

till after the Punic wars, when Spain became a Roman province. C. Julius Caesar conferred the *civitas* of Rome on all its citizens in 49 B.C.; and not long after L. Cornelius Balbus Minor built what was called the "New City," constructed the harbour which is now known as Puerto Real, and erected the bridge across the strait of Santi Petri, which unites the Isla de Leen with the mainland, and is now known as the Puente de Zuzo, after Juan Sanchez de Zuzo, who restored it in the 15th century. Under Augustus, when it was the residence of no fewer than 500 *equites*, it was made a *municipium* with the name of Augusta Urbs Gaditana, and its citizens ranked next to those of Rome. Some remains of the ancient city, and particularly of the temple of Hercules, are said to be visible below the sea. After the fall of Rome it was destroyed by the Goths, and remained in obscurity under the Moors, from whom it was retaken by Alphonso the Wise in 1262, but it emerged again when the discovery of America made it valuable as a market for colonial produce. In more recent contests Cadiz has been subjected to several disasters. It was taken and pillaged in 1596 by the British fleet, under Essex and Howard, in revenge for the Spanish Armada. It was attacked, but without success, by Lord Wimbledon in 1626, and by the duke of Ormond and Sir George Rooke in 1702. It was bombarded by Nelson in 1800. In 1808 the Spanish patriots in Cadiz brought the French fleet, which lay in the bay blockaded by Admiral Collingwood, to a surrender; and they were in turn subjected to a protracted siege of two years by Marshal Victor, from which they were relieved by the successes of Wellington in the Peninsula. It was once more reduced by the Duke d'Angoulême in 1823, and remained in the hands of the French till 1828. In 1868 the city was the centre of the revolution which effected the dethronement of Queen Isabella.

CADMIUM, a metal closely allied to zinc. It was discovered in 1817 by Stromeyer and Hermann, independently, but in a similar manner. The former chemist, in the execution of his duties as inspector of pharmaceutical products in Hanover, found a substance, sold as oxide, to be really carbonate of zinc, and, applying to the manufacturer for explanation of the reason of the substitution of the latter product for the former was informed that, although the best zinc, in which no iron could be detected, was employed, the oxide could not be produced without a slight discoloration from oxide of iron. On investigation by Stromeyer, it was found that the discoloration was due not to iron but to the oxide of a new metal, which he succeeded in isolating, and named cadmium, from the old chemical name for zinc oxide (*Cadmia fossilis*). About the same time, the sale of an oxide of zinc supplied by Hermann, a chemical manufacturer, who produced it from the waste of the Silesian zinc furnaces, was stopped in Prussia as being contaminated with arsenic,—the reason obviously being that the acid solution of the substance in question gave a bright yellow precipitate when heated with sulphuretted hydrogen. The erroneous character of this inference was, however, soon demonstrated by Hermann, who made a careful investigation of the subject, and discovered the nature of the new metal, but not before Stromeyer had published the results of his observations.

Cadmium does not occur in the metallic state in nature, and there is only one definite mineral known which contains it in quantity, namely, the sulphide, or greenockite, which occurs at Bishopstow, in Renfrewshire, in small isolated crystals of a bright orange-yellow colour, belonging to the hexagonal system, in a doleritic rock associated with prehnite. This contains 77.7 per cent. of cadmium and 22.3 per cent. of sulphur, corresponding to the formula CdS, and is isomorphous with voltzite, the rhombohedral form of sulphide of zinc. Although an extremely rare mineral in the pure state, being confined to the single locality mentioned above, sulphide of cadmium is often present in zinc blende, the richest varieties containing 3 per cent. of cadmium. Among these are the yellow radiated blende of Prizbram in Bohemia, Eaton in New Hampshire, and Engis and Corfali in Belgium. It is also found in the carbonates and silicates of zinc from most of the localities producing these ores, but in what state of combination is doubtful, as it is not generally found in quantity sufficient to be appreciated by the analysis of samples,—

being only discoverable when the ore is treated for zinc on the large scale, in the first products of the reducing processes.

Cadmium is a white metal with a slight bluish tinge by reflected light; it is whiter than lead or zinc, but less so than silver, has a high lustre when polished, and breaks, under a gradually increasing strain, with the fibrous or scaly fracture characteristic of a soft tough metal. It may be readily crystallized in octohedra, differing in this respect from the allied metal zinc which is rhombohedral. It is somewhat harder than tin, but less so than zinc, and like the former metal it emits a peculiar crackling sound when bent. It is malleable, and may be rolled into thin sheets. The specific gravity after fusion is 8.604, which is increased by hammering to 8.694. The specific heat is 0.05669 (Regnault), or 0.0576 (Dulong and Petit). The electric conductivity is 22.10, or somewhat lower than that of zinc; the thermal conductivity does not appear to have been determined. It melts at a temperature below redness (315° to 320° C.), and boils at the temperature of 860° C., giving off a vapour of an orange-yellow tint. The principal coloured lines with their relative intensity observed in the spectrum of cadmium vapour are, according to Huggins's notation, 5024, 6391, 6568, 8892.5, 9181, 9531, 9861, 14731⁰, 15171⁰, 15361, 17471, 18431⁰, 23158, 25626, 32304. The most brilliant of these are chiefly in the green and blue field.

Chemically cadmium belongs to the diatomic group of elements; its symbol is Cd, and its equivalent 58. It unites readily with most of the heavy metals, forming alloys, which with gold, copper, and platinum, are brittle, while those with lead and tin are malleable and ductile. The alloy of $\frac{2}{3}$ silver and $\frac{1}{3}$ cadmium is very tenacious; but that, in the reverse proportion, of $\frac{1}{3}$ silver and $\frac{2}{3}$ cadmium is brittle. An alloy of two parts of cadmium, two of lead, and four of tin, known as Wood's fusible metal, melts at a somewhat lower point than the similar alloy where bismuth takes the place of cadmium, or Darcey's fusible metal (see BISMUTH). It forms several amalgams, among which those containing equal parts of mercury and cadmium and two of mercury to one of cadmium are remarkable for their cohesive power and malleability; whereas that containing 22 per cent. of cadmium is hard and brittle. The amalgams of the former class have been proposed at different times for use in stopping teeth, but are not now so employed. When exposed to damp air cadmium becomes rapidly covered with a dull film of suboxide, but as with zinc the oxidation is only superficial, the crust formed protecting the metal below from further change. When heated to a redness in air it burns, forming a yellowish brown oxide. It also, when in a state of vapour, decomposes water at a red heat, with the formation of oxide of cadmium, hydrogen being evolved. It is soluble with evolution of hydrogen, in sulphuric, hydrochloric, nitric, and even acetic acid, forming colourless salts. When treated with an aqueous solution of sulphurous acid, it dissolves without evolution of hydrogen, sulphite and sulphide of cadmium being found in the liquid.

Oxide of cadmium, CdO, is a yellowish brown powder of the specific gravity 6.95, varying in depth of tint according to the temperature at which it is prepared. It may be produced by burning the metal in air or by calcining the nitrate or carbonate. It is readily reducible by hydrogen or carbon, at a high temperature, but below that necessary for the reduction of zinc oxide. If a mixture of the oxides of the two metals be heated in a current of hydrogen in a glass tube, the oxide of cadmium is reduced, volatilizes, and condenses in the cooler part of the tube, while the oxide of zinc remains unchanged. Oxide of cadmium is a strong base, forming salts similar in constitution to those formed by oxide of zinc, and those of the earthy and alkaline metals. The most important of these is the sulphate.

CdSO₄, which is produced when the metal or its oxide is dissolved in sulphuric acid, forming crystals containing either one or four atoms of water, the former being deposited from a boiling solution, and the latter at the ordinary temperature of the air. The uses of cadmium salts are very limited; the sulphate is employed to a small extent as a lotion in inflammation of the eyes, similarly to the sulphate of zinc, and the iodide in photography and in medicine for the same purposes as iodide of potassium. The only compound of any real importance is the sulphide, CdS, which produces several brilliant yellow and orange colours. These are quite permanent, unlike the yellow produced by lead, chromium, or other metals, which are all more or less subject to discoloration when exposed to the action of sulphuretted hydrogen in the atmosphere. It is produced when sulphuretted hydrogen, or an alkaline sulphide, is added to the solution of any cadmium salt, as an orange-red powder, which becomes carmine-red when heated. At a white-heat it melts, and solidifies on cooling in lemon-yellow scales of a micaceous structure. When the precipitated sulphide is heated in hydrogen it is decomposed, forming cadmium vapour and sulphuretted hydrogen, which reunite in the cooler part of the tube, producing crystals exactly similar to the native mineral greenockite.

The best test for cadmium is afforded by the colour of the deposit formed on charcoal when it is volatilized and oxidized before the blowpipe flame. This is of a reddish brown colour, and usually shows the colours of thin plates from the tenacity of the film; whereas zinc under the same conditions gives a deposit which is bright yellow while hot, but becomes white on cooling. The precipitation as a yellow sulphide from an acid solution is another distinguishing character, as sulphide of zinc does not separate except from neutral or alkaline solutions. In quantitative analysis it is always estimated as oxide, being separated from solution as carbonate by precipitation with carbonate of sodium, which is converted into oxide by calcination. Cadmium, like lead, may also be separated from its solution in acids by means of zinc, which precipitates it in a dendritic form, like the well-known lead tree.

The production of cadmium is restricted to a very few localities. At Engis in Belgium it occurs in zinc blende to the extent of about 0.2 per cent. The oxide formed, together with oxide of zinc in the calcination of the blende, is in the subsequent reducing process in the ordinary Belgian zinc furnace (see ZINC), reduced and volatilized in the first period of the operation, before the heat is raised sufficiently to produce much zinc vapour, and the vapour, on coming in contact with the air, burns with a characteristic brown flame as distinguished from that of zinc, which is bluish green. The deposit formed in the condensing tubes, and in the nozzles (*allonges*) in front of the retorts, during this part of the process is comparatively rich in cadmium oxide, averaging about 1½ per cent. It is put aside until a sufficiency is collected, when it is enriched by a second distillation up to about 6 per cent., this second product being finally reduced by a third distillation with carbon at a dull red heat. The furnace contains fifteen retorts, four of which are reserved for the reduction of the enriched oxide. Cast-iron tubes are used, as the vapour of the metal readily penetrates clay retorts. The loss on the process is very considerable, only 30.12 per cent. of the whole amount of cadmium contained in the material treated being recovered; 21.17 per cent. is left in the residues, and 48.71 per cent. escapes condensation. The total produce of cadmium is very small; about one-half of the amount is produced at Engis, and the remainder in Silesia. In 1874 the production of cadmium in Lower Silesia amounted to 25 cwt., valued at £900 or about £800 per ton; but owing

to the small demand many works had given up the manufacture. (H. B.)

CADMUS, in Greek Legend, was the founder of the town of Thebes originally called Cadmeia, and according to the tradition was a son of Agenor, king of Phœnicia, whence he had proceeded to Greece in search of his sister Europa, but failing to find her had, in obedience to an oracle, settled at Thebes. He there founded a town over which he in time became king, received from the gods Harmonia, a daughter of Ares and Aphrodite, as his wife, by her had a family on whom fell heavy misfortunes, and finally retired with her to Illyria, where they both died in peace, and were transformed into snakes which watched the tomb while their spirits were translated to Elysium. At the marriage all the gods were present, and the muses sang. Harmonia received a dress (*peplos*) worked by Athena, and a necklace made by Hephaestus. Their offspring were Semele, Ino, Autonoe, Agave, and a son Polydorus. On his first settlement at Thebes, Cadmus had slain a dragon, which guarded a spring, and at the orders of Athena had sown its teeth in the ground, from which there sprang a race of fierce armed men (*Spartoi*). By throwing a stone among them Cadmus caused them to fall upon each other till only five survived, and they became the founders of the noblest families of Thebes. Cadmus, however, because of this bloodshed, had to do penance for a long year (*i.e.*, eight years). Such is the legend. When Greek writers came to explain it they identified Cadmus as a Phœnician hero who had introduced into Greece the Phœnician writing, mining, and other arts or institutions of civilization. But his name is Greek rather than Phœnician, and like Cadmilus in Samothrace appears to mean "order," and to indicate a person who has instituted order in a state. He may have adopted much from the early Phœnician traders; but from the fact of Thebes having been one of the seats of the primitive Pelasgi, and from the occurrence of Cadmilus in Samothrace, also a seat of the Pelasgi, it is very probable that Cadmus was originally a purely Greek hero.

CADUCEUS (*κηρυκείον*), the symbol of office carried by public heralds, by Mercury (Hermes), as herald or messenger of the gods, and by Iris, Victory, and Eirene. It consisted of a staff round which two serpents were twined in a knot, their heads meeting at the top of the staff. Mercury, it was said, had seen two serpents fighting and knit together so, and had chosen this as a symbol of the quarrels which it was his duty to assist in settling. Sometimes a pair of wings are attached to the staff to indicate the speed of Mercury as a divine messenger. In the British Museum there is a bronze caduceus, found in a tomb in Sicily, which appears, from the inscription engraved on it in early Greek letters, to have belonged to a public herald of the town of Longena.

CÆDMON, or CÆDMON (the former way of spelling is that of Bede, the latter that of Florence of Worcester), is the name of the earliest Anglo-Saxon or Old English poet of whom we have any knowledge. The meaning of the name has been much disputed. Sir Francis Palgrave, despairing of finding a native derivation, suggested (*Archæologia*, vol. xxiv.) that the poet might have been so called from the Chaldaic name for the book of Genesis, which is "b' Cadmin," in the beginning, or "Cadmon," beginning, from the opening words of the first chapter of Genesis. He thought that he might even have been an "Eastern visitor," who had arrived in Britain from the East, mastered the language, and come out as a vernacular poet. A hypothesis so fanciful as this last may be at once rejected. Another suggestion of the same lively writer connects the name with the Adam Cadmon (the primitive and ideal man) of the Cabalists. It is true that Cabalistic speculations cannot be traced back with certainty beyond the 9th century, but it is quite possible that the word may have

been recognized as an important word in the East, and as bearing a distinct philosophic or theosophic meaning at a far earlier date. On the other hand, in favour of the view which gives to the name a native origin, it may be urged that Bede, though he only employs the word once, says in that passage that the poet's nocturnal visitant "called him by his name," and said, "Cædmon, &c." Does not this look as if the name had a homely and north-country sound in Bede's ears? If so, what did it mean? Sir Francis Palgrave maintains that no Anglo-Saxon derivation can be found for the first part of the name. Dr. Bouterwek, however (in a work on Cædmon, published at Elberfeld in 1845), together with Professor Sandras, explains *ced* as meaning a boat in Anglo-Saxon, whence the former translates the name "pirate," the latter "boat-man." This would be satisfactory if it rested on any ground of fact; but unfortunately this word "ced" is a pure invention of Professor Bouterwek's; neither the Anglo-Saxon language, as known to us, nor the Old English of the first three centuries after the Conquest, nor any local dialect contains any such word. On the whole, Sir Francis Palgrave's first suggestion seems to involve the least difficulty. "Cædmon" means "beginning" in the Targum of Onkelos, the Chaldee version of the Scriptures, which was in popular use among the Jews from the 1st century B.C. downwards, and some learned ecclesiastic at Whitby who had visited the Holy Land may have given to the poet the name Cædmon (which in Anglo-Saxon mouths became Cædmon), because he was to sing of the "beginning" of things.

The few particulars that are known of the life of Cædmon are all to be found in Bede's *Ecclesiastical History*, a book so well known that an abridgement of them is all that will be necessary here. Cædmon was probably a ceorl, employed under the "villicus" or bailiff of the lands belonging to the monastery of St. Hilda at Whitby. He had arrived at mature age, and had embraced Christianity at the call of the devoted Irishmen who from Iona and from Lindisfarne, through two-thirds of the 7th century, spread the light of faith through the regions of northern England. He used to attend festive meetings; but when the song went round, and the harp was passed into his hands, Cædmon, ignorant of the rough old battle-songs of the heathen time, could sing nothing. On one such occasion he is said to have left the feast and gone to the stables, where it was his turn that night to attend to the horses and plough-oxen. He fell asleep, and dreamed that a person appeared to him, who, calling him by his name, said, "Cædmon, sing me something." On his replying that he could not sing, and that on this account he had left the revellers, the other replied, "Nevertheless thou shalt sing for me." "What," said Cædmon, "must I sing?" "Sing," he answered, "of the beginning of created beings" (*principium creaturarum*). Thereupon Cædmon began to sing verses which he had never heard or learned, praising and magnifying the Creator who had made heaven and earth for the children of men. Awakening from his sleep he remembered the verses which had come to him in his dream, and added others to them.

In the morning he went to the bailiff who was over him and told him what had happened; the bailiff took him to the abbess. St. Hilda assembled a company of pious and learned persons, and before them trial was made of Cædmon's gift. He told his story, and repeated the verses, and they all judged that he had received an inspiration from above. They explained to him then and there a passage from holy writ, and desired him to versify it. He went away and returned the next morning with his task most excellently performed. The abbess then received him "*cum omnibus suis*" (it is not easy to determine whether this phrase applies to his kith and kin or merely to his worldly goods)

into the monastery; and there he lived as a monk for the remainder of his life, employing diligently his leisure hours in the cultivation of the gift which he had received. The English poets who, up to the time when Bede wrote, had attempted to write religious poems in imitation of Cædmon, had, in the historian's opinion, fallen far short of him. How long he lived in the monastery we are not informed. The narrative of his death, beautiful in its piety and simplicity, relates how, after an illness of fourteen days, he desired to be removed to the infirmary, where, on the same night, after receiving the Eucharist by way of viaticum, and "signing himself with the sign of the holy cross," he sank into a peaceful slumber from which he never woke.

Florence of Worcester speaks of him, under the year 680, as that celebrated monk of St. Hilda's Abbey who had received from heaven the free gift of poetic inspiration. William of Malmesbury, in the *Gesta Pontificum* (lib. iii. § 116), says that his relics had been discovered at Whitby shortly before he wrote (early in the 12th century), and had been, according to popular report, the occasion of miracles.

An important question remains—whether Cædmon was really the author of the metrical paraphrase of Genesis, Exodus, part of the book of Daniel, &c., which usually goes by his name. The unique MS. containing this paraphrase came into the hands of Archbishop Usher in the 17th century, and was by him given to the French scholar, Francis Dujon, better known as "Junius," who bequeathed it to the Bodleian Library. It is in a hand of the latter part of the 10th century, and contains no indication of authorship. The poem opens as follows:—

Us is riht micel that we rodera weard,
Wereda wuldor-cining, wordum herigen,—

(For us it is very right that we should praise with our words the Guardian of the heavens, the glorious King of hosts.) A number of very curious illustrations, etchings heightened with green and red colour, are in the earlier portion of the MS.; engravings of them may be seen in the 24th volume of the *Archæologia*. Obviously the only means of identifying this anonymous poem as the work of Cædmon is to compare it, as to its opening and contents, with the poem described by Bede. The substance of Cædmon's opening, according to Bede, was this: "Now we ought to praise the author of the heavenly kingdom, the power of the Creator and His counsel, the deeds of the Father of glory. How He, since He is eternal God, is the author of all wonders, who, the Almighty Guardian of the human race, first created for the sons of men the heaven, to be the roof of their abode, and afterwards the earth." The opening of the paraphrase, though more diffuse, agrees with that here described pretty well as to its general meaning, except that the heavens are represented in it as created for the angels rather than for the children of men, who do not come upon the scene till later. Were there no other evidence, it might seem not unreasonable to identify the paraphrase with the poem of Cædmon. But here a new difficulty meets us. King Alfred translated Bede's *Ecclesiastical History*, and when he comes to this passage he gives us a metrical version of Bede's Latin description of the opening, which he seems to intend his hearers to take for the *ipsissima verba* of Cædmon. Of this there are two indications:—first, he renders Bede's words, "quorum [sc. versuum] iste est sensus," into "thara endebyrdnes this is," "their order is this;" secondly, he omits a long sentence immediately following the description of the opening, in which Bede explains that from the difficulty of translating verses literally from one language into another he has merely given the sense and not the "ordo ipse verborum." Now Alfred tells us that he does give the order (endebyrdnes) of the words, and he leaves untranslated the passage which

affirms that only the general sense is given. The verses which he inserts begin thus:—

Nu we sceolon herian heofon-rices weard,
Metodes mihte and his mod-gethene,—

(Now must we praise the Warden of the heavenly kingdom, the might of the Creator, and the thought of His mind.) In short, Bede's description is turned with great literalness into Anglo-Saxon verses. But are these Cædmon's? If they are, then the paraphrase is not the work of Cædmon; for not one line in the opening as given by Alfred agrees with the paraphrast's opening. However, in spite of the circumstances mentioned above, the judgment of criticism will not identify Alfred's verses with the true work of Cædmon. They are so bald, so literal, that the conviction forces itself upon us that Alfred is here merely translating from Bede's Latin, and amusing himself with making his version metrical. On the other hand the paraphrast is a genuine poet; variety, force, and colour are the ever-present attributes of his poetic diction; his imagination is bold and fertile; his moral purpose clear and pervading—in fact he is just such a man as we should conceive the real Cædmon to have been.

The other point of comparison between the paraphrase and Bede's description relates to the contents of Cædmon's poem. "He sang," says the historian, "the creation of the world, the origin of man, and all the history of Genesis; and made many verses on the departure of the children of Israel out of Egypt, and their entering into the land of promise, with many other histories from holy writ; the incarnation, passion, resurrection of our Lord, and His ascension into heaven; the coming of the Holy Ghost, and the preaching of the apostles; also the terror of future judgment, the horror of the pains of hell, and the delights of heaven." With this account the contents of the paraphrase which we have agree, up to a certain point, remarkably well. It may be said, generally, to embrace the whole history of Genesis, except that portion which relates to events posterior to the time of Isaac. It then passes to the history of Moses and his statutes, "Moses domas," briefly giving the thread of events till it arrives at the passage through the Red Sea, on which the writer enlarges with evident enjoyment. An abrupt transition is then made to the book of Daniel; the story of the three children saved out of the fiery furnace is told; Daniel's dream-wisdom is set forth, and the doom denounced against Belshazzar. Then what is called the second book of the paraphrase, the beginning of which coincides with a change of handwriting in the MS., commences, and now the resemblance to Bede's description ceases. This book opens with the complaints of the fallen angels in hell and the lamentations of the souls detained in the *Limbus Patrum*; the descent of Christ after his passion to liberate these souls is described; the resurrection is barely mentioned, but the intercourse of Christ with his apostles previous to his ascension, and the ascension itself, are told at some length. The book concludes with a description of the terrors of the Day of Judgment. Such a poem cannot be said to correspond with Bede's description; but then it must be remembered that, partly on account of the change of hand and of subject, partly on account of the presence in it of later linguistic forms, the ascription of this second book of the paraphrase to the author of the first has always been held problematical. On the whole, although the grounds of a confident judgment do not exist, the analysis of the evidence here attempted points to the conclusion that the first book of the paraphrase, though not the second, may with considerable probability be assigned to Cædmon.

Some writers have assigned other extant poems to Cædmon, e.g., the *Halga Rôd* (Holy Rood) of the Vercelli codex, a passage in which has been found to tally with the

Runic inscription on the Ruthwell Cross, and also the fragment called *Judith*, in the MS. volume containing *Beowulf*. But the evidence in favour of either supposition may be set down as nil; nor does the style in *Judith*, still less in the *Halga Rôd*, agree with that of the Paraphrast. (T. A.)

CAEN, or, as it is called in the old chronicles, CADON CATHM, CAHEM, or CAAM, the capital of an arrondissement in the department of Calvados in France. It stands about 80 or 90 feet above the level of the sea, in an extensive valley, on the left bank of the Orne, at the influx of the Odon, 9 miles from the English Channel, and 122 west of Paris, in 49° 11' 14" N. lat., 0° 21' 15" W. long. The town is handsome and well built; the streets, of which the most important is the Rue St. Jean, are generally wide, straight, and clean; and the houses, being of freestone, have a very good appearance. Hardly any remains of its once extensive ramparts and towers are now to be seen; but the castle, founded by William the Conqueror and completed by Henry I., is still employed as barracks, though in a greatly altered condition. The city contains several ancient churches and other buildings, affording fine specimens of the Norman style of architecture. Among these are the church of St. Pierre, dating from the 14th century and surmounted by a handsome stone spire, the finest in Normandy, 242 feet in height; the magnificent churches of the Abbaye Aux Hommes, or St. Etienne, and the Abbaye Aux Dames, or Trinity, both founded in 1066,—the former by William the Conqueror, where a plain grey marble slab in the pavement now marks his long since desecrated tomb, and the latter by his queen Matilda, who was interred there. The old convent of the Capuchins is now occupied by the society of Le Bon Sauveteur, which, founded by two poor girls about 1730, has grown into a most important institution, and maintains an asylum for the insane of both sexes, a charitable dispensary, a school for the education and industrial training of deaf and dumb children, and various minor establishments. Caen is the seat of a high court of appeal for the departments of Calvados, Manche, and Orne, and has tribunals of primary instance and commerce, a chamber of commerce, a *conseil de prud'hommes*, a university (founded in 1431 by Henry VI. of England), a royal college, a school of hydrography, a public library of 45,000 volumes, an extensive botanic garden, a museum belonging to the society of Norman antiquaries, and a theatre. There is a local *Académie des sciences, arts, et belles-lettres*, which has published a series of *Mémoires* since 1754. The commerce of Caen is considerable. It exports barley, flour, potatoes, wine, brandy, fruit, cattle, hardware; and imports timber from Norway, coal, pig-iron, oats, wheat, and oil-seeds. Its manufactures are of comparatively small importance with the exception of rape and colza oil, though there is a certain turn-out of caps, table-linen, cotton fabrics, leather, earthenware, and cutlery; breweries, dye-works, and ship-building yards are also in operation. The manufacture of lace, formerly of great extent, has very much declined. A fine kind of oolitic stone, in great favour as a building material, is quarried in the neighbourhood. Several large fairs are held annually. At high water, vessels of 150 or 160 tons can come up to the harbour, which consists of a part of the river bed and a basin 1896 feet in length by 164 in breadth, and has communication with the sea not only by the river, but also by a canal debouching at Ouistreham. A canal to connect it with the sea is in course of construction, which will render it accessible to large vessels. The town is situated on the main line of railway from Paris to Cherbourg, and is connected by branch lines with Courseulles on the coast, and with Laval inland.

Though Caen is not a town of great antiquity, the date of its foundation is unknown. It existed as early as

the 9th century, and when, in 912, Neustria was ceded to the Normans by Charles the Simple, it was a large and important city. Under the dukes of Normandy, and particularly under William the Conqueror, it rapidly increased. It became the capital of Lower Normandy, and in 1346 was besieged and taken by Edward III. of England. It was again taken by the English in 1417, and was retained by them till 1459, when it capitulated to the French, in whose possession it has since continued. In 1793 the city was the focus of the Girondist movement against the Convention. Among the numerous celebrities to whom Caen has given birth may be mentioned Malherbe, Boisrobert, Huet bishop of Avranches, and Tannegui Lefebvre. Population in 1872, 39,415 in the city, and 41,210 in the commune.

See L'Abbé de la Rue, *Essais historiques sur la ville de Caen*, 1820-42; Manœl, *Histoire de la ville de Caen*, 1844; Vauthier, ditto, 1843; L'Abbé Daniel, *Embellissements de la ville de Caen*, 1842; Freeman's *Norman Conquest*, vol. iii.; Macquoid's *Normandy*, 1874.

CÆRE (Καίρε), called by the Greeks *Agylia* (Ἀγύλλα), which is probably an Etruscan name, a city of Southern Etruria, near the coast of the Tyrrhenian Sea. Its site is occupied by the modern Cervetri (*Cære vetus*), situated in the district of Civita Vecchia, about 32 miles from Rome. In the Virgilian legend of Æneas, Cære appears as the seat of the Etruscan king Mezentius; but the earliest fact in its genuine annals is its participation in an attack on the city of Alalia in Corsica. It afforded a refuge to the Tarquins on their expulsion from Rome, and it was afterwards chosen by the Romans as the securest hiding-place of their treasures during the Gallic occupation of their city. In the time of Strabo the city had become of little importance, and was even outgrown by the neighbouring village of *Aque Cæretanae*. It continued, however, to rank as a municipium, and in the 4th century of the Christian era had a "bishop" of its own; but in 1250 it was deserted by a large part of its inhabitants, who removed to what is now the village of *Ceri*. The chief building of modern date in Cervetri is the castle of the Ruspoli family, who are in possession of the seigniory. From the inhabitants being admitted to the privilege of Roman citizenship, but without the right of suffrage, the "Cærite franchise" came to be a proverbial expression denoting disfranchisement. A large number of interesting Etruscan remains have been found in the tombs of Cære, among which may be specially mentioned paintings of high antiquity and inscriptions showing one of the sepulchres to have belonged to the Tarquin or Tarchnas family.

See Dennis, *Cities and Cemeteries of Etruria*, vol. ii.; Visconti, *Antichi monumenti scoperti nel ducato di Cere*, 1836; Canina, *Descrizione di Cere Antica*, 1838; Griffl, *Monumenti di Cere Antica*, 1841; *Transactions of the Royal Society of Literature*, vol. ii.; Noël des Vergers, *L'Étrurie et les Étrusques*, 2 vols. 1862-4; Aug. V. Hare, *Days near Rome*, 1875, vol. iii.; *Journal des Savants*, 1843, &c.; and various articles in the *Annali* and *Bulletino dell'Istituto di corrisp. archeol. di Roma*, especially 1869, 1873 and 1874.

CAERLEON, the *Isca Silurum* of the Romans, is situated upon the right bank of the river Usk, about 3½ miles N. of Newport in Monmouthshire. Its name appears to be a corruption of the Latin *Castrum Legionis*,¹ and there can be no doubt that the place was the station of the second Augustan legion, and ranked as a colony and capital of Britannia Secunda in the period of Roman dominion. The existing remains of ancient Caerleon still *in situ* are unimportant, consisting only of fragments of the city walls and a grass-grown amphitheatre (comprising an area of 222 feet by 192 feet), in which the tiers of seats are indistinctly visible. - The hamlet on the opposite bank of the river

¹ Nennius, writing about two centuries before Geoffrey of Monmouth, says (c. 56), "Bellum gestum est in urbe Leogis, quæ Britannice Cair Lien dicitur."

preserves its Roman name of *Ultra Pontem*, and it is probable that the connecting bridge was a pontoon similar in character to that which survived to the close of the last century. The local museum is rich in objects of interest, collected (chiefly through the zeal of Mr J. E. Lee, the author of *Isca Silurum*), either in Caerleon or its immediate neighbourhood. It includes a tessellated pavement of much beauty brought from Caerwent, four Tuscan pillars which are thought to have supported a temple of Diana, a large number of inscribed and sepulchral stones, a series of coins from the time of Otho to that of Honorius, stone coffins, *amphoræ*, *antefixa*, amulets, enamels, and Samian ware of home and foreign manufacture. It is remarkable that on two inscriptions the name of Geta (the younger son of Severus) has been mutilated and partially effaced—evidence of the hatred in which the civil governor was held by his brother Caracalla. In the recent restoration of the Parish church (in style Early English, with traces of rude Norman) a good deal of Roman masonry was brought to light, and upon the hill side, which formed the burial place of the ancient city, fragments of urns and memorial slabs are even now often exhumed. Enough has been discovered to prove that Caerleon was a place of great importance in Roman times, but not enough to support the hyperbolic language of Giraldus Cambrensis (borrowed from Geoffrey of Monmouth) that its "splendid palaces, with their gilded roofs, once emulated the grandeur of Rome" (bk. ix. c. 12).

Although the chief historic interest attaching to Caerleon is derived from the impress left upon it by Roman occupation, it has also a less substantial claim to notice in connection with the romance of Arthur and the Round Table. It was hither the "blameless king" came at Pentecost to be crowned, and made high festival with the chieftains from Lothian and Orkney, from Gower and Carados. Here, too, if we follow the laureate's version, Arthur took counsel with "Dubric, the high saint" and Guinevere climbed—

"The giant tower, from whose high crest, they say,
Men saw the goodly hills of Somerset,
And white sails flying on the yellow sea."
(*Idylls of the King*, *Enid*.)

The lofty mound upon which this tower is said to have stood is close to the Roman amphitheatre, to which the name of Arthur's Round Table has been given. The tumulus is evidently artificial, and may perhaps have supported the keep of the castle mentioned in *Domesday*, the ruins of which, now limited to a solitary bastion on the river side, were very extensive even in Leland's time.

The grantee of Caerleon at the Norman Conquest was William de Scobies, and the lordship was subsequently enjoyed by the Crown and the great families of Clare and Mortimer. From the latter it devolved to King Edward IV., and in later times has been held by the Morgans of Llantarnam and the Howes, Lords Chedworth. The chief proprietor at the present time is Sir Digby Mackworth, Bart.

The ecclesiastical history of Caerleon reaches back to the first introduction of Christianity into Britain, when it was constituted the seat of an archbishopric. It sent a representative to the councils of Sardis (347 A.D.) and Rimini (359); and in the persecution of Diocletian during the previous century two of its citizens, Aaron and Julius, are said to have suffered martyrdom. The see was transferred to St David's in the 11th century, and at the present time Caerleon is included within the diocese of Llandaff. Some remains of a Cistercian priory may still be traced, but even the memory of Dubricius, the stout opponent of the Pelagian heresy, has perished in his dwelling-place. (C. J. R.)

CAERMARTHEN. See CARMARTHEN.
CAERNARVON. See CARNARVON.

CÆSALPINUS, ANDREAS (1519-1603), one of the most distinguished of the Italian natural philosophers of the Renaissance, was born at Arezzo in Tuscany in 1519. Of his family nothing is recorded, nor does he appear to have left any progeny, or to have been married.

We have no account of his life till we find him seated in the botanical chair of the university of Pisa, where also he studied, if he did not teach, anatomy and medicine. His first publication was entitled *Speculum Artis Medicæ Hippocraticum*, in which it were too much to expect he should have released himself from the shackles of his venerable guide; but he has left evident proofs, in a passage often quoted, of his having a clear idea of the circulation of the blood, at least through the lungs. In botany his inquiries were conducted on a more original plan, and their result was one of the most philosophical works in that science, issued from the press at Florence in 1583, in one volume quarto. The title-page is sufficiently arrogant in tone.—*De Plantis libri XVI. Andrea Cæsalpini Aretini, Medici clarissimi doctissimique, atque Philosophi celeberrimi ac subtilissimi*; yet Cæsalpinus appears to have been the editor, and prefixed, in his own name, an elegant and learned epistle dedicatory to Francis de' Medici, grand duke of Tuscany. This book, now rarely to be met with, is not only the unacknowledged source from which various subsequent writers, and especially Morison, derived their ideas of botanical arrangement, but it was a mine of science to which Linnæus himself gratefully avowed his obligations. Linnæus's copy of the book evinces the great assiduity with which he studied it; he has laboured throughout to remedy the defect of which Haller complains of the want of synonyms, has subjoined his own generic names to nearly every species, and has particularly indicated those remarkable passages, at pages 13 and 15, where the germination of plants and their sexual distinctions are explained. In the former we trace the first rudiments of a natural classification of plants by the differences in their cotyledons, or, in other words, we find the origin of the natural systems of Linnæus and Jussieu; in the latter passage we detect the fundamental principle of the Linnean artificial system. Nor were these merely incidental suggestions of the author. He pursued his inquiries to a conclusion on which the existence of botany as a science depends, and which the no less eminent Conrad Gesner detected about the same time, though his ideas respecting it were not then made public. The principle to which we allude is the classification of plants by their parts of fructification alone. This was afterwards extended, by the greatest writers on the subject, as Ray and Tournefort, and more completely by Linnæus, to the discrimination of their genera by the same parts, more particularly considered and contrasted. To this more extensive conclusion, indeed, the principle directly and inevitably leads. Cæsalpinus used it himself with such success as to develop some of the most important characters for generic distinctions, such as the flower being superior or inferior with respect to the fruit; the heart of the seed situated at its summit or base; the seeds, or the cells of the seed-vessels, solitary or otherwise; the partitions of certain pericarps parallel or contrary to their valves. Linnæus remarks that Cæsalpinus, though the first systematic botanist, found out as many natural classes, or orders, as his followers. He did not indeed define well the philosophical limits of genera in the vegetable kingdom, and therefore his work cannot be regularly quoted throughout for generic synonyms. The want of plates of his own, and of references to other authors, renders, as we have already hinted, some of his names and descriptions unintelligible. Yet Linnæus has in manuscript filled up many blanks which he had been obliged to leave in his own

Classes Plantarum, where the system of Cæsalpinus first assumed a synoptical form. The latter might probably have adopted a more clear and methodical mode of arranging and explaining the botanical part of his subject, had he not had in view the vague and desultory manner of Pliny, whom he closely imitates in the materials of his numerous chapters, as well as in his style of description. A small and unimportant *Appendix* to this work, of nineteen pages, appeared at Rome in 1603, which is of very rare occurrence, but may be found reprinted in Boccone's *Museo di Pianta Rare*, p. 125. The herbarium of over 760 plants which he left is said to be still preserved at Florence.

Cæsalpinus having been settled at Pisa when the great Galileo first presumed to doubt the infallibility of the Aristotelian philosophy, and, most likely, at the time when that rising philosopher became professor of mathematics in the same university, we can hardly imagine him to have been free from the party-spirit which so disgracefully manifested itself there. He seems to have retained his professorship till 1592, when he removed to Rome in attendance on Pope Clement VIII. He died in 1603 at the age of eighty-four.

Cæsalpinus printed at Rome, in 1596, a quarto volume of above two hundred pages, entitled *De Metallicis*, dedicated to Pope Clement VIII. which, like his botanical publications, is now extremely rare. In the philosophy of this work Aristotle is his guide; in its method and composition, Pliny. A prefatory address to the pope declares it to have been undertaken in opposition to a certain treatise on the same subject, which, though written with diligence and elegance, contained many things inconsistent with the principles of philosophy, and subversive of the Peripatetic doctrines, and with the author of which, as being excommunicated by the holy church of Rome, no measures were to be kept.

The *Questionum Peripateticarum libri quinque*, published at Rome in 1603, diverge considerably from the pure doctrine of Aristotle, and by the emphasis laid on the universal and common intelligence inherent in matter, approximate rather to the pantheism of the Stoics.

CÆSAR, CAIUS JULIUS, was born July 12, 100 B.C., according to others in 102 B.C., of a family who for many years had held high offices in the state. He was the greatest man of the Roman or perhaps of all the ancient world. It is not without reason that his name has remained among us as the title of sovereignty, or that his memory survives as the standard of commanding greatness; yet the very completeness of his character makes it difficult to obtain a clear grasp of his individuality. In every relation of life he attained apparently without effort to the highest excellence, as a citizen, a politician, an orator, a general, a companion, a man of letters, and a far-seeing organizing statesman. Yet study will make it clear to us that his greatness has not been overrated, and the more we contemplate his position and his work, the less opportunity we shall find for blame or criticism. He entered into active life at a great crisis of his country's history. A strong national individuality, firmness, and unity of character and purpose had gradually won for Rome the supremacy of Latium, of Italy, and of the world. But the qualities which were able to acquire an empire were not able to govern it. The time was now passed when the senate presented an example of dignity and magnanimity, when a sense of law and justice and persistency of aim and object sufficed to extenuate a cruelty which knew no limit but the realization of its will. It was truer now than in the time of Horace that Rome was falling by the weight of its own greatness. The long struggle between the patricians and plebeians for political equality served rather to strengthen than loosen the cohesion of the state. But the nations which lay outside the city could not be assimilated without severe struggles. The equality of Latins and Italians with the citizens of Rome might be