits upon her eggs both day and night. The distinction however seems unnecessary. By the uniformity of instinctive operations nothing more is meant than that the actions of all the individuals of the species are similar when the circumstances are the same. Under different circumstances they may act differently, but the correspondence of individual operations will still continue.

While some writers have gone the length of reducing all the faculties of the human mind to certain instinctive principles of action, others have elevated the animal instincts to a level with rational deliberation. Instinct

however differs from intellect by the unerring certainty of its employments, the uniformity of its results, and the perfection of its works prior to and independent of all instruction or experience; and lastly, by the pursuit of nothing beyond what conduces directly either to the continuation of its species or to the propagation of the kind.

But the actions of rational creatures proceed slowly through diversified and oft-repeated experiments, while the means they employ are always various, and seldom the best and most appropriate. In the species through falling short of perfection in many respects, the difficulty is increased by a voluntary combination of the beautiful with the merely useful.

INSTITUT NATIONAL. The various academies of learning in France having been dispersed during the first storms of the Revolution, a decree of the Republic, dated 3rd Brumaire of the year IV., established a national academy, called the Institut, consisting of 40 members, namely, 1, physical and mathematical sciences; 2, moral and political sciences; 3, literature and the fine arts. The object was to promote the progress of learning, to publish memoirs, to make the nation acquainted with the new discoveries, and to correspond with the learned and foreign nations.

Each class consisted of a certain number of members residing at Paris, and a number of associates in different parts of France, with a small number of foreign honorary members (Comptes rendus et Mémoires de l'Institut National des Sciences et Arts, 8vo., Paris, an V. (1797). Bona parte, after he was made first counsellor, gave a new organization, by a decree of 12th of January, 1803, and made it consist of four classes: 1, physical and mathematical sciences, divided into eleven sections, namely, geometry, mechanics, astronomy, geography, and navigation; 2, general physics, chemistry, mineralogy, botany, rural economy and the veterinary art, anatomy and zoology, and lastly, medicine and surgery. This class consisted of 62 resident members, who could appoint 100 correspondents; 3, French language and literature, consisting of 40 members, 8 foreign members, and 8 foreign associates, besides 60 correspondents, native and foreign; 4th class, fine arts, divided into five sections, namely, painting, sculpture, architecture, engraving, and music. This class consisted of 28 members and 8 foreign associates, and 36 correspondents. The class of moral and political sciences was suppressed: Bona parte was never partial to those studies. (Thibaudau. Histoire du Conseil des Inscriptions et Belles Lettres, and Académie des Inscriptions et Belles Lettres, and Académie des Beaux Arts, being members of the two classes were filled up by the members of each class, but the choice was subject to the approbation of the first consul. An annual allowance of 1500 francs was fixed for each resident member, and a salary of 6000 francs to each of the five permanent secretaries. The first members were taken from the class of foreign, one for each of the other three. Annual prizes were also awarded. Bona parte was named member for the section of mechanics. When he became emperor the Institut took the name of Imperial.

After the Restoration, Louis XVIII., by an ordinance, 21st March, 1816, without changing the arrangement of the departments of each class, restored the old names of Académie des Sciences, Académie Française, Académie des Inscriptions et Belles Lettres, and Académie des Beaux Arts, giving to each a more independent organization, but still keeping them united in one academical body called the Institut. Louis Philippe, by a royal ordinance, October 26, 1832, has added a fifth class, or 'Académie de Moral and Political Sciences,' divided into five sections, and consisting of thirty resident members and five foreign associates, besides about thirty correspondents. (Histoire et des Sciences de France, 8vo., Paris, 1818, contain many valuable papers. See also the annual 'Compte Rendu,' on the state of science in France, and the 'Discours,' or orations pronounced at the reception of every new member.

INSTITUTION. [Bennett, p. 219.]

INSTRUMENTS, ASTRONOMICAL, are described under several heads.

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INSURANCE, FIRE. Associations for securing individuals from the ruinous consequences of accidents beyond their own control now form almost a necessary part of our social institutions. Among such combinations for the security of the property of owners from loss arising from fire are among those of most obvious utility, and have long been successfully established in this country. It might have been expected that the most important advantage which might be derived from providing against their ruin by means of annual contributions would have been felt and acknowledged on the part of the government, so far at least as to permit the levying of a tax upon the amount of property of individuals, equal to the premium demanded by the insurance offices, and which is found sufficient to cover all losses, as well as to defray the expenses of management, and to afford an adequate return to the individuals who embark their property in the undertaking. How far the imposition of such a tax prevents insurance being effected it is not possible to determine. That many persons neglect to insuring against the risk of fire being compelled to pay 4s. 6d. for each 100l. value of their property, who would not neglect such precaution if they could attain security by payment of 1s. 6d. for a like amount, will be readily acknowledged; and the propriety of repealing this tax has been frequently urged. But this tax produced to the revenue in 1837 the amount of 903,196l., and as the amount is raised without trouble and at little cost, the tax offers to the minister of the day an inducement for its continued existence which it will be difficult to overcome. The view of an individual who apprehends the consequences of injury or grievance from the tax, and the insurance offices, by which it is collected and paid over to the government, has a special advantage in its continuance, in respect of the discrimination which is made against them on the amounts insured. During a period of distress experienced by the agriculturists, the landowners and farmers of Great Britain, acting through their representatives in parliament, recently obtained an advantage over other classes of the community by the repeal of the duty upon insurance of farm produce.

The value of property insured against fire in Great Britain may be ascertained from the gross amount of the duty collected; a value thus obtained, in 1837, to 575,464,400l., exclusive of farm produce.

INSURANCE, LIFE. [Life Insurance.]

INSURANCE, MARINE. [Ship.]

INTAGLIO, an Italian word composed of in and tagliare, or to cut; and is a term of art applied to small objects of the gem class, in which the design is indented, or engraved, to distinguish them from those in which the subject or device is raised, called Cameo, and under which head will be extant. It is a form of art applied to small objects of precious metal, the French call such sunken works en creux.

The earliest reference to works in intaglio is in the sacred writings, where they are spoken of as being employed for the transmission of the secret of the name of God, A, B, and their conjunctions, as a word of authority to decrees, contracts, and similar purposes. In the Old Testament frequent notices of them occur, as, among others, when Tamar desired a pledge from Judah he gave her his signet (Gen. xxxvii. 19). Another instance is in the description of the sacerdotal garments where it is said we are told the stones that were set in it were to be like the engravings of a signet, every one with his name' (Ezod., xxxix.); showing by this general reference that such engraving, or working in intaglio, must have been well known at that time. The Greeks carried this branch of the fine arts to the same perfection which their genius and freedom had enabled them to reach in all others to which they devoted their attention; but we do not trace its existence among them to a very remote date. It has been supposed that a Homer does not allude to seals they were not used by him. But the question respecting the procedure by which the antient intaglia-tors (sculpitore and coelators—though the latter term seems to apply more properly to metal-chasers—as they are called by Pliny) worked their pieces which are now justly referred to as the best examples of the art. It has been a question with antiquaries whether the lathe was known; but though it is not described by any antient writer, the works of those who professed to be so called seem to afford evidence of its employment; and Pliny refers to the invention of an instrument which he calls 'tornum' (Nat. Hist., lib. vii.), which may fairly be supposed to mean a turning machine or tool. It is certain they were acquainted with the use of diamond-powder.

The modern practice of cutting stones in intaglio is by apparatus similar in principle to the turning lathe, which gives the cutting tool, placed horizontally, a quick rotary motion. The diamond-dust, being brought in contact with it, the surface is ground away or indented, till the effect required is produced. Instruments of various sizes are used, which can easily be removed from the stone upon the removal of the instrument. The preference of diamond-dust mixed with a little sweet oil. As the work proceeds proofs are occasionally taken in wax. Engraving dies in an important branch of the art of intaglio, and requires great care and skill for its perfection. The die is made of finely prepared and tempered steel. When the first intaglio, or original die, is executed, it forms a matrix (or mould), into which a specially prepared compound of resinous matter is introduced, forming a mixt first undergoing a process by which it is hardened. An impression taken in this way is called a punches. When this is completed (and frequent annealing and striking are necessary before it is perfected) the engraver retouches the work, now in relief, and gives it all the delicacy of the original model; the metal is then hardened, and by pressing this punches into other steel which is soft (by almost a repetition, instead of the before-mentioned process), it serves for the purpose of making the dies for coming. Owing to the different qualities of steel and the casualties to which dies are liable (in the hardening, in the annealing, and afterwards while being worked in the press in striking the coins), many are destroyed, but Mr. Wron, the chief engraver at the Royal Mint, has stated that 'the number of punches is many more than any other art of which it is unfreqently amounts to above three and four hundred thousand; though, he adds, the average amount is much less.

INTEGER, a whole number, as distinguished from a fraction. The more common name for a multitude of unity is 'whole number,' meaning a number of units without a broken unit or fraction of a unit. But if the student find any difficulty in separating the word 'whole' for this purpose from its common meaning, he may accustom himself to the word integer. We are led to this remark by finding in a work of celebrity an attempt to connect the word 'whole,' as used in 'whole number,' with its general meaning, as when we say the whole is greater than its part, as follows: "'Whole' is the plural of the noun 'integer,' from the Latin integer, meaning 'whole'; the word 'integer' is the superlative of the word 'integer' from the Latin integer, meaning 'whole'; the word 'integer' is the superlative of the word 'integer.'"
But though this view of the fundamental question is sufficient, in pure mathematics, it is not calculated to connect the process of integration with those conceptions which the mind employs in application to geometry or mechanics. We are here accustomed to a rough species of integral calculus, with which the preceding seems at first to have no connection, but to exceed that of ps to Aσ or Bσ, etc. or the ratio of p to Aσ or Bσ, etc. But by diminishing θ without limit, all the preceding ratios are increased without limit; that is, the ratio of the first series to the second series is increased without limit. We have then the following equation:—

$$\phi(a + b) - \phi(a) = \int_{a}^{b} \phi'(x) \, dx.$$  

It is common to represent the terminal value of x by x itself, as follows:—

$$\phi(x) = \int_{a}^{x} \phi'(t) \, dt,$$

and when the initial value of x is left indefinite, then a constant is written for \( a \), and the symbols of the limits are omitted, as follows:—

$$\phi(x) = \int_{a}^{x} \phi'(t) \, dt + C.$$  

Let us now suppose a given function \( f(x) \) upon which we wish to perform the preceding summation, from \( x = a \) to \( x = a + b \); namely, making \( n \Delta x = b \), we desire to find the limit of

$$\lim_{n \to \infty} \left( f(a) + f(a + \Delta x) + \ldots + f(a + (n-1) \Delta x) \right) \Delta x$$

on the supposition that \( n \) is increased, or \( \Delta x \) diminished, without limit. This process can be performed immediately, if we can find the function which has \( f(x) \) for its differential coefficient. Let \( f(x) \) have the diff. co. \( f(x) \); then, by the preceding theorem, the required limit of the summation is

$$f(a) + f(a + b) = f(a).$$

For instance, as soon as we know that \( \frac{1}{x} \) is the differential coefficient of \( \log x \), we know that \( \log(x + b) - \log x \) is the limit of the following series,

$$\frac{\Delta x}{a} + \frac{\Delta x}{a + \Delta x} + \frac{\Delta x}{a + 2\Delta x} + \ldots + \frac{\Delta x}{a + n\Delta x},$$

the number of terms being \( n \), \( \Delta x \) being the nth part of \( b \), and \( n \) being increased without limit.

The process in the article AREA will now easily show that, if \( y \) be the ordinate of a curve to the abscissa \( x \), the area contained between the ordinates whose abscissae are \( a \) and \( a + b \), the part of the abscissa \( b \), and the curve, is \( \int_{a}^{b} \phi(x) \, dx \) taken from \( x = a \) to \( x = a + b \). Thus if the curve be a part of a rectangular hyperbola, whose equation is

$$xy = c,$$

or \( c = \frac{1}{x} \), the area included between the ordinates, whose abscissae are 1 and \( 1 + h \), is \( \int_{1}^{1+h} \phi'(x) \, dx \) from \( x = 1 \) to \( x = 1 + h \). But \( c \log x \) is the function whose differential coefficient is \( c \frac{1}{x} \); whenever it follows that the preceding area is

$$c \log(1 + h) = c \log 1 + c \log(1 + h)$$

square units. This is the property of the hyperbola from which the logarithms of Napier were called hyperbolic. [LOGARITHMS.]

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An integral is said to be definite, when its limits are
defined, whereas the former is not.

**INTEGRATION, FINITE.** By this term is meant the summation of any number of terms of a series which follows a regular law; and just as integration was reduced in the last article to the determination of a function from its differential coefficient, so finite integration or summation may be reduced to the determination of a function from its difference. [Difference.]

Firstly, let there be a function of \(x, \psi x,\) and let \(x\) successively become \(x + \Delta x, x + 2 \Delta x, \ldots \) up to \(x + (n - 1) \Delta x,\) so that \(n\) different values are given to \(x.\) It is required to sum the series

\[
\psi x + \psi(x + \Delta x) + \psi(x + 2 \Delta x) + \ldots + \psi(x + (n - 1) \Delta x).
\]

Let \(x = \Delta x,\) and let \(\psi(x)\) be called \(\psi.\) Then the series becomes

\[
\psi \cdot \Delta x + \psi(\psi + 1) + \psi(\psi + 2) + \ldots + \psi(\psi + n - 1)\]

This sum is a function of \(n,\) and such that if \(n\) be changed into \(n + 1,\) one more term \(\psi(\psi + n)\) will be added: consequently it must be the function which has \(\psi(\psi + n)\) for its difference. If then we denote the preceding sum by \(\Sigma \psi(\psi + n),\) we find

\[
\Delta (\Sigma \psi(\psi + n)) = \psi(\psi + 1) + \psi(\psi + 2) + \ldots + \psi(\psi + n) = \psi(n + 1)\]

All that precedes has no reference to the term with which we begin: thus \(4 + 5 + 
\ldots + n + 1, 5 + 4 + 3 + 
\ldots + n + 1,\) etc. All these are called 
\(\Sigma \psi(n + 1)\) This symbol is therefore indefinite, but it will be found that the process by which it is to be determined gives an indefinite result.

Suppose, for instance, we have ascertained that \(\psi(n^2 + n)\) is the function whose difference is \(n + 1,\) which will be found to be the case; then

\[
\Sigma \psi(n + 1)^2 - \Sigma \psi(n) = \frac{1}{2} n(n + 1)^2.
\]

It is equally true that \(\psi(n^2 + n) + C\) has \(n + 1\) for its difference, where \(C\) may be anything whatever, provided that it do not change when \(n\) changes. Hence

\[
2\psi(n + 1) = \psi(n^2 + n) + C;
\]

but \(C\) being any whole number less than \(x, \Sigma (n + 1)\) may stand for \(a + (a + 1) + 
\ldots + x.\) Consequently \(C\) in the one must be taken in a manner corresponding to \(a\) in the other. If \(n\) were equal to \(a,\) the series would be reduced to one term \(a,\) and \(\psi(n^2 + n) + C\) would become \(\psi(a^2 + a) + C.\) Determine \(C\) so that these shall be equal: we have then to make

\[
a = \frac{\psi(a^2 + a)}{C}, C = \frac{\psi(a^2 - a)}{a + (a + 1) + \ldots + n} = \frac{\psi(n^2 + n)}{a^2 - a}.
\]

The inverse method of differences, or rather of finite integration, is founded upon the preceding principles and now that, as far as the mere summation of simple series is concerned, the following rules will be sufficient:

1. **Let** \(a\) be the first of a series of \(n\) terms, \(a, b, c, \ldots\) Form the successive differences of \(a\) [Difference], which will all vanish after a certain point in every instance to which this rule applies. Then the sum of the \(n\) terms is

\[
n + n - 1 \Delta a + \frac{n - 1 \Delta a}{2} + \frac{1}{3} \Delta a + \ldots
\]

**Example:**

\[
1 + 8 + 27 + 64 + 125 + \ldots + n^3
\]

First diff. 7 19 37 61
Second diff. 12 18 24 30
Third diff. 6 6 6 0
Fourth diff. 0 0 0 0

Here \(a = 1, \Delta a = a, \Delta a^2 = 2a, \Delta a^3 = 6a, \Delta a^4 = 0,\) \(\Delta a = 0,\) \(C,\) and the sum required is

\[
n^2 + n - 1 + n - 1 \Delta a + \frac{n - 1 \Delta a}{2} + \frac{1}{3} \frac{n - 1 \Delta a}{2} - 3
\]

It may be convenient to give the reduction of the preceding formula in the cases where all after the second differences vanish, and the same for the third. Let \(a, a', a'' \ldots\) be the differences of \(a;\) when \(a'' = 0, a' = 0, \ldots\) the sum is one-sixth of

\[
a^n + n - 1 + 3 n - 1 + n - 2 + 3 + n - 1 + n - 3.
\]

When \(a^n = 0, a' = 0, \ldots\) the sum is one-fourth of

\[
a^n + n - 1 + 2 n - 1 + n - 2 + 3 + n - 1 + n - 3.
\]

**Example**

\[
500 + 8 + 37 + 64 + 125 + \ldots + n^3
\]

First diff. 7 19 37 61 1
Second diff. 12 18 24 30 1
Third diff. 6 6 6 0 0
Fourth diff. 0 0 0 0 0

Here \(a = 1, \Delta a = a, \Delta a^2 = 2a, \Delta a^3 = 6a, \Delta a^4 = 0,\) \(\Delta a = 0,\) \(C,\) and the sum required is

\[
n^2 + n - 1 + n - 1 \Delta a + \frac{n - 1 \Delta a}{2} + \frac{1}{3} \frac{n - 1 \Delta a}{2} - 3
\]

It may be convenient to give the reduction of the preceding formula in the cases where all after the second differences vanish, and the same for the third. Let \(a', a'', a''', \ldots\) be the differences of \(a;\) when \(a'' = 0, a''' = 0, \ldots\) the sum is one-sixth of

\[
a'''' + n - 1 + 3 n - 1 + n - 2 + 3 + n - 1 + n - 3.
\]

When \(a'''' = 0, a''' = 0, \ldots\) the sum is one-fourth of

\[
a'''' + n - 1 + 2 n - 1 + n - 2 + 3 + n - 1 + n - 3.
\]

**Example**

\[
500 + 8 + 37 + 64 + 125 + \ldots + n^3
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First diff. 7 19 37 61 1
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Here \(a = 1, \Delta a = a, \Delta a^2 = 2a, \Delta a^3 = 6a, \Delta a^4 = 0,\) \(\Delta a = 0,\) \(C,\) and the sum required is

\[
n^2 + n - 1 + n - 2 + 3 + n - 1 + n - 3
\]

It may be convenient to give the reduction of the preceding formula in the cases where all after the second differences vanish, and the same for the third. Let \(a', a'', a''', \ldots\) be the differences of \(a;\) when \(a'' = 0, a''' = 0, \ldots\) the sum is one-sixth of

\[
a''' + n - 1 + 3 n - 1 + n - 2 + 3 + n - 1 + n - 3.
\]

When \(a''' = 0, a''' = 0, \ldots\) the sum is one-fourth of

\[
a''' + n - 1 + 2 n - 1 + n - 2 + 3 + n - 1 + n - 3.
\]
INT 501  INT
distinguished from sensibles, the objects of this cognition
depended intelligible (eisich, wery).    
INTERCALARY. [KALENDAR.]
INTERDICT (Interdictum in the Roman law). The general
distinction between the Roman Interdictum and Ectio
seems clearly pointed out by Savigny in a few remarks
on the passage in Gaius (iv. 139), where that writer treats of
the interdict. The words of Gaius, which form the ground-
work of the following remarks of Savigny, are: 'Certi ex
Proctorum a Processum principaliter auctoritatem suam
finierit, quod est Interdictum.’ (On these points, see the
readings, after Maieui); and his remarks have reference to the
supposed difficulty of the word principaliter, and to a certain
proposed emendation supported by very indifferent reasons.
In the same place of Gaius the interdictum is this: in the actio
prayer does nothing, but only a, juridicd, whose duty it is to inquire and decide.
When the judge has decided, the matter may in general be
considered as at an end, and if the priest is again called on
to act in the cause, such must be viewed as an accidental
thing: this appears from the terms of the priest's order in
matters which belong to the actio: he does not command or
order a thing to be done, but he says 'judicium dabo.'
With the interdictum it is just the reverse. Here also
judicis or recuperatorum may be required when the facts are
in dispute; but as a general rule in matters to which the
interdictum is applicable the priest's order can immediately
terminate the question. The priest accordingly does not say 'judicium добо,' but he uses the ordering words 'restituas, exhibas, vix i ferri voto,' &c.; and this
order may not be expressed, as Savigny remarks, than by the word 'prayer, the matter in which, as
Haubold observes, can hardly be anything else than this: the
priest or the processual at once gives a definitive judgment,
by which the dispute, at least for the present, is terminated.'
A much more important point is, whether the pope for the
priest's sake or the church's, or for a better performance of any kind of church rites within the same; the church-service was sus-
pended, the sacraments were not administered, and the
funeral service was not read. The use of interdicts appears
not to have been as wide-spread as we might have expected.
Hincmar, bishop of Lyon in France, laid a parish of his
diocese under an interdict in the year 870. (Morier's Dic-
tionary, art. 'Interdict.') In the middle ages this measure
was often resorted to by the pope has consequence of some serious disputes with the sovereigns of particular countries,
and it had the effect of throwing whole kingdoms into con-
sternation, and even into a state of rebellion, by which the
territorial supremacy of the pope was asserted, and the
law of the land manfully resisted. Gregory VII. and Innocent III. made free use of the
interdict. Adrian IV. laid Rome itself under an interdi-
ict for the purpose of driving away Arnaud du Brescia
who had been elected to the See of Rome by the interdi-
out of regard to the spiritual wants of the people,
who could not be justly punished for the guilt of their
rulers. Gregory IX., during the interdict against Frederic II.,
allowed mass to be said on Sundays. On some occa-
sions the sacraments were administered in the presence of
infants were allowed to be administered. (See Lyndwood.)
The frequent abuse of the interdict has been censured
even by Catholic writers. In course of time the measure
was found no longer to answer its object, and it became
of rare occurrence. Paul V. in April, 1606, laid the republic
of Venice under an interdict, because the senate had
declared that no more convenes should be founded, and
no more privileges be granted to the Venetians, or
orders without permission from the government. The
senate forbade the bull of interdict to be published in the
territories of the republic, and ordered the parochial clergy
not to continue the celebration of Mass. As the pope was
interdicted, he was obliged to submit to the mandates of
the Jesuits, Franciscans, and other monks pleaded their
duty of obedience to the see of Rome, and the senate told
them that they might depart, which they did. At last, in
1607, through the intercession of the pope, the interdict in
France, the pope removed the interdict, which had produced little or
no effect on the minds of the Venetian people.

INTEREST, money which is paid for the use of other
money, the lender stipulating for a fixed sum to be paid
in the next twelve months. Half-yearly, quarterly, and
daily interest is also paid. The money is returned. When this is not the case, and
when the money paid for the loan depends upon the
success of an undertaking, or any casualty not connected
with the duration of the called for period: when the
money and its interest are to be returned by yearly instal-
ments, and paid off in a certain fixed number of years, it is
called an annuity certain: but when the payment is to depend upon the life of any person or persons, it is called a life annuity. [1. Art. 99, 100.] But by whatever name the proceeds of money may be called, the rules of calculation are the same in every case but that of a life-contingency. A simple rule for converting shillings, pence, and farthings into the decimal of a pound, alluded to in the article Annuities, might be made of such frequent use in calculations connected with interest, that we begin with it. The rule is founded upon the circumstance of one farthing being very little more than the two-hundredth part of a pound.

To convert any number of shillings, pence, and farthings to the decimal of 11, as far as three places.

Rule.—Allow 000 for two every shilling, and 50 for the edge of every shilling, and 1 for every farthing. The pence and farthings, adding i if the pence and farthings be sixpence or upwards. Then make three decimal places of the result. Thus 1s. 72d. give 50 and 31, and 02, which, converted into a decimal of three places, is .004, or 1s. 72d. is .004.; the truth lies between .0038 and .0032. Again, 17s. 44d. give 500 and 50 and 18, or 866, so that 17s. 44d. is .866. very nearly.

To convert any decimal of a pound into shillings, pence, and farthings, called a simple rule.

Rule.—Take away the decimal point, and make a whole number of the three places; for every hundred of this whole number allow two shillings, and another shilling to the remaining 50, if so much remain; let ever so much of the remainder be one farthing, but strike off one if the remaining number exceed 24. Thus .9732 gives 18s. 11d. and 23 farthings, or 19s. 6d. but .147 gives 2s. 46 farthings, or 2s. 11d. The following are examples of both rules:

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Conversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>.003</td>
<td>16c. 0d.</td>
</tr>
<tr>
<td>.123</td>
<td>17s. 11d.</td>
</tr>
<tr>
<td>.345</td>
<td>18s. 0d.</td>
</tr>
<tr>
<td>.678</td>
<td>21s. 0d.</td>
</tr>
</tbody>
</table>

The preceding rule is sufficiently accurate for common purposes: but by allowing 1:04 instead of 1 for every farthing, and neglecting the contingent addition, the result may be made nearly true to five places. And by allowing 10,000 for every 2 shilling, 5000 for 1, 2500 for 4, and 1000 for 5, as much as 100, as may be enough in the next place, the result is accurately multiplied by a hundred thousand. Thus to multiply 15. 9d. by 1000,000,

\[
14. \times 70000 = 980000
\]

Interest is usually reckoned by the sum paid yearly for each 100l.; thus 4 per centum, appropriated into 4 per cent, means that 4 pounds is paid yearly for 100l., or that one-twentieth of the whole sum is paid yearly for its use. In some cases, as in the dividend of a bequest, or a estate, a part is compared with the whole by stating how much of each pound is paid. The preceding rule gives the means of reducing one to the other instantaneously; thus since 4s. 3d. is .28S., a bankrupt who pays the former sum per pound, or .238L for 1L, pays 23S. for each 100l., or 233L per cent. Similarly 73¢ per cent, or 37¢L per cent, is .37L for 1L, or 73¢ in the pound.

Integers are not a simple when it is paid as soon as due, or when, if deferred, interest is not charged upon interest. But when the latter charge is made, the interest is called compound. In simple interest it makes no difference whether at the yearly rate or at shorter terms: but this is not the case in compound interest. The sum lent is called the principal; and the principal, together with the interest, the amount: also the principal is called the present value of a pound.

A compound question of simple interest requires merely the process of taking a given fractional part of a sum of money, and not need be explained at length in a work of reference. One example however will serve to show the facilities which the preceding rule affords.

What is the interest upon 697l. 13s. 44d. at 4% per cent, for 7 years?

To find this we must take the hundredth part of the sum 40 times for one year's interest, which we must then repeat 7 times.
\[ A = a \left(1 + r\right)^t \]
\[ a = A \left(1 + r\right)^{-t} \]
\[ r = \sqrt[\frac{1}{t}]{\frac{A}{a}} - 1 \]
\[ n = \log \frac{A - \log d}{\log (1 + r)} \]

From one of these forms of the equation, either of the four, \( A, a, r, \) or \( n \), can be found, when the other three are known. From the second form it appears that the fraction of \( \frac{1}{1+r} \), which will in a year amount to a pound, is divided by \( 1+r \). Let this be called \( v \); we have then
\[ v = \frac{1}{1 + r} \]

Hence it is easily seen, that according as a pound is to be the amount at the end of one, two, three, \&c., years, the principal now necessary to produce that amount is \( v, v^2, v^3, \&c. \) or \( v^n \) expresses the present value of \( \frac{1}{1+r} \) to be received at the end of \( n \) years. Here are no less than fifteen words necessary to express a fundamental result; and when we speak of \( 1 + r \) it must be as 'the amount of \( \frac{1}{1+r} \) in \( n \) years.' To shorten these phrases, the former might be advantageously called the next present value, and the latter the \( n \)th amount.

The sum which yields \( \£1 \) every year is called the value of a perpetuity of one pound, or simply the perpetuity of \( \£1 \). If it be \( P \), we have
\[ Pr = 1, \quad P = \frac{1}{1 + r} = \frac{P}{1 - v} \]

The reader will find an arithmetical account of Annuities under that word; we now proceed to the algebraical formula connected with them. An annuity, and also a perpetuity, is always said to be created a year before any payment is made: thus an immediate grant of an annuity payable yearly implies that the first payment is made a year hence; and similarly of a perpetuity. But in cases where we have to speak of an annuity or perpetuity, of which one payment is to be made now, we propose to call them an annuity due, and a perpetuity due. Again, an annuity or perpetuity deferred for, say 10 years, makes its first payment in 11 years: but a perpetuity due in 10 years, makes the first payment at the end of 10 years. An annuity of 20 years makes 20 payments; an annuity due of 20 years makes 21 payments. Let all annuities mentioned be of \( \£1 \), unless otherwise specified.

The present value of an annuity for \( n \) years is evidently
\[ v + v^2 + v^3 + \ldots + v^{n-1} + v^n \]
for \( v \) in one year becomes \( \£1 \), and provides for the first payment; \( v^2 \) for the second, and so on. The preceding is equivalent to
\[ \frac{v - v^n}{1 - v} \]

Similarly the present value of an annuity due for \( n \) years is \( \£1 \) more than the preceding, or
\[ \frac{1 - v^n}{1 - v} \]

An annuity deferred for \( k \) years is now worth
\[ v + v^2 + v^3 + \ldots + v^{n-1} + v^n \]

or
\[ \frac{v - v^n}{1 - v} \]

A perpetuity deferred for \( k \) years is worth \( \frac{v^k}{r} \) or \( v^k \); but a perpetuity due in \( k \) years is the same as a perpetuity deferred for \( k-1 \) years, and \( k-1 \) must be written for \( k \) in the preceding given for \( k \).

If the proceeds of an annuity of \( n \) years be put out to interest as fast as they become due, then at the instant after the last payment is made the first payment will have improved for \( n-1 \) and \( n \) years, the second for the second and \( n-2 \) years, \&c., and the last payment will have made nothing: whence the whole amount of the annuity at the moment of expiration is
\[ (1+r)^{n-1} + (1+r)^{n-2} + \ldots + (1+r) + 1 \]

which is
\[ \frac{1 - r^n}{r} \]

The annuity of \( n \) years, which \( \£1 \) will buy, makes at each payment \( r \frac{1}{n} \); and so on: that is, the following are methods of restoring \( \£1 \) now left:

1. By annuity for \( n \) years
2. By annuity for \( n \) years, deferred \( k \) years, of

And \( \£1 \), due at the end of \( n \) years, may be paid by an \( n \) years annuity of \( \frac{\£1}{1+r} \), or by an annuity due of \( \frac{\£1}{1+r} \), or by an annuity due of \( \frac{\£1}{1+r} \) and \( \frac{\£1}{1+r} \).

It is hardly necessary to say, that an annuity, \&c., of \( \£1 \) is to be found by multiplying the annuity, \&c., of \( \£1 \) by \( r \).

An annuity of \( n \) years, which gives \( \£1 \) at the first payment, \( \£2 \) at the second payment, \&c., and \( \£n \) at the \( n \)th and last payment, is worth
\[ v + v^2 + \ldots + v^{n-1} + \frac{1}{1 - r} \]

and when the numerator and denominator change places, we have the fraction of \( \£1 \), which must be paid at the end of the first year, in order to repay \( \£1 \) now lent, by uniformly increasing instalments in \( n \) years.

For a short and easy method of deducing the preceding formula from the common tables, see the fifth appendix to the 'Essay on Probabilities' in Dr. Lardner's 'Cabinet Cyclopaedia.'

An annuity of \( n \) years, which gives \( \£1 \) at the first payment, \( \£(n-1) \) at the second payment, \&c., and \( \£1 \) at the \( n \)th and last payment, is worth
\[ v + v^2 + \ldots + v^{n-1} + \frac{1}{1 - r} \]

and reversing numerator and denominator, we have the fraction of \( \£1 \), which must be paid at the end of the first year, in order to repay \( £1 \) now lent, by uniformly decreasing instalments in \( n \) years.

All the preceding formulæ are easy to compute by aid of logarithms, and the result of any one being given, and the rate of interest, it is easy to determine (except in the two last formulæ) the number of years necessary. But if the number of years given, and the rate of interest is the rate of interest which is unknown, an equation must be solved, the degree of which is at least as high as the number of years.

When the interest is to be paid at the expiration of a fraction of a year, it is the same thing as if a less rate of interest were paid for a greater number of years. In the proceeding investigations \( 1 + r \) may be considered as the amount of \( 1 \) at the end of a term, and \( n \) as the number of terms. If then quarterly interest be paid during \( n \) years, \( \£1 \) per pound per annum gives \( \£r \) per pound per quarter, which continued for \( 4n \) quarters gives \( (1 + \frac{1}{4n})^n \) for the amount.

The tables appended to this article are intended to save the trouble of calculation in ordinary cases. They extend from \( \frac{1}{4} \) to 6 per cent. Higher rates are occasionally useful, but it is to be remembered that when the rate of interest is high, and the number of years not small, tables of yearly interest become incorrect when the money is in reality improved half-yearly or quarterly. Thus the tables at 5 per cent., with double the number of terms, will better represent the actual progress of money at 10 per cent. than the common yearly tables. The calculator who wishes to meet every case with readiness, must make himself independent of particular tables. This can be done with the common seven-decimal tables of logarithms, up to five places of decimals and 100 years: and if the logarithm of \( 1 + r \) be given to ten places of decimals, up to seven places and 1000 years. The following subsidiary table is therefore given, which contains the logarithms of \( 1 + r \), for every quarter per cent. up to 6 per cent, and to ten places of decimals. It has been used for a simple method of finding intermediate logarithms.
We now describe the tables which follow:

Table I. gives the present value of £1 to be received at the end of the several years marked. Thus, in the column of 4 per cent. opposite to 15 years, we find 555256, which is the sum that will in fifteen years, 4 per cent. amounts to £1. The present value of 100l., similarly circumstance, is 555256, or 55110. 6d.

Table II. gives the present value of an annuity of £1. Thus opposite to 30 years in the column of 5 per cent. is 1262621, meaning that £1, to be paid at the end of every year from this time for 30 years, is now worth 1262621l., if money will make 5 per cent.

Table III. shows the annuity which £1 will buy for any number of years. Thus in the column of 4 per cent. opposite to 7 years, we find 16661l. If then 100l. now lend, were to be repaid by instalments in seven years, the first instalment a year hence, so as to allow compound interest at 4 per cent., then each instalment should be 16661l.

Table IV. gives the amount of £1 improved at compound interest during a number of years. Thus opposite to 11 years in the column of 3 per cent. is found 138423, meaning that £1, in 11 years, at 3 per cent., amounts to 138423l. and 100l. to 138423l.

Table V. gives the amount of an annuity of £1, as it will be the moment after the last payment has been made, if the preceding payments have been allowed to accumulate. Thus in the column of 3 per cent., under 27 years, we find 4375906l., so that the proceeds of an annuity of 100l. for 27 years, allowed to accumulate at 3 per cent., will at the last payment have realized 4375906l.
### Table III

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<th>5% per. Ch.</th>
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P.C., No. 787

VOL XII—3 T
The amount of money which persons are willing to pay for the temporary use of money depends upon a variety of circumstances. When profits are high the rate of interest will also be high. When, on the contrary, money capital is not abundant in proportion to the calls for its employment, the competition of those persons who possess money, and who derive an income from it, will cause them to endeavor each other in the money-market, to lend money at a low rate of interest to traders, who again will meet each other in competition in their various occupations, and must be content with such a rate of profit as will repay the low rate of interest for which they have bargained, together with some compensation for their risk, skill, and trouble in its management as the degree of competition at the time will allow. If some new channel for the employment of money should be opened holding out the promise of high profits, a competition among borrowers will ensue, the effect of which will be to raise the rate of interest until it assumes its due proportion to the rate of profits; and as there never can, generally speaking, be two rates of profits at the same time (at least for any long period), in the same market, the effect of the additional call for capital to supply the partial demand that has been supposed, will be to raise profits and interest generally. An increase of money capital, either absolutely, or relatively to the means for its employment, will obviously have the contrary effect of lowering its value in use, that is, reducing the rate of interest and profits.

It would be difficult to imagine any circumstances bearing upon this subject in which the parties would not, of themselves, into the conditions here proposed, and it is therefore difficult to see wherein consists the wisdom on the part of governments of limiting the rate of interest; and yet the fact is, that such a limit has usually been made the rule, and that the absence of restriction as to the rate of interest except the exemption of the laws which regulate and limit the rate of interest in this country having been made by those who were among the class of borrowers rather than that of lenders, may perhaps afford some explanation of the views of the legislature in putting restrictions on the trade in money. That these restrictions however were, and so far as they exist still are, unfavourable both to lenders and borro-

s, and more unfavourable to the borrowers than the lenders, may easily be demonstrated. In the year 1787 Mr. Bentham wrote his 'Defence of Usury,' and showed, in a manner which one would have thought adapted to produce general conviction which must have entered into the mind of the public, that the usury law, so far as the law was operative, and the inefficacy of the law to prevent altogether what are denominated usururious transactions. But the minds of those who in this country have the functions of legislation are so completely invested in religious, or in other considerations, so far as the law was operative, and the inefficacy of the law to prevent altogether what are denominated usururious transactions. The system of restriction has had as a sort of check on fraud, and has done away in some degree, when the law was horizontal and in some other important particulars, so that within certain limits, as regards time, the rate of interest among the mercantile classes may now be said to depend upon what may be considered the market value of money, which is to say, the proportion to be demanded for the use of money. A statute passed in 1845 limited the rate of interest to 10 per cent. per annum; in 1824 the rate was lowered to $8 per cent., in 1860 to 6 per cent., and by the statute 12 Anne. 16 (1713), it was further reduced to 5 per cent., beyond which rate it has never since been raised. It has been alleged that since that time, under the penalty of forfeiting for every offence three times the amount of the money lent.

During the late war, when the rate of profit was high and when the government was an habitual borrower of enormous sums, the system of restriction was not adhered to in the negotiation of its loans, the interest upon which was necessarily lower than the market rate of interest; and at all times necessitous borrowers and those who have a doubtful or insufficient security to offer to lenders have always found means to evade the statute by granting annuities (Rayner and J. 1838) and by the use of the interest as a substitute for money; and at the same momentary occasions of commercial difficulty or panic the market rate of interest in this country has not been higher, since the peace in 1815, than the legal rate.

The law does not recognize the charge of interest upon interest, or, as it is called, compound interest, and yet it is only equitable that where money which is due for interest is not settled, it should be considered a fresh loan, for the use of which interest should be paid. This however is a rule so easily evaded by the borrower granting a further acknowledgement of the interest as though it were principal, that it does not amount to a practical hardship: such new contract, in fact, changes the interest already due into a new interest and also recognizes its rate in the mercantile and banking accounts, in which interest is charged upon a former ascertained balance. Such balances may, and in fact often does, include interest already due; and such fact is generally overlooked when interest upon interest, or compound interest.

Debits do not as an invariable rule carry even simple interest from the time when the money becomes due to the creditor; in such case payment of interest is rather the exception than the rule. Unless the debt be such a debt as carries interest by the custom of merchants or traders, or unless there is an express agreement to such effect between the parties, or unless such agreement can be inferred from their course of dealing, or unless there are some special circumstances, debts do not necessarily carry interest from the time when due. But now, by 3 and 4 Will. IV., c. 42, a jury may not, if they think fit, upon all debts or sums certain, allow interest. But excepting these or restrictions by not exceeding the current rate of interest, from the time when such debts or sums were payable, if payable by virtue of a written instrument at a certain time; or if payable otherwise, then from a rule so easily evaded by the borrower granting a further acknowledgement of the interest as almost amounting to fraud, so as such dema
demand notice that interest will be claimed from the date of such demand. This statute also empowers juries to give damages, in the nature of interest, in respect of the debts due by custom of trade or usance (cases), or by the usance of France and Fadt, n. 118. All judgment-debts are to carry interest at the rate of 4 per cent. per annum, from the time of entering upon the judgment. Legacies are payable at the end of one year after a testator's death, and not at the time of the testator's death. The maximum interest as at the rate of four per cent. per annum; unless the testator has made special provisions in his will as to the time of payment.
and the rate of interest. As to interest of money lent on
ships or their cargo see BORROMEO.

The remarks that had been mentioned as having been made as
to the rate of interest formed part of the arrangement
made in 1833, at the last renewal of the charter of the
Bank of England. It consisted in excepting from the operation
of the Bank Act the natural interest on bills and warrants.
It was extended to all such mercantile instruments not having
more than twelve months to run before they are due.

INTERJECTIONS have been defined to be "words
used to express an emotion of the soul, or mind," and
"expressions of joy, grief, astonishment, &c.
Interjections however can hardly be considered as a distinct
part of speech, but are more properly natural sounds common to all
men when laughing, in pain, &c. Many words, such as
against, acc, ei, in Latin, and adieu, welcome,
&c., in English, which have been considered as interjec-
tions by grammarians, ought to be regarded as verbs, sub-
stantives, adjectives, or adverbs.

In their original sense (between, and laquer, to
speak), a term applied to those judgments, decrees, and
orders of courts of law and equity which are made as a
progress in a suit before final judgment. Thus, orders for
the person, who, as a matter of justice, is entitled to the
devotions out of which the dispute arises, are interlocutory orders
or decrees; and those judgments which, though they estab-
lish the right of the plaintiff, leave the amount of damages
to be fixed by jury and interest and costs.

INTERLUDE. A brief piece of church music for the organ,
several exceeding a few bars, generally produced ex tempore,
and played after each stanza, except the last, of the
prayer of the celebrant. It is generally given for the purpose of
giving breathing time to the singers, should always be short
and grave, and in keeping with the psalm tune.

INTERLUDE. [ENGLISH DRAMA.]

Interlude in particular importance to the lower body in the earth.
All nations have felt the necessity of disposing, in some
manner, of their dead, both to avoid the disagreeable
sensation which the sight of a dead body occasions, to
prevent it from being devoured by wild beasts, and to
guard against the noxious effects which arise from the
putrefaction of dead animal matter when exposed to the
atmosphere. Among some of the nations of antiquity we
find that a superstitious veneration for the dead, the ne-
cessity of an air and moisture different from that in
the happiness of the deceased, and the crime attached to the violation
of the tomb, formed a part both of their civil and religious
code. The manner of disposing of the bodies of the dead
had always been of the ordinary modes of sepulture; but the custom of
burning them in the earth and burning on a funeral
pile. The practice of burying is probably the oldest as it
was the simplest mode, and with most nations has always
been the custom, except in the case of savages, for the
months of the year, and afterwards collecting the ashes and
depositing them in a tomb or urn, became very general, and
was the common practice of the Greeks and Romans, so
far as we know their history. The Egyptians do not seem
to have ever adopted the practice of burning the dead; and
though, as we have observed, burning was common among
the ancient Greeks and Romans, it seems likely that inter-
ment was always practised by the lower orders. At Rome,
the bodies were sometimes burned in pits (puticuli), or
thrown to decay in certain unfrequented places. (Varro, De Ling. Lat. 4.)

The practice of burning seems to have gradually
cessated at Rome, and the following (66) seems to be the
embalming and interment of Poppea as a deviation from
the general practice. For further particulars the reader is referred to
the Townley Gallery, 'Library of Entertain-
ing Knowledge,' and "The Monument in which she was bur-
ied." At the present day all European nations deposit their
dead in the earth, and the ceremony of burning is extinct in Europe.
It was proposed indeed to revive it during the
French revolution, but the idea was never adopted. In the
early ages of the world, the dead were preserved only by
deposited in holes in the ground, which were filled up with
earth; but this would scarcely be found a sufficient protec-
tion against wild beasts, and heaps of stones or mounds of
death were accordingly added. Respect for the memory of
the dead, the fear of their being forgotten or confounded
with the vulgar, have given rise in all ages to the erection
of sepulchres, tombs, and monuments of all kinds, to per-
petuate the remembrance of those whom the survivors
loved or honoured.

The places set apart for the burial of the dead are gene-
erally called cemeteries, which is a Greek term signifying
"a place of rest," and was applied to cemeteries, as were
to loci of interment by the early Christians. It is a matter of great
importance to determine what are the best situations for
cemeteries. Among the Greeks we find that they were
under a necessity of placing the tombs at some distance from
the places generally placed by the sides of the public roads.

The ancient Romans followed the custom of the Romans,
but they afterwards transferred their burial-places to the
necropolis, or "city of the dead," and the tombs were
have continued to be generally situated up to the present
time, the churchyards being the usual place of interment,
though, when the church is surrounded by houses, it is
by no means a fit situation; for the putrid exhalations
arising during the decomposition of animal bodies are
highly injurious to health, and capable of giving rise to,
or at least of encouraging, the progress of various pesti-
ileous diseases, of which the most common in this coun-
try are in the warm and moist climate, and in
the situations of cemeteries becomes an important consideration,
in connexion with public hygiène, or medical police. The ad-
advantage, in point of salubrity, of having burial-places re-
moved from a residence, is clearly shown by the practice of the
tombs not to be seen, and it is to be hoped that in a few years the
practice of burying the dead in the midst of crowded cities
and in churches will entirely cease. Cemeteries should be
placed on high ground, and to the north, so that southerly winds
should not blow over the houses charged with the putrid exhalations; low
and wet places should be avoided, and care should be taken that bodies are not
interred near wells or rivers from which people are sup-
plied with water.

The subject of interment possesses considerable interest
in a medico-legal point of view, for it is often of great im-
portance in determining the time of death, and in locating the body
in the earth.

The chemical constitution of the soil seems to have little
influence either in hastening or retarding decomposition:
the two most active agents in accelerating this process are
the heat arising from the respiration of the organism and
the depth from the surface at which a body is interred, the
longer it resists putrefaction, and it will remain unchanged
for a considerable period if enclosed in a leaden coffin
so as to go through a natural mode of decomposition; for the de-
depends, in a great measure, on its power of absorbing
and retaining moisture; thus in sandy soils through which
the water drains quickly, decomposition goes on slowly, and is
in some cases altogether prevented, as in case where the
have perished in deserts, and have been overwhelmed by
the drifting sands, in which their bodies have been found
long after, dry and shrivelled, but without any sign of
having undergone putrefaction. In clayey soils, which re-
tain water, putrefaction readily takes place, and quickly
proceeds to the destruction of all the soft parts, unless trans-
formation into adipose is effected, which stops decompos-
tion. [Adipososis.] Bodies under change in three ways,
as the result of decomposition: first, the putrefactive
process may go on uninterruptedly till the soft parts are
entirely destroyed, and only the skeleton remains; secondly,
the fat may be carried into adipocere; thirdly, the body
may become dry, and preserve its form, and be converted
into a sort of natural mummy. This last change sometimes
takes place in the ground in very dry and elevated situ-
tations, but more frequently in dry wells and caves. With
respect to the process, which the body undergoes
in its progress to complete decomposition, it has been found
that every portion of the face is generally destroyed
between the third and fourth months; the thorax rarely
undergoes any change for the first three months, but the
abdomen, except in the colour of its integuments, but after
that period it collapses and its parietes become very thin.
For an accurate knowledge of this subject we are principally
indebted to the labours of Orfila, to whose "Exhuma-
ions Juridiques" we refer for further information.
INTERMITTENT. [Fever.]

INTERNAL and EXTERNAL, geometrical terms applied to the angles made by the sides of a bounded figure. The angle made by two sides is an internal angle; that made by a side and a side produced is an external angle.

INTERPLEADER, or ENTER PleADER, the name of a suit or action at law, or in equity. When a person holding goods, or owing a debt or duty, is sued by two or more claimants, the court will order them to interplead upon the application of the party sued, and upon his delivering up or offering to deliver up the matter in dispute, and disclosing all interest therein. Antiently this doctrine formed a great title in the law, but from the number of exceptions and technical niceties admitted by courts of law, parties sued or liable to be sued by two or more persons in respect of one matter were able to obtain relief in courts of equity only, which disregarded mere formal objections, and interfered upon the filing of what is called a Bill of Interpleader. The legislature, upon the recommendation of the late Common Law Commissioners, by the statute 1 and 2 Wm. IV., c. 55, has rendered this mode of relief more easy of attainment in the courts of law.

INTERPOLATION. Every mathematical table consists of a series of values of some algebraical expression corresponding to equidistant values of the letter on which it depends. Thus, the most extensive table of logarithms in common use is a succession of values of log. z, answering to z = 10,000, z = 10,001, z = 10,002, and so on up to z = 99,999. The process of interpolation is that of inserting in a table values of the tabulated function intermediate to those given in the table. For example, suppose that p, q, r, s, &c., are written in a table opposite to a, a+6, a+126, a+36, &c., and it is demanded what is the value of the function corresponding to a+2b: this is a question of interpolation.

Such a question can only be solved approximately, but, generally speaking, the values in the table are themselves but approximations, and the interpolated values are as correct as the tabular ones. Strictly speaking, the question itself is indeterminate, for no function can be determined by means of any finite number of values, however great. The question is precisely analogous to that of drawing a curve through a given number of points, which may be done in an infinite number of ways, how many points soever there may be. But if the points be gradually increasing in distance from a given line, and if it be a condition that the intermediate points must do the same, then if the points be near together, any two curves which satisfy the conditions must very nearly coincide. If equidistant absciss of a curve be tabulated with their ordinates, then the ordinates corresponding to intermediate absciss will be very nearly the same for any curve which can pass through the points which belong to the tabulated ordinates.

The method of interpolation consists entirely in the application of the following theorem. [D I F F E R E N C E.] Let p, q, r, s, &c., be terms of a series corresponding to a, a+b, a+2b, &c., and let the successive differences be formed, as in the following table:

<table>
<thead>
<tr>
<th>n</th>
<th>p</th>
<th>Δp</th>
<th>Δp</th>
<th>Δp</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a+b</td>
<td>q</td>
<td>Δq</td>
<td>Δq</td>
<td>Δq</td>
</tr>
<tr>
<td>a+2b</td>
<td>r</td>
<td>Δr</td>
<td>Δr</td>
<td>Δr</td>
</tr>
<tr>
<td>a+3b</td>
<td>s</td>
<td>Δs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a+4b</td>
<td>t</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

where Δp is q - p, &c., Δp is Δq - Δp, &c. Then the nth term reckoned from p exclusive is

\[ p + n\Delta p + \frac{n(n-1)}{2}\Delta p + \frac{n(n-1)(n-2)}{2}\Delta p + \text{&c.} \ (A). \]

Thus q is \( p + \Delta p, \) r is \( p + 2\Delta p + \Delta q, \) and so on. This series, which gives the rest of the table accurately, will give the intermediate values approximately, if \( p, \Delta p, \Delta q, \text{&c.} \) diminish by making \( n \) large. When, by making \( n \) large, we find the term which should stand opposite to \( a+\frac{1}{2}b, \) if the table were made twice as minute as it now is, or, as we may say,

\[ \text{bisection: if } n = \frac{1}{2}, \text{ we find the term answering to } a + \frac{1}{4}b, \text{ and so on.} \]

The following is an instance:

Given the present value of 1,000,000. 20 years hence, at 2, 4, 6, 8, and 10 per cent.; to deduce from thence an approximation at the rate of 4% per cent. Let it be observed, that from 2 to 4% is one interval and a quarter of the tables, or \( n = \frac{1}{4}. \)

\[ \begin{array}{cccc}
2 & 672971 & -216584 & \\
4 & 465387 & +144582 & +24677 \\
6 & 311805 & +47325 & +8705 \\
8 & 214548 & +31535 & +65094 \\
10 & 141644 & & \\
\end{array} \]

We have taken this example to show, when the intervals of the tables are considerable, how slowly the differences may diminish. The consequence is that only four places of the result will be correct. We have now

\[ \begin{array}{c}
p = 672971 \\
\Delta p = 216584 \\
\Delta^2 p = 47325 \\
\Delta^3 p = 8705 \\
\Delta^4 p = 65094 \\
\end{array} \]

\[ \begin{array}{c}
5 n - 1 = n - 2 = 7 \\
\frac{n(n-1)}{2} = 16 \\
\frac{n(n-1)(n-2)}{6} = 128 \\
\frac{n(n-1)(n-2)(n-3)}{24} = 2048 \\
\end{array} \]

\[ \begin{array}{c}
5 \times -216584 = -270730 \\
5 \times 72002 = 11250 \\
5 \times -24677 = 964 \\
5 \times 8705 = 149 \\
\end{array} \]

Answer 414604
Correct Answer 414643

The smaller the tabular interval, the more correctly will a given number of differences serve to make the interpolation. Let us take the preceding question on the supposition that the rates are 2, 3, 4, 5, and 6 per cent., in which from 2 to 4% is 23 intervals, or \( n = 24. \)

\[ \begin{array}{c}
p = 672971 \\
\Delta p = -112295 \\
\Delta^2 p = 202066 \\
\Delta^3 p = 4213 \\
\Delta^4 p = 838 \\
\Delta^5 p = 3377 \\
\Delta^6 p = 14414 \\
\Delta^7 p = 65084 \\
\Delta^8 p = 311805 \\
\end{array} \]

\[ \begin{array}{c}
n = 5 \\
\frac{n(n-1)(n-2)(n-3)}{24} = 5 \\
\frac{n(n-1)(n-2)(n-3)(n-4)}{120} = 128 \\
\end{array} \]

Answer 414644
Correct Answer 414643

The most simple interpolation is that which takes differences only into account, and is perfectly well known.
The formula (B) is sufficient to bisect the intervals given in the article cited.

The following is the method by which the formula (A) may be expressed in terms of, not of p, q, r, s, but of p, q, r, s.

Suppose this is to be done as far as the third difference, or in terms of p, q, r, s.

Assume for the function in question

\[ f(a + b) + f(a - b) = A + B + C + D, \]

When n = 0, this should be p; but it then becomes - 6 A, whence A = -b.

When n = 1, this should be q; but it then becomes 2 B, whence B = -r.

Similarly C = -s, and D = 1: or the function tabulated, within the given limit, is, so far as third differences can determine it,

\[ f(n + 1) \frac{f(n - 2) - f(n - 3)}{3} \]

\[ f(n - 2) \frac{f(n - 3) - f(n - 4)}{6} \]

This method may be extended to the interpolation of intermediate values, when the given values are not equally distant. Suppose that according as n is a, b, c, or a, a function is p, q, r. Assume for the function

\[ A(a - b) + B(a - c) + C(a - b) + D(a - c) \]

When then n = a, we must have A = B = C = D = 0.

\[ A = 0, B = 0, C = 0, D = 0. \]

The following results will serve as an application of the last method but one. Suppose it required to interpolate four equidistant values between q and r in the series p, q, r, s, using third differences inclusive.

First interpolate four arithmetical means between q and r, and let them be A, B, C, D; then interpolate four arithmetical means between 3q = s, and 3r = p, and let these be A', B', C', D'. Then the four terms intermediate between q and r must be

\[ \frac{A + \frac{A}{2}A', B + \frac{B}{2}B', C + \frac{C}{2}C', D + \frac{D}{2}D'}{2}. \]

If it be required to interpolate three equidistant values between q and r, using third differences, take p, q, r, s, and between q and r interpolate three arithmetical means, A, B, C; also between 3q = s and 3r = p, p, q, r, and q, r, s, and let these be A', B', C', and D'. Then the three terms required are

\[ \frac{A + \frac{A}{2}A', B + \frac{B}{2}B', C + \frac{C}{2}C', D + \frac{D}{2}D'}{2}. \]

To interpolate two terms, still with third differences, find two arithmetical means between 3q = s - p -3r - 2p + 2s; the twenty-seventh parts of these means are the intermediate terms required. The interpolation of one term has already been given (B).

When second differences only are used, no material simplification of the fundamental rule can be given. To place k intermediate terms between q and r by means of q, r, s, and t, interpolate k arithmetical means, and correct them as follows. Calculate \[ x = \frac{2(r - x) + 2(k + 1)t}{2k + 3}, \] and call this A; then subtract from the several means

\[ kA, 2(k - 1)A, 3(k - 2)A, \ldots, (k - 1)A, kA. \]

It would be a little more correct to let A be \( p + \frac{r - q}{5} = \frac{1}{5}(k + 1)t, \) which in the case of a single intermediate term would amount to using third differences.

INTERPRETATION. (Mathematics.) This word is coming into use as descriptive of a process which it has long been customary to employ, though without any express name. When an algebraical definition is laid down, there is frequently some restriction implied in the manner of making the definition, so that the process to which it leads is more exacting than can be explained by it, or were contemplated when it was made. For example, the abbreviation of a, a, a, a, &c. [EXPERIMENT] into a, a, a, &c. and the rules which spring from it, soon lead to such results as

\[ a + a + a + a + \ldots. \]

which, though they follow from algebraical processes, yet, when first arrived, are without algebraical meaning. In such a case, the process of interpretation enters: the question is, what should such symbols mean? have they a necessary meaning? if not, is there any meaning which will be more convenient than another? A definition has been laid down, leading to results which cannot be explained by it: required the extension of the definition which will enable it to explain its own results.
Examples are found in all works which explain the principles of algebra. The rule always is, let the interpreted meaning of the new symbols be such as will make the whole of the process true by which they were obtained. Now as they must have been obtained by the application of those formulas which are true of the intelligible results of the definition, the rule just mentioned leads to the following: let the meaning of the intelligible results be such as will make the formulas of the intelligible ones true of them. Thus, in the preceding instance, the fundamental formula which connects the terms of the series a, a', a'', &c., is

\[ a^n \times a^m = a^{n+m} \]

which is intelligible when \( m \) and \( n \) are positive whole numbers. Suppose it now required to interpret \( a^0 \): that is, to give it a meaning which shall make the preceding formula true of it. Write 0 instead of \( m \) and we have

\[ a^0 \times a^m = a^{0+m} = a^m \]

or \( a^0 \) must stand for 1. Again, suppose it required to interpret \( a^{-1} \). In order that the preceding formula may be true of the meaning of \( a^{-1} \), we must have

\[ a^1 \times a^{-1} = a^{1-1} = 1 \] or \( a^{-1} \)

whence \( a^{-1} \) must stand for \( 1/a \). And similarly for other cases.

It is interpretation which creates the distinction between algebra, as now known, and arithmetic with general symbols of number, or universal arithmetic. This we shall see in the article Negative and Impossible Quantities. INTERVAL. [Scale.]

**INTERVAL** in Music, is described by Dr. Robert Smith, in his Harmonics, as 'a quantity of a certain kind, terminated by a graver and an acuter sound.' Brossard had said the same thing in other words:—C'est la différence, ou distance, qu'il y a d'un son grave à un son aigu. Agreeing in this definition, from c to e is an interval of a 2nd; from c to e a an interval of a 5th; from c to b a an interval of a flat 7th, &c.

**Intervals are Simple** when confined within the octave, Compound when they exceed it, and are named according to the distance of the two boundary notes. Thus the interval of a whole tone (c d) is called a 2nd; of a whole tone and a semitone (c e), a minor 3rd, &c. Intervals therefore are considered as sounds, and hence are either consonant or dissonant; i.e. concords or discords. [Concord; Discord.]

**Examples of Simple Intervals.**


**Examples of Compound Intervals.**

Of a 2nd, or an 8th and a 2nd. Of a 5th, or an 8th and a 5th. Of a 15th, or of two octaves.

**INTESTACY** is either the dying without a will, or after having made a will which does not dispose of the whole of the real or personal estate to which the deceased was entitled, and therefore there may be either general or partial intestacy. Real estate, in all cases where it is not disposed of by will, descends to the heir. [Heir; Descendent.]

Personal estate which is not disposed of by will goes to the administrator, to be by him applied in payment of the debts of the deceased, and to be distributed among his next of kin. [Executor; Administrator.]

**INTESTINA** (Intestinaux), the second class of the Radiata, or fourth division of the animal kingdom, according to the classification of Cuvier. In the 'Regne Animal' this class is divided into two orders, Cavitaria and Parenchymata, which include all the Entozoa of Rudolph; but the term Intestina, if retained at all, should be applied only to the true intestinal worms, or those parasites which live in the intestines of other animals, and should exclude the Entozoa which are found in the cellular tissue and substance of the different viscera of the body.

The order Cavitaria ('vers intestinaux cavitéaires') of Cuvier corresponds to the fifth order nematoidea of Rudolph, and the group Celaeminthina of Owen. The Parenchymata ('vers intestinaux parenchymateaux') includes the other four orders of Rudolph, Acantlioplia, Trematoda, Cestodea, and Cystidea, and corresponds to Mr. Owen's group of Stereelmitha.

The principal species of worms infesting the stomach and intestines of man are enumerated under Antemnatics; and for further details see Entozoa.

**End of Volume the Twelfth.**

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