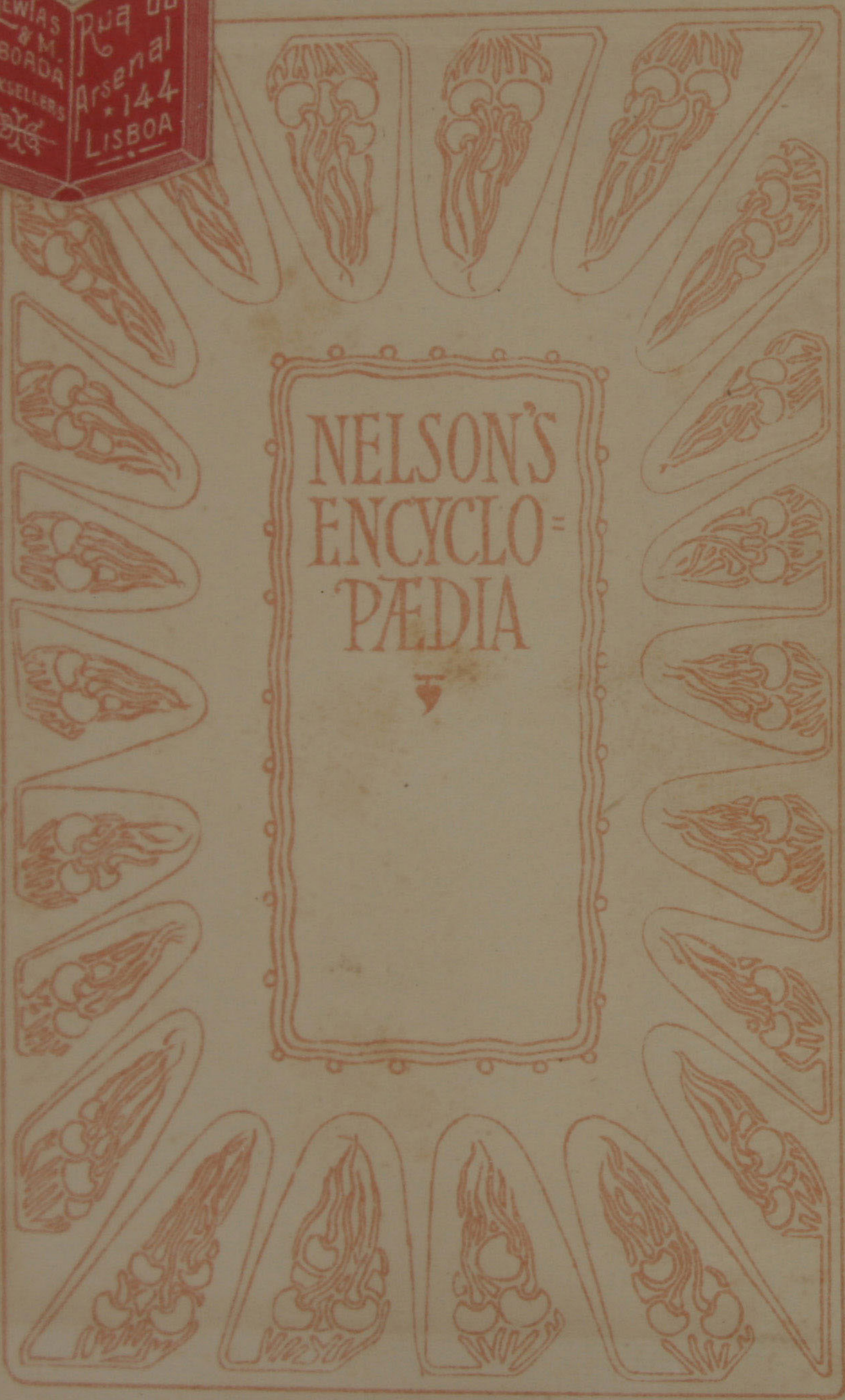


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NELSON'S ENCYCLOPÆDIA

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VOL. II.

Anquetil—Azymites

WELSON'S ENCYCLOPEDIA

VOL. II

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NELSON'S  
ENCYCLOPÆDIA

VOL. II.

Anquetil—Azymites

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# LIST OF CONTRACTIONS USED IN THIS WORK.

<b>ac.</b> , acres.	<b>Gr.</b> , Greek.	<b>stn.</b> , station.
<b>agric.</b> , agricultural.	<b>Heb.</b> , Hebrew.	<b>s.v.</b> , under the word.
<b>alt.</b> , altitude.	<b>I.</b> , isl., island.	<b>Syr.</b> , Syriac.
<b>anc.</b> , ancient.	<b>ibid.</b> , the same.	<b>temp.</b> , temperature.
<b>ann.</b> , annual.	<b>i.e.</b> , that is.	<b>terr.</b> , territory.
<b>Ar.</b> , Arabic.	<b>in.</b> , inches.	<b>trans.</b> , translated.
<b>Aram.</b> , Aramaic.	<b>Ital.</b> , Italian.	<b>trib.</b> , tributary.
<b>arr.</b> , arrondissement.	<b>Lat.</b> , Latin.	<b>U.S.A.</b> , United States of America.
<b>A.S.</b> , Anglo-Saxon.	<b>lat.</b> , latitude.	<b>vil.</b> , village.
<b>aver.</b> , average.	<b>l. bk.</b> , left bank.	<b>vol.</b> , volume.
<b>bor.</b> , borough.	<b>lit.</b> , literally.	<b>W.</b> , west.
<b>bur.</b> , burgh.	<b>long.</b> , longitude.	<b>wat.-pl.</b> , watering-place.
<b>c. (circa)</b> , about.	<b>m.</b> , miles.	<b>yds.</b> , yards.
<b>cap.</b> , capital.	<b>mrkt. tn.</b> , market-town.	—
<b>cf.</b> , compare.	<b>Mt., mts.</b> , mount, moun- tain, -s.	<b>Railways</b> — <b>C.R.</b> , Cale- donian Railway;
<b>co.</b> , county.	<b>munic.</b> , municipal.	<b>C.P.R.</b> , Canadian Paci- fic Railway; <b>G.E.R.</b> ,
<b>Com.</b> , Commission.	<b>N.</b> , north.	Great Eastern Railway;
<b>comm.</b> , commune.	<b>N.T.</b> , New Testament.	<b>G. &amp; S.W.R.</b> , Glasgow and South-Western
<b>cub. ft.</b> , cubic feet.	<b>O.T.</b> , Old Testament.	Railway; <b>L. &amp; N.W.R.</b> ,
<b>Dan.</b> , Danish.	<b>par.</b> , parish.	London and North- Western Railway;
<b>dep.</b> , department.	<b>parl.</b> , parliamentary.	<b>N.B.R.</b> , North British Railway, etc., etc.
<b>dist.</b> , district.	<b>Per.</b> , Persian.	<b>Bibliography</b> — <b>Biog.</b> <b>Dict.</b> , Biographical
<b>div.</b> , division.	<b>pop.</b> , population.	Dictionary; <b>Encyc.</b> <b>Brit.</b> , Encyclopædia
<b>Du.</b> , Dutch.	<b>Port.</b> , Portuguese.	Britannica; <b>Proc.</b> <b>Royal Geog. Soc.</b> , Pro- ceedings of the Royal
<b>E.</b> , east.	<b>prov.</b> , province.	Geographical Society;
<b>eccles.</b> , ecclesiastical.	<b>q.v.</b> , which see.	<b>Jour.</b> , Journal; <b>Hist.</b> , History; <b>Mag.</b> , Maga- zine, etc., etc.
<b>ed.</b> , edition; edited.	<b>R.</b> , riv., river.	
<b>e.g.</b> , for example.	<b>r. bk.</b> , right bank.	
<b>Eng.</b> , English.	<b>R.V.</b> , Revised Version.	
<b>episc.</b> , episcopal.	<b>ry.</b> , railway.	
<b>est.</b> , estimated.	<b>ry. jn.</b> , railway junction.	
<b>et seq.</b> , and following.	<b>S.</b> , south.	
<b>F.</b> , Fahrenheit.	<b>Sans.</b> , Sanskrit.	
<b>fort. tn.</b> , fortified town.	<b>seapt.</b> , seaport.	
<b>Fr.</b> , French.	<b>Sp.</b> , Spanish.	
<b>ft.</b> , feet.	<b>sp. gr.</b> , specific gravity.	
<b>Ger.</b> , German.	<b>sq. m.</b> , square miles.	
<b>gov.</b> , government.		



# NELSON'S ENCYCLOPÆDIA.

## Vol. II.

**Anquetil, LOUIS PIERRE** (1723-1806), French historian and member of the Institute; remembered for his *Histoire de Rheims* (1756-7); *Histoire de France* (1805), continued by Bouillet and Baude (ed. 1876-9); *Précis de l'Histoire Universelle* (1797); and *Louis XIV. sa Cour et le Régent* (1789).

**Anquetil-Duperron, ABRAHAM HYACINTHE** (1731-1805), Orientalist, brother of the preceding, was born in Paris. In 1754 he proceeded to India to study the works of Zoroaster, and returning to Europe in 1761 was appointed interpreter of Oriental languages at the Bibliothèque Royale, Paris. He brought with him nearly 200 Persian MSS., which are now in the Bibliothèque Nationale. He published the first European translation of the *Zend-Avesta* (1771), now, however, superseded; and *Oupnek'hat* (1801-2), a Latin translation of a Persian version of the *Upanishads*.

**Ans**, suburb of Liège, Belgium; has coal mines and iron works. Pop. 10,000.

**Ansars** (Ar. 'the helpers'). (1.) A name given to those inhabitants of Medina who helped Mohammed when he fled thither from Mecca, A.D. 622. (2.) A Syrian tribe (Nosairians) inhabiting the country between the Orontes (N.) and Tripolis (S.), numbering 75,000.

With their Mohammedan tenets they have mixed remnants of old Syrian nature-worship. They also affirm a crude doctrine of the Trinity, and believe in the transmigration of souls. See Dossard's *L'Histoire et la Religion des Nosaires* (1900).

**Ansbach**, also ANSPACH, tn., Middle Franconia, Bavaria, 27 m. w.s.w. of Nuremberg; from 1486 to 1792 the residence of the margraves of Brandenburg-Ansbach, whose palace (1713-23) remains. Pop. 18,500.

**Ansdell, RICHARD** (1815-85), English animal painter, born at Liverpool. He first exhibited at the Royal Academy in 1840 two pictures, *Grouse Shooting* and *A Galloway Farm*, and in 1842 a historical picture, *The Death of Sir William Lambton*. He afterwards travelled much, especially in Spain. He thrice won the Heywood Medal (Manchester), and in 1855 a gold medal at the great Exhibition in Paris, for *The Wolf Slayer* and *Taming the Drove*. He exhibited over 180 works, and was made R.A. in 1870.

**Anseele, EDUARD** (1856), Belgian socialist, born in Ghent; has latterly devoted himself to literature. He founded the socialist periodical *Volkswil* (now *Vooruit*).

**Anselm** (1033–1109), prelate and scholastic philosopher, was born at Aosta, on the south side of the St. Bernard pass. 'As a thinker, a Christian leader, and a man, he was one of the most remarkable and attractive characters of the middle ages.' In 1060 he entered the monastery of Bec, which Lanfranc's labours had rendered famous. Both men were Italians, and this fact, along with their zeal for the highest aims of education and moral reformation, bound them fast together. In 1063 Anselm was installed as prior of Bec, in succession to Lanfranc; and fifteen years later, the founder Herlwin having died, he reluctantly accepted the office of abbot. Shortly after the death of William the Conqueror (1087) the great change in Anselm's career took place. Lanfranc having died in 1088, the archbishopric of Canterbury fell vacant. Not till the beginning of the year 1093 was the see filled up. During the interval the king, William Rufus, appropriated the revenues. Anselm, on whom the thoughts of the people fastened as the most worthy successor to Lanfranc, came to England in 1092, and early in 1093 the king appointed him archbishop of Canterbury. Anselm's later life was a long struggle in behalf of the spiritual against the temporal power. Twice he was exiled—by William II. in 1097, and by Henry I. in 1103—over the question of investiture. In 1105 Henry and the archbishop were reconciled, and in 1106 Anselm returned to England. In 1494 he was canonized. His fame as a theologian excels even his fame as a churchman. He sought to show that the doctrines of Christianity were capable of being expressed in a rational system. He started with the articles of faith, and endeavoured to find in them principles that were intelligible ('credo

*ut intelligam*'). This process is exemplified in his great book, *Cur Deus Homo* (Eng. trans. by Prout, 1887), an attempt to explain the necessity of the incarnation and the meaning of the atonement. Besides this book he wrote two philosophical works, *Monologion* and *Proslogion*. These, along with his *Letters* and other works, are collected in an edition by Gerberon (Paris, 1675). His *Life*, by Eadmer, is included also. The best-known books on Anselm in English are by Möhler (Eng. trans. 1842), Hasse (1842–53; Eng. trans. 1850), Dean Hook (*Lives of the Archbishops of Canterbury*, 1860–76), and Dean Church (1870). In French the chief monograph is by Charles de Rémusat (1854). Cf. Dante's *Paradiso*, xii. 128. See A. C. Welch's *Anselm and his Work* (1901).

**Ansgarius**, sometimes also ANSKAR, ST. (801–865), 'the Apostle of the North,' born in Picardy, was monk at the monastery of Corvey, on the Weser, till 826, when the emperor, Ludwig the Pious, sent him to accompany the newly-baptized Danish king, Harold, to Denmark, there to spread the gospel. Driven from thence, in 828 he went as a missionary to Sweden, and in 831 was made missionary bishop of Hamburg. In 847 the see was transferred to Bremen. He founded the Schleswig Church, and in 852 the Swedish Church also, and preached among the Wends. He wrote *Pigmenta* and *Vita Willehadi*. His own *Life* was written by his successor, Archbishop Rimbert—*Monumenta Germanica Historica*, vol. ii., ed. Pertz. See Tappehorn, *Leben des Heil. A.* (1863).

**Anshelm**, VALERIUS (d. 1540), whose real family name was Rüd, was of German origin, but practised as a physician in Bern from 1509. A fervent supporter of the reformation, he was entrusted (1529) with the task of writing

the history of the city of Bern. His *Berner Chronik* is in the form of annals, and is largely based on original documents. He takes the anti-French point of view, and is specially full on the reformation. See Stierlin's ed. (6 vols. 1825-33), and E. Bloesch's *Anshelm und Seine Chronik* (1881).

**Anson, GEORGE**, Lord Anson (1697-1762), British admiral, was born at Shugborough, in Staffordshire. Between 1724 and 1735 he made three expeditions to S. Carolina against the Spaniards. In 1740 he was charged to make war against the Spanish colonies; was victorious, and returned to England in 1743 laden with booty. He utterly defeated the French fleet under La Jonquière in 1747, capturing six men-of-war and four East Indiamen, with £300,000 in specie. In recognition of this service he was raised to the peerage, and in 1761 was made admiral of the fleet. The narrative of Anson's *Voyage Round the World* (1748), by Walters, has long retained its popularity. See *Life* by Sir John Barrow (1839).

**Ansonia**, city, New Haven co., Connecticut, U.S.A., on the Naugatuck R., 10 m. w. by N. of New Haven. It has manufactures of brass and copper, heavy machines, etc. Pop. 13,000.

**Ansted, DAVID THOMAS** (1814-80), geologist, was born in London, where his earlier work was done as professor (1840) in King's College; he was later (1845) appointed to the Addiscombe military school. He was the author of *Geology* (1844), and of popular writings—e.g. *Great Stone Book of Nature* (1863); *Applications of Geology to the Arts and Manufactures* (1865); *The World we Live in* (1870). See *Geol. Mag.*, 1880.

**Anster, JOHN** (1793-1867), first translator into English of Goethe's *Faust*, was an English barrister and a law professor in Dublin, but

is best remembered as an essayist, as a poet, and especially as a translator of Fouqué, Schiller, and Goethe. *Faust* first appeared in 'Maga' (1820). The translation of the first part of *Faust* appeared in 1835, and that of the second part in 1864. See *Gent. Mag.*, Aug. 1867.

**Anstey, CHRISTOPHER** (1724-1805), a country gentleman, residing at Trumpington and afterwards at Bath; won great popularity by the *New Bath Guide; or, Memoirs of the B—r—d* [Blunderhead] *Family, in a series of Poetical Epistles* (1766), a clever sketch of Bath life, which was hailed as 'a new and original kind of humour' (Gray, *Letter to Wharton*, Aug. 26, 1766). See also Walpole, *Letter to Montague* (June 20, 1766). His other verse includes *The Patriot* (1767), *An Election Ball* (1776), and *Liberality; or, The Decayed Macaroni* (1779). His *Works, with Life*, were published by his son (1808).

**Anstey, F.**, pseudonym of THOMAS ANSTEY GUTHRIE (1856), born at Kensington. In his undergraduate days he published several short stories, and in 1882 his first book, *Vice Versâ: a Lesson for Fathers*, attained a great success, and was afterwards dramatized. Among his subsequent works are *The Giant's Robe*, *The Black Poodle*, *The Tinted Venus*, *The Brass Bottle*, and *The Fallen Idol*, which have been very popular. Mr. Anstey has contributed to *Punch*, and many of his papers have been reprinted—e.g. *Salted Almonds* (1906). He has also written the popular play, *The Man from Blankley's*.

**Anstruther**, fishing and seapt. tn., Fifeshire, Scotland, on the Firth of Forth, 9 m. s.s.e. of St. Andrews. Consists of the two royal burghs of Anstruther-Easter and Anstruther-Wester. It is the chief fishing station on the Fife coast. Thomas Chalmers (1780-

1847) and William Tennant (1784–1848), author of *Anster Fair*, were born here. Pop. 1,700.

**Ant.** Ants are social insects belonging to the order Hymenoptera, the order to which bees and wasps also belong. The name is sometimes also given to the termites, or 'white ants,' which are unrelated insects, included in the Neuroptera or May-fly order. The peculiarity which specially distinguishes the true ants (*Formicidæ*) is the shape of the body, the abdomen being connected with the thorax, or anterior region, by a very mobile joint. This gives great power of movement, and is associated with the frequent presence of a sting. Whether the sting is present or absent, there is always a poison bag, containing formic acid, which is either injected into the wound made by the sting, or is merely squirted at an attacking foe in the stingless forms.

Other characteristics of the ants are, first, the arrangement of the mouth parts. The mandibles (see INSECTS) are so arranged that they can be used for various industrial purposes without their movements affecting the maxillæ and lower lip, the true feeding organs. Further, ants are also characterized by the existence in each species of at least three types of individuals — males, females, and workers, the last type being often divided into castes. The young are helpless maggots, requiring to be fed and tended by the workers. When full grown, these maggots pass into a quiescent pupa stage, from which the perfect insect emerges after an interval.

In conformity with their social habits and instincts, ants always live in communities, and construct nests specially devoted to the purpose of rearing their young. The frequent confusion of ants with termites has arisen from the fact that the nests of the two

resemble each other much more closely than those of the ants resemble the chambered structures of their nearest allies, the social bees and wasps. While among the latter the larvæ are always placed in separate cells, the ants keep their young in loose masses, the individuals being moved from one region of the nest to another as the necessities of the case require. Ants are specially sensitive to dryness, and usually construct subterranean galleries and chambers, with the apparent object of obtaining moisture; but the shape and the situation of the nest are subject to great variation.

The economy of the ant-nest in its simplest form may be given as follows:—A nest contains numerous eggs, laid by one or more fertile females (queens), which are tended by barren females or workers. The young hatched from these eggs are fed from the mouths of the workers, who are, it is believed, capable of determining the sex of the future insects by the nature, or perhaps the quantity, of the food. The young then become pupæ, out of which hatch either winged or wingless adults. The former are males and females, are produced chiefly at certain seasons of the year, and rise from the nest in a smokelike cloud into the air. This is the nuptial flight, during which pairing takes place, and is followed by the death of the males. The females lose their wings, and either return to the original nest, or are apparently capable of founding new nests. In either case they continue to lay fertile eggs for a prolonged period. The wingless forms do not quit the nest save during their ordinary pursuits, and, though they are all barren females, occur in various forms, as soldiers, large workers, and small workers. To them all the activities of ant life, save that of

reproduction, are committed. This is the simplest statement of ant economy; but it is now known that there are various types of fertile individuals, both males and females, some being, apparently, always without wings. Transitional forms also occur between workers and fertile females.

A remarkable peculiarity of ants, and one that has always attracted attention, is the slave-making practised by many species. The British *Formica sanguinea*, a courageous and warrior-like species, at times makes raids on other ants, carrying off their pupæ to its own nest. It is stated that these forays take place only at those seasons of the year when the pupæ are likely to be all workers, and not males or females. It is, at least, certain that the workers hatched from the stolen pupæ remain in the nests of their conquerors, and there perform much of the needful work. The slave-making in the case of this species is not universal, and ants are capable of existing without their slaves; but *Polyergus rufescens*, known as the Amazon ant, found on the continent of Europe, is stated to be entirely dependent on its slaves. These ants have mandibles, which serve as efficient weapons in war—for which they display much natural aptitude—but which are not fitted for ordinary industrial purposes.

This association of different species of ants as masters and slaves is paralleled by the habit which many display of living in association with totally unrelated insects. The fact that ants domesticate aphides—'ant-cows'—has long been known; but modern research is greatly multiplying the number of kinds of insects which may be found in ant-nests. The association with aphides is not very remarkable; for ants are exceedingly fond of the sugary secretion which these exude, and

the general characteristics of the plant-lice lead to the belief that they are quite passive in the transaction. Much more remarkable is the large number of beetles found in ant-nests, some of which are fed by the ants, and carried away by them if any circumstance should render a migration necessary. While in some cases these guests are simply tolerated—perhaps because the ants cannot get rid of them—and others are definitely parasites, some seem to be of the nature of pets.

Ants are so numerous that one or two typical forms only can be mentioned here. The British *Formica rufa*, or red ant, constructs loosely-built, moundlike nests, sometimes reaching three feet in height, in which forty to fifty species of guests have been described. The American leaf-cutting ants (*Atta*) are among the most destructive of insects. They gather an enormous amount of material in the shape of pieces of leaves, and utilize this with much skill to form 'fungus-beds,' on which they grow singularly pure cultures of a fungus which constitutes their main food supply. The naturalists Bates (*Naturalist on the Amazons*) and Belt (*Naturalist in Nicaragua*) have given interesting accounts of these formidable creatures. The wandering ants (*Eciton*) are interesting American forms, which are usually blind, and do not make permanent nests, but wander from place to place. The driver ants (*Anomma*) of Africa are related forms, which travel in vast hordes, overwhelming everything on their path. See articles by Herbert Spencer and Weismann in the *Contemp. Review* for 1893. For a general account of ants, see the *Cambridge Nat. Hist.*, 'Insects' (vol. i. 1895, vol. ii. 1899); Lubbock's *Ants, Bees, and Wasps*; Farren White's *Ants and their Ways* (1883); and *Ants*, by Prof.

Wheeler (1910). See TERMITES for examples of the so-called white ants.

**Antacids**, medicines which counteract acidity by combining with the acid. The acids formed in the stomach during digestion, such as lactic acid and butyric acid, are neutralized by antacids given *after* meals. Certain alkalis are given with the object of rendering the blood plasma more alkaline: these are the salts of potassium, sodium, ammonium, lithium, magnesium, and calcium. Antacids are administered chiefly in dyspepsia, gout, rheumatism, and rheumatoid arthritis.

**Antæus**, according to Greek tradition, was a Libyan giant of invincible strength as a wrestler, until overcome by Hercules, who lifted him off the earth (his mother), and so deprived him of strength.

**Antalcidas**, born in the 5th century B.C., was ambassador from Sparta to the Persians in 393-392 and in 388-387, in each instance with the view of strengthening Sparta against Athens by means of Persian support. On his return from the second of these missions as admiral of the Spartan fleet, he conducted the war against Athens so successfully as to conclude the peace of Antalcidas, by which all the cities and islands of Greece were declared independent, except Imbros, Lemnos, and Skythos, and all the Greek cities of Asia Minor were annexed to the Persian empire. He was again sent to Persia in 371 B.C.

**Antananarivo**, cap. of Madagascar. See TANANARIVO.

**Antar**, or ANTARA (-IBN-SHEDDAD), a celebrated Arabian warrior and poet of the 6th century, author of one of the seven *Moallakât*. Many of his poems are published in Ahlwardt's *Six Ancient Poets* (1870).

**Antarctic Ocean**. This great water division of the globe is, in

many respects, the antithesis of the Arctic Ocean. The Antarctic, there is good reason to believe, consists of a central mass of land, covered with a thick and presumably unbroken ice-cap. To this vast accumulation of ice are due the huge table-topped icebergs projecting 150 to 200 ft. above the surface of the sea, and descending 1,200 to 1,500 ft. below it. As the edge of the great ice-barrier is approached, the ocean in many parts very perceptibly decreases in depth. For instance, E. of Victoria Land, and off the adjacent Adélie Land, the depth ranges from 100 to 800 fathoms; E. of the S. Shetland Is. it is 100 to 500 fathoms deep; and w. of Graham Land there is a 'continental' shelf of 200 to 300 fathoms depth. But in the lower latitudes, or between 60° and 40° s. lat., the depth is greatly increased. From Patagonia E. to Kerguelen I. the depth generally exceeds 2,000 fathoms, in some places even 3,000 fathoms. Indeed, the depth on the 60th parallel nearly all round the Pole exceeds 2,000 fathoms; while to the s.w. of S. Georgia Sir James Clark Ross records having sounded a depth of 4,000 fathoms, or more than 4½ m., without touching the bottom. S. America, or rather Tierra del Fuego, is apparently linked to the Antarctic lands at Graham Land by a curving submarine ridge, which separates the S. Atlantic from the S. Pacific, and comes up to within about 110 fathoms of the surface. On the whole, the water of the Antarctic Ocean would appear to be colder than the water of the Arctic. On the surface, and down to about 50 fathoms, it is comparatively warm, though absolutely cold, 29° to 30° F. Thence the temperature gradually increases down to about 165 fathoms, where it is 35°; and this temperature is maintained



down to 800 or 825 fathoms. From this level to the bottom it again sinks, to about  $31^{\circ}$ . These are the results of observations made by the German deep-sea expedition in the *Valdivia* in 1898-9. According to the observations of the *Challenger*, some twenty-five years earlier, the temperature of the surface water was between  $29^{\circ}$  and  $38^{\circ}$  (according to latitude), and of the bottom  $32^{\circ}$  to  $35^{\circ}$ ; and wedged in between these two layers was a colder stratum of water, with a temperature of only  $28^{\circ}$  to  $32.5^{\circ}$ . Ross, again, in 1841-3, reported a surface temperature of  $27.3^{\circ}$  to  $33.6^{\circ}$ , with an average of  $29.8^{\circ}$ , this being in the summer. With these data it would be interesting to compare the air temperatures of the S. Polar regions discussed by Prof. A. Supan in *Petermann's Mitteilungen* for 1901, and the results obtained by Ross (*Antarctic Voyage*) and by the *Belgica* in 1898-9 (reported by Mr. H. Arctowski in *Ciel et Terre*, 1899). Meteorologically, the area over the S. Pole is one of low pressure, having a mean of less than 29 inches; and this vast permanent anticyclone appears to have a much wider extension in winter than in summer. The climatic conditions depend largely upon the wind. When it blows from the south it is clear and cold; but winds from the opposite directions bring fogs and cloud and a rise of temperature. There is continuous daylight from Nov. to Jan. In regions higher than  $40^{\circ}$  s. lat., the Antarctic plankton, or organic life of the surface, is characterized by an abundance of diatoms. Pelagic animals, such as molluscs, amphipods, copepods, and other marine organisms, are plentiful down to 1,000 fathoms, and are not at all scarce at 2,700 fathoms. Sir John Murray asserts there are species common to both North and South Polar regions which are absent

in the depths of the intervening oceans.

The southern right whale (*Balaena australis*) extends at least as far south as  $50^{\circ}$  s. lat., but it is in no sense an ice whale. There are two whales peculiar to southern seas—the pigmy whale (*Neobalaena marginata*) and a bottle-nose (*Hyperoödon planifrons*); but these hardly extend into the Antarctic. There are possibly several Antarctic porpoises. Four true seals are peculiar to the Antarctic—Weddell's seal (*Leptonychotes Weddelli*), the sea-leopard (*Ogmorhinus leptonyx*), Ross's seal (*Ommatophoca Rossi*), and the crab-eating seal (*Lobodon carcinophagus*). All are widely distributed throughout the area. No fur-seal is truly Antarctic; but it is stated that the elephant-seal occurs off the coast of Victoria Land. The most characteristic birds are the penguins, especially the emperor and the Adélie; the petrels, especially the ice, giant, and Antarctic petrels; and the Antarctic skua. Meantime the invertebrates are little known; but the *Belgica* and *Scotia* especially, among recent expeditions, have taken rich hauls. Land plants are naturally very few; a grass (*Aira cæspitosa*) and a few mosses and lichens have been described. Much information has been collected by the recent expeditions regarding the geology. A most interesting discovery, made by the Shackleton expedition, was the existence in  $85^{\circ}$  s. of coal measures at least 1,500 ft. thick, in which at least seven distinct seams were noticed in the outcrop in the cliff face. In Victoria Land sandstone has been found containing fossil plants (dicotyledons), apparently of Miocene age. In the region of Louis Philippe Land, almost at the opposite side of the circle, a marine volcanic tuff containing (drifted) land plants of Tertiary

age occurs. In the same region there are deposits containing Jurassic land plants, and fossiliferous marine beds belonging to the Jurassic and Cretaceous systems. The South Orkneys consist of Primary sedimentary deposits, chiefly greywackes and conglomerates, in which a fossil graptolite has been found. Kaiser Wilhelm II. Land (see below) is apparently composed of Archæan rocks, especially granite, gneiss, and quartzite. Here, as elsewhere within the area, there also occur volcanic lavas of recent date.

ANTARCTIC EXPLORATION.—The history of Antarctic exploration, if the discovery of S. Georgia by Vespucci in 1502, and of the S. Shetlands by Dirk Gerritsz in 1599, be dismissed as doubtful, is of comparatively recent origin. In 1739 the French merchant Captain Bouvet discovered an island to the s.w. of Cape of Good Hope, which he named Cap de la Circoncision, believing it to be part of the long-sought-for south continent. Professor Chun of the *Valdivia* expedition rediscovered the island in 1898, in lat.  $54^{\circ} 26' 4''$  s. and long.  $3^{\circ} 24' 2''$  E., and concluded that other islands reported in the neighbourhood were identical with Bouvet I. The next discovery within the Antarctic area was in 1756, when the Spanish vessel *Leon* sailed round S. Georgia, to which the name of San Pedro was given. But the first voyage of importance to the southern seas was that of Captain Cook in 1772-5. On Jan. 17, 1773, the Antarctic circle was crossed for the first time, in long.  $39^{\circ} 35'$  E. After having, in January 1774, reached solid pack-ice, in long.  $106^{\circ} 54'$  w. and lat.  $71^{\circ} 10'$  s., he visited and named S. Georgia and the Sandwich group. William Smith, in 1819, sighted a row of islands, which he named the S. Shetlands; and Edward Bransfield, in 1820, examined the group

as far as  $53^{\circ}$  w., and nearly to  $65^{\circ}$  s. In 1819-21, the Russian captain, F. G. von Bellingshausen, visited the Sandwich group, and sailed s. to lat.  $69^{\circ} 21'$  in long.  $2^{\circ} 15'$  w. He attained his highest latitude,  $69^{\circ} 53'$  s. in long.  $92^{\circ} 19'$  w., on Jan. 13, 1821, and named the land he saw Peter I. Island; while another point of coast, in lat.  $68^{\circ} 43'$  s. and long.  $73^{\circ} 10'$  w., he called Alexander I. Land. James Weddell, in 1822, attained the lat. of  $74^{\circ} 15'$  s. John Biscoe (1830-2) sighted Enderby Land, and discovered Biscoe Is. and the land now known as Graham Land; and John Balleny, in 1839, the islands named after him. Dumont d'Urville discovered Joinville Land and Louis Philippe Land in '838, and Adélie Land and the Côte Clarie in 1840. Charles Wilkes, of the U.S. Navy, sighted other points w. of Balleny Is., and gave them the name of Wilkes Land. The finest expedition that has hitherto explored the South Polar seas left Hobart in December 1840. It consisted of the ships *Erebus* and *Terror*, under the command of Captain James Clark Ross, who was accompanied by Dr. (Sir Joseph) Hooker. Possession Islands were discovered, and a landing effected on the largest of the group, and a line of coast, Victoria Land, was traced from Cape North for about 570 m. to Cape Crozier, where it merged into the great ice-barrier, which was followed for 250 m. Several summits and mountain ranges were named, including the mighty volcanoes Erebus (13,100 ft.) and Terror (extinct; 10,900 ft.), and the s. magnetic pole was located in lat.  $75^{\circ} 5'$  s. and long.  $154^{\circ} 8'$  E. In this region Captain Ross reached the lat. of  $78^{\circ} 4'$  s., and the next season lat.  $78^{\circ} 9' 30''$  s. in long.  $161^{\circ} 27'$  w. In 1845 Lieutenant Moore, in the *Pagoda*, continued Ross's work. Visits to the Antarctic were also made by whalers subsequently, and by

Bull in the *Antarctic* in 1895. The first winter passed by man within the Antarctic circle was that of 1898, when the Belgian expedition in the *Belgica*, under the command of Captain de Gerlache, was beset by ice in lat.  $71^{\circ} 31'$  s. and long.  $85^{\circ} 16'$  w. Mr. C. E. Borchgrevink, who had visited Victoria Land in the *Antarctic*, went out again in the *Southern Cross* in 1898, and wintered at the foot of Cape Adare. Several important expeditions have recently been at work in the Antarctic region. (1.) The British National Antarctic Expedition in the *Discovery* entered the ice-pack in the vicinity of Victoria Land in January 1902, and left that region in February 1904. Before going into winter quarters (in lat.  $77^{\circ} 50'$  s., long.  $166^{\circ} 42'$  e.), the expedition followed the Ross barrier for a considerable distance to the east, finding that in long.  $165^{\circ}$  it trends to the north. Here a heavily glaciated land, with occasional bare peaks, rises from the barrier. The coast of this land, named Edward VII. Land by the expedition, was followed as far as lat.  $76^{\circ}$ , long.  $152^{\circ} 30'$ . Subsequent explorations showed that Mts. Erebus and Terror are on an island, and that M'Murdo Bay is really a strait. On Jan. 1, 1903, Capt. R. F. Scott, accompanied by Lieut. Shackleton, sledged southward along the coast of Victoria Land, and carried the British flag to  $82^{\circ} 17'$  s., the highest southern latitude then attained. It was found that a great inlet extends to the south for an unknown distance between Victoria Land on the west and Edward VII. Land on the east. Victoria Land itself proves to be a vast continental plateau, 9,000 ft. in height, fringed by a coast range of mountains, broken by large fiords. (2.) The German Antarctic Expedition, in the *Gauss*, left Germany in 1901, returning in 1903. The vessel reached the pack-ice in

February 1902, in  $61^{\circ} 58'$  s. lat. and  $95^{\circ} 8'$  e. long. Proceeding south, she discovered new land, which was named Kaiser Wilhelm II. Land, and wintered off this land in  $89^{\circ} 48'$  e. long. and  $66^{\circ} 2'$  s. lat. The leader believes that this land forms part of a continuous continent stretching from Knox Land to Kemp Land. Near the coast an inactive volcano (the Gaussberg, 1,200 ft.) was observed. (3.) The Swedish expedition in the *Antarctic* left Europe in 1901; the ship was lost in 1903, but the party was rescued. The *Antarctic* first sailed down the west coast of Danco Land, and proved that it is a continuation of Louis Philippe Land. Subsequently she passed through Antarctic Sound to the east coast of Louis Philippe Land. It was proved that Mount Haddington is placed upon an island, and that King Oscar II. Land is continuous with Louis Philippe Land, both being continuous with Graham Land. (4.) The Scottish National Antarctic Expedition in the *Scotia* (under Dr. Bruce) left Scotland in 1902, and returned in 1904. The scene of the *Scotia's* work was the Weddell Sea. She explored in her first season 4,000 m. of ocean, from  $17^{\circ}$ - $45^{\circ}$  w. long. in  $70^{\circ} 25'$  s. lat., wintering in the South Orkneys. In her second season she reached the southeastern extremity of the Weddell Sea, and discovered a great barrier of inland ice, believed to be part of the Antarctic continent, which was thus found to be 600 m. north of its supposed position. The expedition also dredged in Ross's Deep, which proves to be 2,600 fathoms. (5.) In 1904-5 the French expedition under Dr. Jean Charcot, in the *Français*, explored the Palmer archipelago. Dr. Charcot made another expedition in the *Pourquoi Pas* in 1908-10. (6.) An expedition under Lieut. (now Sir) E. H. Shackleton in the *Nimrod*, who returned in 1909 after a

journey over land ice of 1700 m. Shackleton reached 88° 23' s., or 111 m. from the South Pole. Novelties of this expedition were a motor car with runners and the employment of Siberian ponies. A special exploring party located the south magnetic pole at 72° 25' s. Mount Erebus, 13,120 ft. high, was ascended. From the southernmost point attained only a vast plain was visible, 10,000 ft. above sea-level. See Murdoch's *From Edinburgh to the Antarctic* (1894); Bull's *Cruise of the Antarctic* (1896); Borchgrevink's *First on the Antarctic Continent* (1901); Bernacchi's *To the S. Polar Regions* (1901); Lecointes' *Au Pays des Manchots* (Belgica Expedition, 1904); *Résultats du Voyage de la S. Y. Belgica* (10 vols., in course of publication); *Southern Cross Collections* (Nat. Hist. 1903); *Die Deutsche Südpolar Expedition* (Berlin, 1903); Nordenskjöld and Anderson's *Antarctica* (1905); Mill's *The Siege of the South Pole* (1905); Scott's *Voyage of the Discovery* (1906); and *The Heart of the Antarctic*, by E. H. Shackleton and others (1909).

**Antares**, a Scorpii, a red star of 1.5 magnitude. It gives a banded spectrum of Secchi's third type, and forms, with a seventh-magnitude green satellite, a beautiful chromatic combination. Admitting the reality of Mr. Finlay's parallax of 0.02", this star must possess about 800 times the sun's light-power, and appears to us in the place it occupied 155 years ago.

**Ant-eater**, a term applied to several unrelated mammals connected only by their diet. The true ant-eaters are members of the order Edentata, and are confined to S. America. The largest, the great ant-eater or ant-bear (*Myrmecophaga jubata*), reaches a length of four feet, exclusive of the large, bushy tail, and has the face prolonged into a long, tubular snout.

Teeth are entirely absent, and the long, flexible tongue is covered with sticky saliva. The fore limbs are furnished with powerful claws, which are used in tearing open the nests of termites, or 'white ants,' on which the animals chiefly feed. Related but less modified forms are the tamandua ant-eater (*T. tetradactyla*) and the little ant-eater (*Cyclothurus didactylus*). The scaly ant-eaters, or pangolins, are members of the same order of mammals; as is also the African aard-vark, sometimes called the Cape ant-eater. The term spiny ant-eater is applied to *Echidna*, and banded ant-eater to *Myrmecobius fasciatus*, a curious little Australian mammal, remarkable in possessing a larger number of teeth than any other existing marsupial. It is chestnut-red, with white and dark stripes on its back, and somewhat resembles the English squirrel in appearance. The pouch, usually present in female marsupials, is here absent.

**Antecedent**, in grammar, the subject to which a succeeding relative pronoun refers; in logic, the premise from which a 'consequent' proposition is inferred; in mathematics, the first element in a ratio—*e.g.*  $2:4 = 3:6$ .

**Antelope**, a general name applied to certain of the hollow-horned ruminants (Bovidæ). Generally speaking, those of the Bovidæ which cannot be definitely regarded as sheep, goats, or oxen are relegated to the antelopes, in spite of the fact that some of these (*e.g.* the Alpine chamois) are structurally near the goats, and others (*e.g.* the African antelopes, of the genus *Alcelaphus*) are far removed from them. On the whole, however, it may be said that, while sheep and goats are typically mountain animals, antelopes are typically plain animals, and are therefore specially at home in Africa. A few only of the more



Characteristic Types of Antelopes.

6

5

- 4 1. Nylgau. 2. Eland. 3. Brindled Gnu. 4. Gemsbok. 5. Common Duikerbok. 6. Addax.

conspicuous antelopes can be noticed here. In the genus *Alcelaphus*, including the African hartebeest, blesbok, bontebok, and others, the back slopes, owing to the fact that the height at the withers is much greater than at the rump, the head is long and narrow, and the horns are lyrate and bent back at the tips. The African gnu is a near ally of these forms. In size these antelopes should be contrasted with the duikerboks (*Cephalophus*), of which the smallest is not larger than a rabbit, while the hartebeest may stand nearly 5 ft. at the withers. The saiga is one of the few antelopes which occur in Europe and Asia. In India there are relatively few antelopes; but the somewhat cowlike nyulghau (*Boselaphus tragocamelus*), with short half-moon shaped horns in both sexes, deserves mention. Related is the African genus *Tragelaphus*, including the beautiful harnessed antelopes, with long, spirally-twisted horns. Another African antelope, the gemsbok (*Oryx gazella*), is remarkable for its long, straight horns, present in both sexes. The eland (*Oreos canna*), the largest of all antelopes, is said to be rapidly disappearing. In structure and in habitat the European chamois (*Rupicapra tragus*) connects the antelopes with the goats. For S. African antelopes see works by Millais and Bryden; for Asiatic, Baker's *Wild Beasts and their Ways* (1892); Blandford's *Fauna of British India: Mammals* (1888); also Sclater and Thomas's *The Book of the Antelopes* (1896).

**Ante Meridiem.** See A.M.

**Antennæ**, or feelers, are sense organs, generally tactile, borne on the head in crustaceans, myriapods, and insects, where they are homologous with the other appendages, such as the jaws. In crustaceans there are typically two pairs of antennæ, and these

may retain their primitive locomotor function. Thus, the Nauplius larva swims by its two pairs of antennæ, as well as by its third pair of appendages, which constitute the future jaws. Further, except in the highest crustaceans, the second pair of antennæ bears at its base a scale or squama, which assists in locomotion. In the crabs, no less than in insects, the antennæ are purely sensory, and in the latter especially are often of elaborate structure. In insects, as in myriapods and *Peripatus*, only one pair of antennæ is present, and their importance as sense organs may be deduced not only from the frequent elaboration of structure, but from the care taken by the animals to keep them clean and free from dust. The function of the elaborate sense organs found on the antennæ in many insects is obscure. Some are, no doubt, olfactory. It has been also suggested that social insects, such as bees and ants, are capable of communicating impressions to one another by means of the antennal sense organs. See Lord Avebury's (Lubbock's) *Senses, etc., of Animals*, Internat. Sci. Ser., 1888.

**Antenor**, the Trojan counselor who urged the Trojans to restore Helen to Menelaus. For this the Greeks spared his life when Troy was taken.

**Antequera** (anc. *Antiquaria*), tn., prov. Malaga, Spain, 27 m. N. of Malaga. The industries include beet-sugar factories, woollen and silk weaving, and tanning. In the vicinity are remarkable rock structures. Pop. 31,000.

**Anthelia**, solar phenomena, consisting of faint luminous rings around the shadow of the head of an observer, projected at no great distance by the sun when it is near the horizon, on a cloud, fog-bank, grass covered with dew, or other moist surface. It is occasionally observed in alpine and polar regions, and is due to

diffraction of light. Also known as 'Ulloa's circle,' or as a 'glory.'

**Anthelmintics**, remedies which kill or expel intestinal worms. Vermicides kill the worms, vermifuges expel them. For tapeworms, oil of male-fern is chiefly used; santonin is useful for round worms; and an injection of quassia, or salt and water, is used for thread-worms.

**Anthem**, a form of musical composition set to sacred words and used in the service of the church. Compositions of this class were first written to be sung in alternate parts; but great diversity of treatment has been admitted, and the modern anthem may be written for solo, soli, or chorus, or for some or all of these parts in combination. In the English Church the anthem takes the place of the motet in the Roman and Lutheran Churches. See ANTIPHONY.

**Anther**, the male organ in flowering plants; contains the pollen, and is situated at the free end of the stamen. See FLOWER.

**Antheridium**, the male reproductive organ in the fern and moss groups, and in some species of Algæ. In every case motile sexual cells, called spermatozooids, are developed within the antheridia.

**Antherozoid**, the free-swimming male element or cell in the sexual reproduction of the lower plants. See SPERMATOOZA, REPRODUCTION, and SEX.

**Anthology**, a series of select extracts, generally poems, chosen from the works of various authors, and complete in themselves. Much the most important is the Greek anthology. The earliest compilation of any note was the *Stephanos* ('garland') of Meleager of Gadara, put together early in the 1st century B.C. Other similar collections were edited by Philip-pus of Thessalonica during the reign of Nero, by Strato of Sar-

dis (the *Paidike Mousa*) under Hadrian, and by Agathias of Constantinople (c. 550 A.D.). The earliest and completest of the extant versions is that brought together by the grammarian Constantinus Cephalas (probably c. 950 A.D.); this work was altered, abridged, and rearranged by Maximus Planudes, a rhetorician of the early part of the 14th century. This inferior Planudean anthology remained for three hundred years the only one known to Europe. It was first printed in Florence by Janus Lascaris (1494), and frequently reprinted—e.g. by Wild and Altheer (Utrecht, 1795-1822), and by Stadtmüller (1894, etc.). The anthology of Cephalas was re-discovered by Salmasius (1606) in the library of the Counts Palatine at Heidelberg, whence it is now generally known as the Palatinate Anthology. Salmasius copied the epigrams hitherto unknown, which circulated in MS. as the *Anthologia Inedita*; but the first complete edition was published in Brunck's *Analecta Veterum Poetarum Græcorum* (Stras. 1772-6), an improved recension being Jacobs's *Anthologia Græca* (Leip., 13 vols., 1794-1814; and 4 vols., 1813-17). The handiest working edition is Dübner's, in Didot's *Bibliothèque Grecque* (Par. 1864-72). The range of the Greek anthology is from the 6th century B.C. to the 10th century A.D. It was translated into Latin by Hugo Grotius (1630; pub. 1795-1822), into German by Herder (1785-97), into English by Wrangham, Sterling, Goldwin Smith, Merivale, Macgregor, and Garnett. The English reader may consult Dr. Wellesley's *Anthologia Polyglotta* (1849); J. A. Symonds's *Studies of the Greek Poets* (1873); A. J. Butler's *Amaranth and Asphodel* (1881); Mackail's *Select Epigrams* (1890; new ed., 1906); and the versions given in Bohn's Library

(1854), and in the Canterbury Poets Series. Latin anthologies, in imitation of the Greek, were published by Scaliger (1573), Pitthöus (1590), Peter Burmann (1759; ed. Meyer, 1835), and Riese and Bücheler (1894-7). The substance of the numerous Oriental anthologies is accessible to Western readers in Von Hammer-Purgstall's *Persian Lit.* (1818), in his *W. Turkish Poetry* (1836), and in Garcin de Tassy's *Hist. de la Lit. Hindoue et Hindoustani* (1839-47). The Chinese *Shi-King* (Book of Songs), attributed to Confucius, and said to be the oldest anthology in the world, may be consulted in Rückert's German translation (1833). The standard English anthology is F. T. Palgrave's *Golden Treasury* (1861); other well-known collections are Trench's *Household Book of English Poetry* (1868), R. W. Emerson's *Parnassus* (1875), *An English Garner*, by Prof. Ed. Arber (1895-6), *The Poets and Poetry of the Century*, by A. H. Miles (1904-7), and Quiller-Couch's *Oxford Book of Verse* (1900). The Psalms of David also are virtually an anthology.

**Antholysis** is the formation of double flowers, in which the stamens and carpels become leaf-like; all the organs are usually multiplied. This peculiar condition throws light on the homology of the members of the flower with the foliage leaves.

**Anthony, ST.** See ANTONY, ST.

**Anthony, SUSAN BROWNELL** (1820-1906), American advocate of woman suffrage, was born at Adams, in Massachusetts. With Mrs. Stanton she organized the National Woman Suffrage Association, and, with her and Mrs. Gage, published *History of Woman Suffrage* (1881-7). She lectured in both America and England. See *Life* by Harper (1898).

**Authorism**, a counter definition, usually stronger or more

correct than that preceding it—*e.g.* 'The hillmen, *hereditary robbers*, descended from their fastnesses.'

**Anthozoa**, a class of the Cœlentera, including sea anemones. See ACTINOZOA.

**Anthracene**,  $C_6H_4C_2H_2C_6H_4$ , an aromatic hydrocarbon formed when certain carbon compounds are exposed to a high temperature. It is produced in large quantities in the manufacture of coal gas, being found in coal tar, and is used in the production of alizarin and allied colouring matters. It is a white crystalline solid with blue fluorescence; m.p.  $213^\circ C.$ , b.p.  $351^\circ C.$ ; easily soluble in benzene.

**Anthracite**, or STONE COAL, a kind of coal distinguished by its great hardness, its high proportion of carbon, and the great heat given out in burning. While ordinary coal has a dull lustre, anthracite is brilliant and even metallic in appearance, often with a curious iridescence like that of a peacock's feather. It has a hollow, rounded, conchoidal fracture, while coal usually breaks into blocks with flat surfaces. It is so hard as not to soil the fingers; its sp. gr. is from 1.3 to 1.8. Anthracite is coal in which the mineralization of woody matters has been carried to a further degree than in coal; but it shows occasional traces of the cellular structure of wood. The percentage of carbon ranges from 85 to 94; in burning, there is little flame, and no caking; combustion is comparatively slow: hence it is of value for fusing refractory metals and for steam-raising. The greatest anthracite fields at present worked are those of Pennsylvania, where the deposits, in pockets, cover nearly 500,000 sq. m., and give employment to 160,000 men; but it is also mined in Wales, Silesia, Westphalia, France, Russia, W.



Canada, and the Rocky Mountains. Richthofen estimates that the anthracite deposits in the Chinese province of Shan-si amount to 630,000,000,000 tons, and that the coal-bearing area is greater than that of Pennsylvania. See P. Roberts's *Anthracite Coal Industry* (1902); Strahan's *The Coals of S. Wales, with special reference to the Origin and Distribution of Anthracite* (1908); *Geol. Sur. Mem.*

**Anthracosia** and **Anthracomya**, genera of fossil bivalve mollusca supposed to be of fresh-water habit, and not unlike the present fresh-water mussels; are common in certain beds of the Coal Measures.

**Anthraquinone**,  $C_6H_4(CO)_2C_6H_4$ , a yellow crystalline solid, melting at  $277^\circ C.$ , and obtained by oxidizing anthracene with chromic acid mixture. It is used in the manufacture of alizarin and its derivatives.

**Anthrax**, formerly applied both to carbuncle and to 'malignant pustule,' but now used as a synonym for the latter only. Anthrax is a disease which attacks man and several of the lower animals (*e.g.* horse, cow, sheep, and goat), and is transmitted by inoculation, or by breathing and swallowing; the former known as external anthrax or malignant pustule, the latter as internal anthrax — "wool-sorters' disease" — from wool, including camel-hair and goat-hair, hides and skins, horse-hair, and bristles. The disease is caused by the anthrax bacillus, discovered by Davaine in 1850. (See BACTERIOLOGY.) The incubation period does not exceed three days. Practical preventive measures suggested are: the employment of persons with the requisite experience; exclusion of workers with open sores; treatment of suspected materials by washing or disinfecting; special ventilating

precautions, and cleanliness of rooms, person, and clothing' (*Report of the Anthrax Com. 1897*). The sufferers are generally those whose work is connected with the handling of hides, wool, or carcasses. Malignant pustule (syn. Fr. *charbon*, 'coal') usually starts at some abrasion or scratch, as a pimple, around which the tissues become brawny and hard. The pimple becomes a vesicle; a black, gangrenous patch ensues, around which a circle of fresh vesicles is formed, while outside them the redness and hardness of the tissues spread. Later, the neighbouring glands become infected, tender, and enlarged. The temperature generally rises, exhaustion follows, and death comes through syncope or through œdema, at times affecting the throat, when, as is often the case, the pustule develops in the face or neck. Treatment of the pustule is by the thermo-cautery, or by local injections of iodine or of carbolic acid; or by complete excision of the pustule and the application of strong antiseptics to the wound; or by the use externally and internally of ipecacuanha from which the emetic principle has been removed. Prophylactic and curative inoculation have not so far proved very efficacious.

Internal anthrax, or wool-sorters' disease, is a form in which the bacillus obtains entrance through the alimentary or respiratory tract. There is no external pustule, but there are swellings and ulcers, with hæmorrhage, in the intestines, bronchi, or lungs, and the bacteria may spread through the lymphatic circulation, and cause secondary ulcers in any organ, with typhoid symptoms. It is sometimes very difficult to diagnose the internal form of anthrax, but the occupation of the patient often suggests the probable con-

dition. In such cases local treatment is impossible; but anti-anthrax serum is recommended, and every step should be taken to support the patient's strength. Anthrax in the lower animals is often called splenic fever.

**Anthropoid Apes**, or SIMIADÆ, form, with the exception of man himself, the most specialized members of the Primates. There are four living kinds of anthropoid apes—the gibbon, orang, chimpanzee, and gorilla. (See these names.) In all the tail is absent, and there are no cheek pouches. The fore limbs are much longer proportionately than in man, and the sternum is broad. See Huxley's *Anthropoid Apes* (1886), and Huxley's *Man's Place in Nature*.

#### **Anthropological Societies.**

These exist in nearly all the capitals of the civilized world. The first to be founded was the Société d'Anthropologie de Paris, in 1859. Then followed the Anthropological Institute of Great Britain and Ireland in 1865; the Moscow Anthropological Society in 1866; the Italian, at Florence, in 1868; the Berlin in 1869; the Vienna in 1870. Similar societies exist at Washington, Sydney, Bombay, St. Petersburg, Rome, Brussels, and Stockholm. Professorial chairs have been founded at Berlin, Budapest, Zürich, Paris, and Munich.

**Anthropology**, or the SCIENCE OF MAN, is more widely related to other studies than is any other subject; it is, therefore, impossible to delimit its boundaries very rigidly. Thus, it merges into zoology and physiology on the one hand, and, on the other, into history and religion. The description of the human body and of its functions does not fall within the scope of anthropology, except in so far as it is descriptive of a definite group of men, or is comparative between different

races or peoples; and although the comparison of man with the higher apes is often made by anthropologists, this inquiry belongs strictly to comparative anatomy, physiology, and psychology. In connection with this article, see especially ETHNOLOGY and MAN.

The detailed study of the anatomy, physiology, and psychology of a distinct race of mankind, and their comparison through different races of men, is known as ANTHROPOGRAPHY—a more comprehensive term than 'somatology' or 'physical anthropology.' This science thus deals with man from a purely animal point of view. While morphological anthropology has been highly developed, the physiological and psychological aspects of anthropography have not received that attention which their importance deserves, and they present a most promising line of inquiry. Anthropography also includes such subjects as the pathology, fertility, criminology, etc., of peoples, as well as biometrical investigations.

The study of the natural history of social life, or the investigation of peoples in respect of the present state and the evolution of their culture, is known as ETHNOLOGY. Although ethnology is subdivided into several separate studies, which deal with arts and crafts on the one hand and with ethical and social matters on the other, yet, since all that man accomplishes is the result of intelligent action, all that is included under ethnology has its psychological aspect.

An essential condition of culture is that art of communication which has developed into language and into writing; and the study of the language of a people, or PHILOLOGY, illustrates the stage of culture which has been reached, and may give a clue to the peoples with whom the race has previously come into contact. 'Linguistics' is, however, an uncertain guide

to the origin of a people, because of the facility with which one language may supplant another. Comparative Phonology, or the study of the sounds produced by various peoples, is a study that requires further development. The communication of ideas by visual signs begins with Pictography (in which maps may be included), and ends with our alphabet. Finally, there are the universal languages of definite signs, of which mathematics, music, and, to a certain extent, chemistry afford the best examples.

The utilitarian arts are considered in the study of TECHNOLOGY. The progress in the improvement of tools and mechanical appliances has been spasmodic. The similarity of the stone or other implements used by different peoples does not necessarily imply community of origin, nor even the transmission of culture, as the material of which the object is made and the use to which it is put preclude great variety in form. The persistent use of stone, wood, bone, or shell by modern peoples may be due to lack of other material, as in the case of people living on a coral atoll. The greatest ingenuity is usually shown in weapons of offence; war has proved a great stimulus to invention, and the wit of the hunter has been sharpened in the continual attempt to circumvent his quarry. Certain crafts, such as agriculture, pottery, and weaving, are essentially women's work, as hunting and fighting form that of men. Clothing, house-building, transit, transport, weights and measures, etc., are also studied.

The arts which do not appeal to mere utility, but have been most important factors in the mental development of man, are those which are investigated in the study of ÆSTHETICS. The temporary decoration of the per-

son by paint or ornaments, and its permanent embellishment by tattooing and deformation, are, at least in many cases, associated with some social or religious concept. Pantomimic dances, music, and feasting have played an important part in social development. Stories about the origin of the world and its creatures, and legends of heroes and races, are the beginnings of literature—at first traditional and oral, later recorded in writing. The rhythmic form, associated with a wealth of simile and allusion, leads to poetry as we know it.

Man's social habits give rise to customs, and then rules, which make for security and good fellowship in the community. Actions were early distinguished as good or evil, according as they were social or anti-social. These distinctions lie within the field of ETHICS, and their sanctions within that of COMPARATIVE RELIGION. Clan morality has widened its area slowly and imperfectly; but the responsibility of the individual was recognized at an early stage, and the social instincts of man have resulted in totemism, and, in a higher form, in various systems of religion. Early speculations as to the nature of the surrounding world and of human life are, indeed, erroneous; but their errors are such as could be remedied by no process of logic, but only by wider experience. Animism and Magic are good examples of theories arising from very limited knowledge.

SOCIOLOGY traces the rise of communities, and their evolution to the complex civilizations of ancient and modern times. History deals with the later phases of this development; but sociology is the endeavour to get behind history, and to give an account of the data with which historians work. The physical conditions of a country, including its climate, vegetation, and animals.

affect profoundly the life of the inhabitants, and we find that certain types of social organization are related to specific habits of life. With the further advance of civilization there arises the 'State,' which is the subject of POLITICS, and the complex conditions of social wealth, which are studied by ECONOMICS.

The earlier history of man is known as ARCHÆOLOGY, which is essentially a department of ethnology, to which it bears a relation similar to that which palæontology does to zoology.

The term ETHNOGRAPHY is limited to the anthropological description of racial or geographical groups of men; and the word ANTHROPOGEOGRAPHY is often used for the study of the distribution of races, and of the effect on civilizations of geographical conditions.

PHYSICAL ANTHROPOLOGY is the comparative study of the structure of the human body in the various races of mankind. In the case of living persons, such characteristics as the colour of the skin, hair, and eyes, as well as the general proportions of bodily stature and facial features, are available for examination; but the detailed study of the skeleton constitutes the most exact part of the science. In this connection, measurements have been devised which are applied in the construction of anthropometric tables. The word *race* is used to designate distinct physical types of mankind, from the intermingling of which *peoples* or *nations* are developed; and it is necessary, in the study of peoples, to analyze the physical factors which have been derived from separate sources. Physical characters may be acquired under varying geological and geographical conditions, from climate and temperature, from food and exercise; clothing modifies the colour of the skin; bones are influenced by habits and posture; and acquired and ances-

tral characters are transmissible from one generation to another.

The most important anthropological measurements are those of the SKULL. Their value is partly due to the fact that the skull contains the brain; but we must not suppose that the dimensions and capacity of the former necessarily affect the quality of its contents. In the skull, the cranium is distinguished from the face. The former is the box which contains the brain. An estimate of its dimensions is formed by measuring its capacity, its circumference in different directions, segments of its circumference, and the chords which subtend them. The face consists of the apparatus for mastication, and of the parts surrounding the organs of sight, smell, taste, speech, and hearing. Its dimensions, either as a whole or in reference to its parts, may be obtained by measurement.

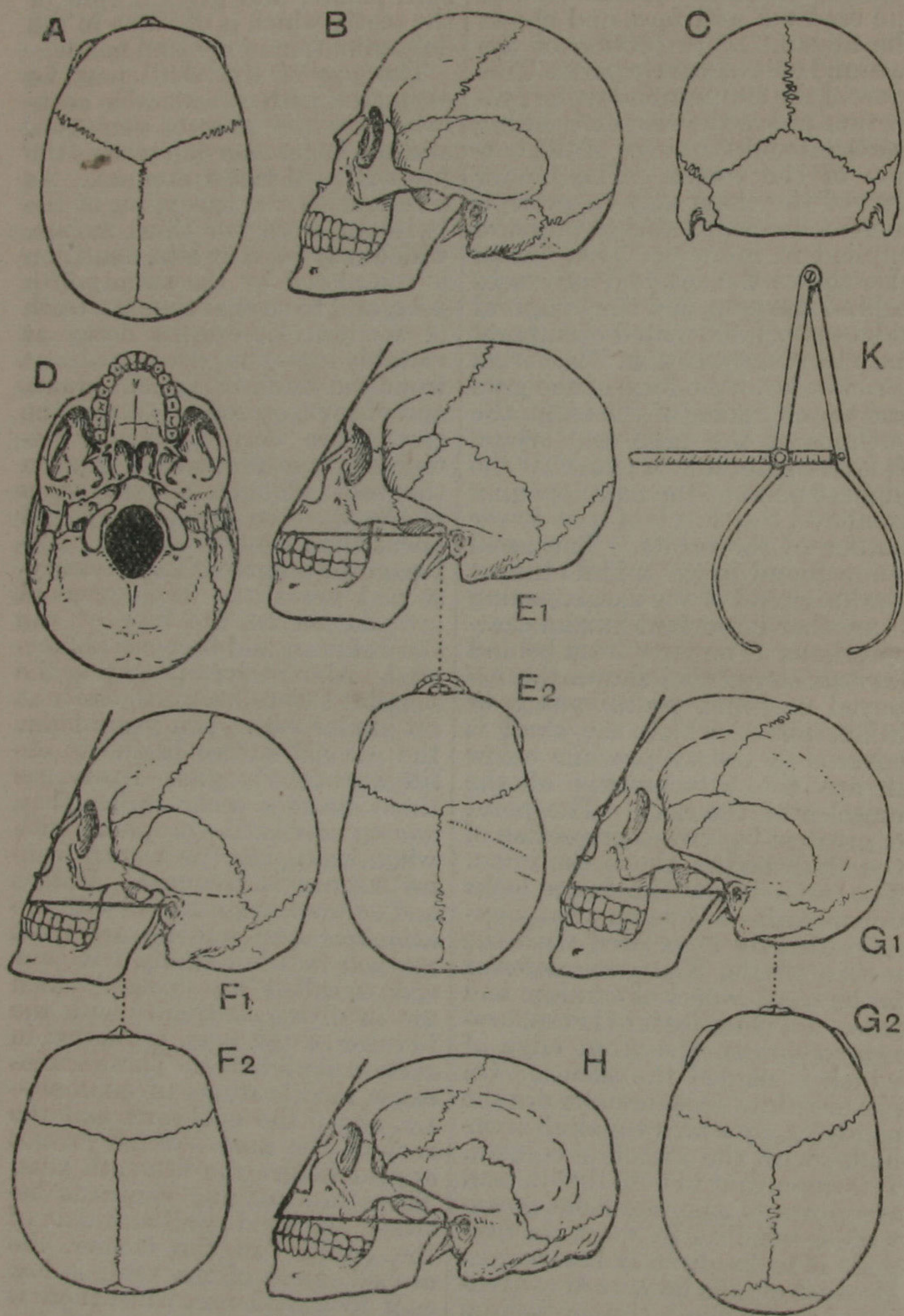
The skull may be examined in two ways—inspection by the eye (cranioscopy), and exact measurements taken by special instruments (craniometry).

1. *Cranioscopy*.—There are certain recognized 'views' of the skull, each of which is termed a *norma*. The view from above (*norma verticalis*) rarely shows any part of the face, or at most the lower part of the nose or the margin of the upper jaw; the cheek arches (*zygomæ*) may be invisible. Three lines of juncture, or sutures, may be seen: the *sagittal*, or longitudinal, the highest point in which is termed the *vertex*; the *coronal*, at the anterior end of the sagittal—the meeting-point between these two being termed the *bregma*; and the *lambdoidal*, at the hinder end of the sagittal. The skull is said to be 'well-filled' when it bulges on either side of the vertex; but when it presents a rooflike slope, as in the case of many aborigines, it is said to be 'ill-filled.' The *norma*

*lateralis* gives the profile view of the cranium and face, and shows the amount of projection of the face and of its separate parts. This view of the cranium shows the projection above the root of the nose (*glabella*) and the curve of the outline of the vertex. The hinder part of the slope may be precipitous—a deformity due to pressure applied in infancy. This *norma* also shows the mastoid processes behind the ears, and the temporal ridges associated with the temporal muscles of mastication. The *norma facialis* shows the form of the jaws and the character of the teeth, the outlines of the nose and orbits. It is characteristic of man that the highest point of the nasal opening is above the level of the lower border of the orbits. The nasal spine found in the middle line at the lower end of the nasal opening is another important human characteristic. The view from behind (*norma occipitalis*) shows the external occipital protuberance or inion, above which the skull is covered by the scalp, while below it are the attachments of the muscles of the neck. The point of greatest backward projection of the skull occurs above the inion. The area below the inion looks downwards—a human characteristic directly associated with the erect attitude. The *norma inferior* is the basal aspect of cranium and face. Its chief feature is the *foramen magnum*, the front edge of which is named the *basion*. On either side of this foramen are the condyles, by which the skull articulates with the vertebral column. It is important to note that in man the *foramen magnum* looks downwards, whereas in most quadrupeds it looks directly backwards. Because of this backward convexity of man's skull, the cerebellum ('little brain') is placed below the cerebrum, while in quadrupeds the former is behind the latter. This *norma* also shows the form of the

hard palate, and gives a view of the teeth, which is of value in the determination of age and habits.

The *age* of the skull may be estimated with considerable accuracy from the state of dentition, and the latter also determines the proportion of face to cranium. As a rule, with the exception of the 'wisdom teeth,' or third molars, which may be very late, dentition is completed by the twenty-fifth year, and from that time the teeth of modern Europeans decay at variable rates; but decay is absent from the teeth of ancient crania and of savage peoples, though the crowns are worn down and flattened by the presence of sand in the food. The general ossification of the skeleton also is completed about the twenty-fifth year. Between the eighteenth and twenty-second years the basi-sphenoid articulation on the base of the skull ossifies, and becomes obliterated. About the fortieth year the saggital suture begins to ossify at its hinder end. Ten years later, the coronal suture begins to obliterate at the bregma. In savages these changes occur earlier than among civilized peoples, with whom metopism (persistent frontal suture) is frequent. Ridges and eminences associated with the attachment of muscles are most marked in adult skulls. Hollow spaces, called 'air sinuses,' which are in direct continuity with the interior of the nose, are found in certain skull bones. These spaces cause modifications of contour—*e.g.* above the eyebrows and the root of the nose—which do not appear before the fifteenth year. There are striking contrasts between the aged skull and that of the adult. In the former, the arched shape of the vault is lost as if by subsidence, while there is an accompanying bulging of the sides and flattening of the base. The loss of teeth from the lower jaw results in a reversion to its



*Anthropology.—Cranimetry.*

A, Norma verticalis. B, Norma lateralis. C, Norma occipitalis. D, Norma inferior. E1, E2, Dolichocephalic type (negro). F1, F2, Brachycephalic type (Chinese). G1, G2, Mesaticephalic type (European). H, Prognathous type (Australian). K, Callipers.

infantile form, in which little more than the lower border of the bone is left, while its angle departs from the right-angled adult condition to repeat the obtuse angle of infancy. Similar changes occur in the upper jaw; and the cheeks of the living subject become hollow, the face shrinks, the nose protrudes, and approximates to the chin.

2. *Craniometry*.—The capacity of the cranium indicates the development of the brain; but other structures besides the brain are contained within the cranium, and it has been suggested that a deduction of 10 per cent. should be made in order to allow for these. There is no method of estimating the capacity of the cranium which is quite free from error, or by which constant results are obtainable. The operator fills the cranium with some substance, which is afterwards measured in a graduated glass vessel. Special precautions must be taken to ensure equal conditions of pressure during both stages of this operation; the routine of the procedure must be rigidly observed; and it is advisable to have a large series of observations recorded by the same operator. After experiments with numerous substances such as sand, seed, and water, it has been found that the best results are obtained by using chilled shot No. 8, and that, both in filling the skull and in pouring the shot from the skull into the glass measure, it should run through a funnel whose outlet is twenty millimetres in diameter. Even when every precaution has been taken, discrepancies will arise; but if the variation be no more than 10 cubic centimetres, it is regarded as 'slight.'

The capacity of the normal human cranium varies from 1,000 to 1,800 cubic centimetres. In striking averages, it is preferable to compare crania of the same sex, because the mean capacity of female crania is 10 per cent. less

than the mean of male crania. On this basis crania have been classified as: (a) *Microcephalic*, below 1,350 c.c.—e.g. extinct Tasmanians, aboriginal Australians, Bush people, Andamanese, many Melanesians, Veddahs and Hillmen of India; (b) *Mesocephalic*, from 1,350 c.c. to 1,450 c.c.—e.g. Negroes, Malays, American Indians, and Polynesians; (c) *Megacephalic*, above 1,450 c.c.—e.g. Eskimos, Europeans, Mongolians, Burmese, and Japanese.

The mean capacity among Europeans is about 1,500 c.c. Sir Wm. Turner has recorded the capacity of a male Scots cranium of nearly 1,800 c.c., and a female aboriginal Australian at 930 c.c. There is no doubt of the human character of the smaller of these two crania, in spite of the enormous difference between them. Another great gap separates man from the nearest of the anthropoid apes, in which 500 c.c. is the maximum capacity. Sex and general bodily stature undoubtedly influence the capacity of the cranium, and thus the weight of the brain. Manouvrier calculates that the cranial capacity  $\times 0.87$  gives the weight of the brain with reasonable exactness.

Linear measurements of the skull may be absolute or relative; and since the cranium is not a rectangular box, it is necessary to measure the distances along the arcs of curves, as well as the chords of these arcs—i.e. the shortest distances between points upon the surface. For these purposes two instruments are required—viz. a graduated steel tape and callipers. The latter consist of a straight graduated bar upon which there are two curved arms; of these one is fixed at zero, while the other may be moved upon the bar so as to record the shortest distance between any two points upon a curved surface. One end of each arm is bent, so as to be available for recording the distance between

two opposing points upon the inner aspect of such a hollow chamber as the nose or orbit. The present writer has devised a modification of this instrument whereby a third arm is added to the graduated bar. This arm is placed at zero in the centre of the bar, and is straight, while the two curved arms are both freely movable; thus the relative distances between three points upon the surface of the cranium may be registered—*e.g.* in determining the amount of asymmetry. By the tape, measurements are made of the circumference of the cranium in the horizontal, transverse, and longitudinal directions; though, in order to complete the two latter, it is necessary to resort to the callipers. By the latter instrument the length, breadth, and height of the cranium are determined. Length is technically the glabello-occipital diameter; breadth, for ordinary purposes, is the greatest width; height is the diameter between bregma and basion. The chief interest in the figures thus obtained lies in the comparison of one with the other. It is customary to compare the length with the greatest width. This is done by assuming that the length equals 100, and then representing the width as a percentage. The result is termed an 'index,' the formula for which is

$$\frac{\text{greatest width} \times 100}{\text{length}} = \text{cephalic index.}$$

This index affords by far the most important basis for classification of skulls. When the index is low, length greatly predominates over width, giving an elongated or oval skull; on the other hand, when the index is high, the skull tends to be rounded. The current classification of skulls upon this index is the following: *hyperdolichocephalic*, below 70; *dolichocephalic*, from 70-75; *mesaticephalic*, 75-80; *brachycephalic*, from 80-85; *hyperbrachycephalic*, above 85. These divisions are

quite arbitrary, and unnecessarily minute. It may serve to indicate the general result of this classification to state that Eskimos, Fuegians, African Negroes, Veddahs, Australian aborigines, Fijians, and certain races of N. Europe are typically dolichocephalic; while aboriginal Americans, Malays, Mongols, Sandwich Islanders, Lapps, Finns, Poles, Tyrolese, etc., provide illustrations of brachycephalic skulls. The mesaticephalic crania are found among Japanese, Chinese, Greeks, French, Germans, Danes, British, etc.

Sometimes height is contrasted with length, and a *vertical index* is calculated on the principle stated above. In this way we get low skulls (*platycephalic*)—*e.g.* Bushmen and aboriginal Australians; moderate skulls (*metriocephalic*)—*e.g.* Scottish, English; high skulls (*acrocephalic*)—*e.g.* Fijians, Loyalty Islanders.

From what has been said, it is clear that there are always two distinct and extreme types of cranium; but any attempt to explain their origin must be largely speculative. It must not be forgotten that the indices merely express relative proportions between two diameters of the cranium, whose function it is to contain and protect the brain. It is now shown that the closing of the sutures about the period of puberty, as in the negro, arrests the normal growth of the brain; hence the negro child is equal to the European in mental capacity, but the negro adult remains a child for the rest of his life (Manetta, Keane, Ellis).

The FACE is of peculiar interest, because it is modified more rapidly than the cranium in the process of evolution. To define its limits is not so simple as it might appear. Popularly, the face includes the forehead, and extends to the tip of the chin; anatomically, the



forehead, being part of the cranium, is not included in the face. Sometimes its upper limit is taken above the root of the nose, in order to include the eyebrows; but, as a rule, the root of the nose (fronto-nasal suture) is the limit. The facial width is calculated between the projecting convexities of the zygomatic arches. A percentage comparison of the length and width gives a *facial index*, according to which high faces are above and low faces are below ninety. The lower jaw, however, is frequently absent from collected skulls, since this bone may be used as an ornament—*e.g.* in New Guinea, where it is used as a bracelet. Accordingly, an upper facial or *maxillary index* is necessary, in which fifty forms the dividing line between high and low faces. Most Europeans have high—*i.e.* narrow—faces; but Mongols, Eskimos, etc., have low or broad faces. The skeleton of the nose varies greatly; and the marked contrast between the Grecian nose and the squat, bridgeless nose of the aboriginal Australian or extinct Tasmanian is chiefly due to a difference in the size of the nasal bones. The nasal spine of the anterior nasal aperture may be well developed, as in Europeans, or feebly, as in the aboriginal Australian, who, in this respect, approximates to the lower animals. When it is feeble, a certain amount of jaw projection (*prognathism*) is always present; and this becomes pronounced when, as in the apes, the nasal spine is absent. The nasal aperture of the skull looks forwards; its downward direction during life is due to cartilages which are absent from the dry skull. The height of the nose is measured from its roof to the anterior nasal spine; the width is taken where greatest. From these data a *nasal index* is calculated, according to which a skull is *leptorhine* (narrow

nostrils) below 48—*e.g.* English, Eskimos, etc.; *mesorhine* (medium nostrils) from 48–53—*e.g.* Chinese, etc.; *platyrrhine* (broad nostrils) above 53—*e.g.* aboriginal Australian. No European is ever platyrrhine, nor any aboriginal Australian ever leptorhine. The orbit is the somewhat pyramidal chamber which lodges the eyeball; the height and width of its outlet are compared. These measurements are taken at right angles to each other, the width being calculated from the *dacryon*—a fixed point upon the inner wall—to the most distant point upon the outer edge of the orbit. The width is always greater than the height, and hence  $\frac{\text{height} \times 100}{\text{width}} =$

*orbital index*. High orbits (*megaseme*) are above 89—*e.g.* Chinese; moderate orbits (*mesoseme*) from 84–89—*e.g.* English; low orbits (*microseme*) below 84—*e.g.* Bushmen and aboriginal Australians. By various measurements of the hard palate we obtain a *palatal index*, which expresses the relation of width to length. As a rule, the width exceeds the length; but in apes the opposite is the case, and aboriginal Australians approximate to the apes in this respect.

So far the cranium and the face have been considered separately, but they must be compared in order to express the relation of face to cranium. The scientific terms indicate the relative projection of the face in front of the cranium. Such animals as the horse, tiger, ape, etc., in which the amount of projection is great, are called *prognathic*. Europeans, in whom the amount of projection is slight, are called *orthognathic*; but the lower races are prognathic. To determine the amount of projection, the distance from the basion to the base of the incisor teeth is multiplied by 100, and the product is divided by the distance from the basion to the root

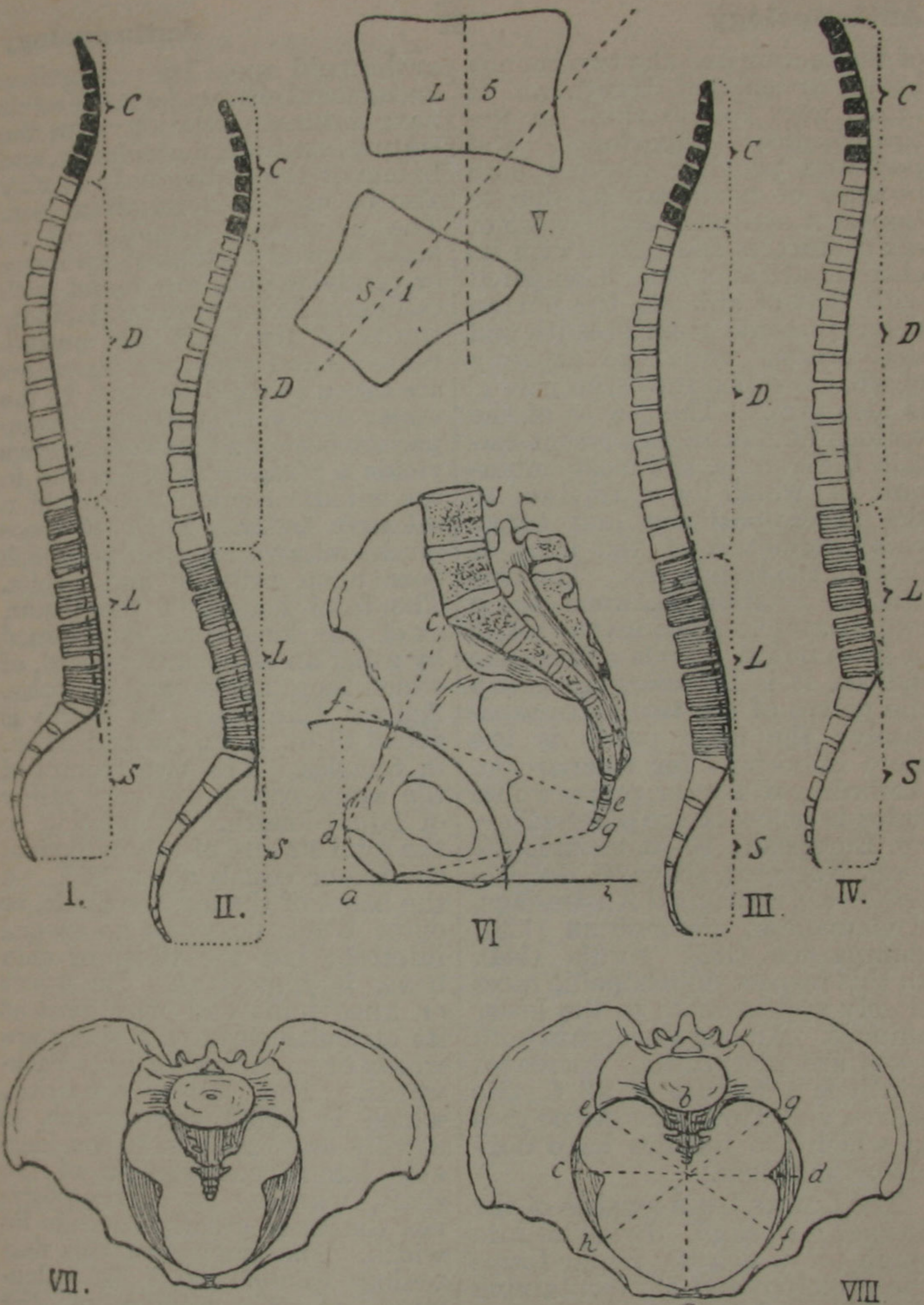
of the nose. The quotient gives the *gnathic index*. Skulls below 98 are *orthognathous*—*e.g.* Europeans, Bushmen; from 98–103, *mesognathous*—*e.g.* Chinese, Japanese, Malays, Maoris; above 103, *prognathous*—*e.g.* Hottentots, Negroes, Kaffirs, aboriginal Australians. Prognathism may be intensified by the lips, incisor teeth, and lower jaw, by the curvature of the skull, and by its attitude upon the spinal column, which is, normally with the axis of vision, horizontal. The facial angle, which only affects the face, and may be determined on the living head as well as on the skull, may also express the amount of prognathism. To obtain this angle, a line is drawn from the external auditory opening either to the subnasal point (*camper*) or to the alveolar point between the two central incisor teeth (*cloquet*). This line is intersected by a face line, drawn from the face margin of the upper lip to the glabella. The facial angle is highest among Europeans, whose skulls are orthognathous, and becomes lower according to the amount of prognathism.

Deformities of the cranium may result from a variety of causes, and the two lateral halves are rarely, if ever, symmetrical. A disease such as hydrocephalus enlarges the skull in all directions. Premature closure of certain sutures may cause abnormal expansion in special directions, producing skulls which are unduly elongated, rounded, or even triangular. Again, certain aboriginal tribes and some civilized peoples cause artificial flattening of the front, back, and sides of the skull by peculiar methods of treating the heads of infants. Lastly, it has been observed that deformity resulting from pressure occurs in skulls which have been softened by burial in water-laden or clay soils.

The SPINAL COLUMN of the infant consists of thirty-three distinct vertebræ. Of these, twenty-four remain separate in the adult, while five fuse to form the sacrum, and four to form the coccyx, or concealed and rudimentary tail. Between the bodies of each pair of distinct vertebræ there is an intervertebral disc of white fibrous tissue having a certain amount of elasticity. In Europeans the vertebræ present certain definite characters; but occasionally structural variations occur, suggesting conditions characteristic of lower animals. Such variations are much more common among the lower human races. During life the adult vertebral column of man presents three well-marked curves—*viz.* cervical, dorsal, and lumbar, of which the cervical and lumbar have their convexity, while the dorsal curve has its concavity, forwards. These curves are directly associated with man's bipedal gait and his erect attitude, in which the weight of the head requires to be poised upon the summit of the vertebral column. The curves are therefore most distinct in civilized man, but the difference between him and primitive man is only one of degree. Quadrupeds do not possess these curves, and the anthropoid apes show them only to a modified extent. At the time of birth the spinal curves of the human infant are quadrupedal, but with the acquisition of the erect attitude the curves change gradually into those which are characteristic of the adult civilized man.

The SACRUM is very wide in relation to its length, and the percentage proportion between these measurements is expressed by a *sacral index*. Width predominates in white races, but among many black races the length is the greater—the normal condition in lower animals.

The PELVIS, or basin, consists



*Anthropology.—Spinal Column and Pelvis.*

FIGS. I.-IV., *Spinal Curves*.—I. European (male). II. European (female). III. Hottentot-bushman. IV. Orang. (c, cervical; d, dorsal; L, lumbar; s, sacral vertebræ.)

FIG. V., *Lumbo-Sacral Angle*.—L5, fifth lumbar vertebra; s1, first sacral.

FIG. VI., *Inclination of the Brim of the Pelvis and its Axis in the Erect Posture*.—ab, horizontal line; cd, line of inclination of the brim of the true pelvis; ef, axis of inferior outlet; g, diameter of inferior outlet.

FIG. VII., *Male Pelvis (European)*.

FIG. VIII., *Female Pelvis (European)*.—ab, antero-posterior or conjugate diameter; cd, transverse or widest diameter; ef, gh, oblique diameter.

of the sacrum and the two haunch bones articulated together. It ranks next to the skull in anthropological importance, and possesses peculiar interest both because of modifications due to the erect attitude and because of sex characters associated with its obstetrical functions. Compared with that of animals, the human pelvis presents great breadth and shallowness, while the capacity of what is called the 'true pelvis' is also great. The pelves of the various human races present certain differences, the most important of which have relation to the antero-posterior and transverse diameters of the inlet or brim of the true pelvis. The percentage relation between these two diameters provides the *pelvic* or *brim index*. In classifying the indices, it is necessary to group the pelves of the two sexes separately; the male pelvis is the more important for comparison. According to Turner, pelves whose index is below 90 are *platypellic*—*e.g.* European; 90–95, *mesatipellic*—*e.g.* Negroes; above 95, *dolichopellic*—*e.g.* aboriginal Australians, Andamanese, orang-outan (126), chimpanzee (133), gorilla (144). In this respect dolichopellic races closely approximate to the lower animals. Among Europeans both sexes are platypellic. Increased width is a feature of all female pelves, and Turner knows no race in which the females have dolichopellic pelves.

The LOWER LIMB consists of the *haunch*; a *shaft*, divisible into thigh (of which the femur forms the skeleton) and leg (containing the tibia and fibula); and the *foot*. This limb is used for support and locomotion; only to a very slight extent can the foot be used for grasping. The femur presents many distinctive human characters directly associated with the erect attitude. Before birth this bone closely resembles the femur of the

anthropoid ape. Its proportions and general characters in the adult have intimate relation with the stature, attitude, muscularity, and habits of the individual; it may also be used in determining sex. The maximum diameter of its head, as well as that of its lower or condylar end, are found with callipers. In the upper and middle thirds of its shaft the antero-posterior and transverse diameters are taken at fixed points. In the upper section the percentage comparison between the two diameters yields a *platymeric index*, and in the middle section we obtain a *pilastric index*. Each of these gives interesting results which bear upon attitude and habits. The total length of the femur, as of any long bone, is obtained by using an osteometric board, of which there are several varieties. Among Europeans its length is about 18 in. in males, and 17 in. in females. The two femurs of the same person are very rarely of equal length. In relation to the total stature of the individual the femur equals about .275. Of the bones of the leg, the fibula, or outer bone, possesses no special interest; but the tibia, or shin bone, is important. Its upper or knee joint end may present its articular surfaces looking upwards or considerably bent backwards. The latter condition, which is called retroversion, is usually associated with considerable lateral compression of the shaft, whereby its antero-posterior diameter greatly exceeds its width. The amount of this flattening (*platyknemia*) is calculated at the middle of the shaft by 
$$\frac{\text{tibial length} \times 100}{\text{antero-posterior diameter}} = \text{platyknemic index.}$$
 The total length of the tibia, which does not include the spine at its upper end, is measured as in the femur. It is believed that squatting—*i.e.* sitting on the heels—influences

not only the extent of the articular surfaces at the upper and lower ends of the femur, but that retroversion of the tibial head, platyknesia of its shaft, and extension of its inferior articular surface to the front of the bone, are due to the same cause. Similar appearances are found in the new-born infant, but these usually disappear unless fixed by the squatting attitude. From the fact that the bones of prehistoric man presented similar conditions, many investigators believe that he could not walk erect, but assumed the posture of the anthropoid apes.

The human femur is always longer than the tibia, but the proportions vary; the relationship is expressed by 
$$\frac{\text{tibial length} \times 100}{\text{femoral length}}$$

tibio-femoral index. In Europeans this index is about 81; aboriginal Australians, 83; Tasmanians, 85; Bushmen, 86. All above 83 are *dolichoknemic*—i.e. the proportion of leg to thigh is greater than in Europeans; all below 83 are *brachyknemic*. In the Aymaras of Bolivia and some Colombian tribes the tibia is longer than the femur, but in all cases both are used for determining the stature. Of several methods, the simplest is: length of tibia + length of femur  $\times 2$ , and 1 in. added for soft parts. Up to ten years of age the rate of growth is greater in the male than in the female; from ten to fourteen years the female is the taller; after fourteen the male again predominates. The maximum height is reached about the thirty-fifth year; and as ossification is completed about the twenty-sixth year, the additional height is believed to be gained by an increase in the intervertebral discs. The peoples of the world present great differences in height. Among Andamanese the mean height is below 5 ft., and among Bushmen, Lapps, Eskimos, and Veddahs the average is also below

5 ft. (1.4 to 1.5 m.). The Akka of equatorial Africa, in whom the height of both males and females is below 4 ft., are the most dwarfed; but in the north the height is greater, through intermarriage with negroes.

The UPPER LIMB is primarily adapted for grasping (prehension), and in a minor degree for support and locomotion. The *clavicle*, or collar bone, merely presents variations in length and thickness, due to stature and muscularity. The *scapula*, or shoulder blade, is plate-like and triangular. Its anatomical features are believed to be considerably modified by muscularity, depending upon habits and occupation. In man (unlike quadrupeds) the length exceeds the width. Length is reckoned from the upper to the lower angles of the bone, and width from the middle of the outer border of the glenoid fossa to the vertebral border at the root of its spine. From these data, 
$$\frac{\text{width} \times 100}{\text{length}} = \text{scapular index.}$$

Among Europeans the mean index is 65.3, but is higher in infants than in adults. The index varies from 62.6 in Lapps, and 64.9 in aboriginal Australians, to 70.2 among Andamanese. It is doubtful whether it possesses much value as a race character. The *humerus*, or upper arm bone, is a typical long bone. The maximum diameter of its head possesses a certain amount of value as a sex character. A small hooklike projection on its shaft—supracondyloid process—is occasionally found, representing a portion of bone which encloses a foramen in many animals. Sometimes the olecranon fossa is perforated—a condition which was of frequent occurrence in prehistoric bones. The *radius* and *ulna*—the outer and inner bones of the fore arm—are not in themselves of great interest. For some time, however, it has been recognized that there are variations in the relative

lengths of upper arm and fore arm. In expressing this relationship, the length of the humerus is compared with that of the radius, and thus  $\frac{\text{length of radius} \times 100}{\text{length of humerus}} =$  radio-humeral index. A high index, therefore, indicates a long fore arm in relation to the upper arm, and *vice versa*. The Lapps and the Eskimos, who have the shortest fore arms, have an index about 71; Europeans, 74; aboriginal Australians, 77; Negroes, 79; Andamanese, 81; the chimpanzee, 90; and the gorilla, 100. This index is higher in the infant than in the adult.

Indices are also employed to represent the relative length of the humerus and femur, the latter being taken as 100. This is called the *femoro-humeral index*. Further, the combined length of the humerus and radius is compared with that of the femur and tibia, by regarding the latter as equal to 100. In this manner an *intermembral index* is obtained, which, when it is above 100, indicates that the shaft of the upper limb is longer than that of the lower limb, as in the orang.

The fullest exposition of these details is known as *Bertillonage*, from M. Bertillon, who aims at establishing the identity of individuals by careful tabulation and classification of the data obtained by measurements. For this purpose actual measurements, and not indices, are employed—*e.g.* standing height; sitting height; span of arms; length and breadth of ear, of nose; length of fore arm and hand, of foot, of fingers, etc. The colour of the eyes—*i.e.* of the iris—and the nature and direction of the opening between the eyelids are also observed and noted. Similar attention is paid to the colour of the skin (whether black, brown, yellow, copper coloured, fair white, or dark white), and to marks upon it, such as tattooing, or scars re-

sulting from wounds. The natural structure of the skin, as seen in the palm of the hand and sole of the foot, where it shows fine alternating ridges and furrows, has led to elaborate methods of recording, classifying, and interpreting the finger-print patterns which may be obtained from the palmar surface of the terminal phalanges of the digits. Lastly, the hair is studied in regard to its colour, and the shape which it presents on section. Among Asiatics it is circular, in transverse section; among aboriginal Australians, ovoid; among Hottentots, laterally compressed; among Papuans, kidney-shaped. Huxley classified mankind as *leiotrichi* (smooth-haired) and *ulotrichi* (crisp or woolly haired). See the art. MAN; and Turner, in *Challenger Reports*, and papers in *Jour. of Anat. and Phys.*; Tylor's *Anthropology* (1881); Deniker's *The Races of Men* (1900); Galton's *Finger Prints* (1893); Bertillon's *Identification Anthropométrique* (2nd ed. 1893); Henry's *Classification and Uses of Finger-Prints* (1900); Hepburn, papers in *Jour. of Anat.*; and *Proc. Ed. Roy. Soc.*

**Anthropometric Survey of Scotland.** In Scotland, the pioneer of anthropometry is Dr. John Beddoe, who published, in 1885, *The Races of Britain*, a work giving detailed measurements of fifty-five Highlanders and a few Lowland Scotsmen. In 1893, Captain J. F. M'Pherson published some interesting statistics on the stature of the men of Roxburgh and Selkirkshire, in the *Transactions of the Berwickshire Naturalists' Club*. Messrs. John Gray and J. F. Tocher carried out an anthropometric survey of the population of East Aberdeenshire as represented at the Buchan gathering in 1895, and in 1896 made a survey of the colour characteristics of the whole of the school children (14,500) of East Aberdeenshire.

In 1896, Rev. Dr. Walter Gregor measured 116 persons belonging to the district of Galloway; and lately, Professor R. W. Reid, Aberdeen University, surveyed the whole of the Aberdeen police force, and made a number of anthropometric observations on the students attending his classes at the university. In 1902, Professor Sir William Turner read a paper before the Royal Society of Edinburgh, giving an account of his anthropometric investigations on the crania of the people of the

children in Scotland, the funds having been supplied by the Royal Society of London. (Report 1902.) In the annexed table some of the results of those investigations are set forth for purposes of comparison.

**Anthropomorphism** (Gr. 'in the form of man'), usually defined as the ascription to the Deity of qualities which properly belong to human beings, really denotes a more generic tendency to represent all things under conceptions derived from man's personal ex-

	Highlanders. Dr. Beddoe.	Aberdonians and East Coast. Gray and Tocher.	Men of Galloway. Dr. Gregor.	Male Inmates of Scottish Asylums. Tocher.
Mean stature ..	.....	1,740 mm.	1,733 mm.	1,674 mm.
Head form — mean length..	200 mm.	197 "	.....	195.5 "
Head form — mean breadth.	152 "	155 "	.....	151.5 "
Mean cephalic index .....	76.2	78.6	77.4	77.6
Mean colour values:—	Edinburgh			
Hair—Red ..	6.7 per cent.	5.7 per cent.	7.5 per cent.	1.6 per cent.
Fair ..	17.5 "	9.5 "	20.0 "	6.5 "
Med... ..	37.2 "	64.1 "	39.2 "	59.5 "
Dark.. ..	32.4 "	20.7 "	29.4 "	32.4 "
Black.. ..	5.7 "	.....	3.8 "	.....
Eyes—Light..	58.2 "	25.4 "	48.0 "	45.0 "
Med... ..	13.7 "	48.6 "	41.5 "	32.6 "
Dark.. ..	27.6 "	26.0 "	10.5 "	22.4 "

south of Scotland. Dr. Thomas H. Bryce has made extensive investigations on the remains of the prehistoric inhabitants of the island of Arran (B.A. Report, 1901, and J.A.I., xxxii.). J. F. Tocher has completed a survey of the inmates of Scottish asylums on behalf of the Henderson Trust of Edinburgh (Henderson Trust Reports, No. 1, 1905; Biometrika, vol. 5). He has also completed on behalf of a Scottish committee, of which Sir William Turner is chairman, a pigmentation survey of 501,552 school

children. Thus the child instinctively attributes feelings like its own to inanimate objects, and it is never possible entirely to banish this element from our thought. Many of our most important conceptions are, in varying degrees, transcripts of the nature of the self, and therefore anthropomorphic. The anthropomorphism which science and philosophy have to avoid arises from the mind's imposing its own nature upon things, not in the way which is essential to cognition, but in ways that are

**Anthropophagi**

arbitrary and unintelligent. But anthropomorphism is most prominently exemplified in religious thought. It is impossible for the religious mind to formulate the relations between God and man save by attributing to Him a nature akin to its own. Still, there have been sects in the Christian Church whose doctrine of God has assumed forms so anthropomorphic as to threaten the purity of the faith. It is impossible to forget that the attraction of Christianity for man, and its power over his heart, is largely due to its setting forth the Divine so livingly in terms of the human. And those who put forward various reasons for denying altogether the legitimacy of such forms of thought have to answer the question whether science is not as anthropomorphic in construing the universe logically and rationally as religion is in construing it morally and spiritually. In both cases it is a reasonable position that anthropomorphism is forced on us by fidelity to the facts.

**Anthropophagi.** See CANNIBALISM.

**Anthropopithecus.** See CHIMPANZEE.

**Anthurium**, a large genus of tropical American plants, belonging to the arum order. A kind grown in greenhouses in Britain has a deep crimson inflorescence.

**Antibes** (anc. *Antipolis*), fort. tn. and health resort of France, 12 m. s.w. of Nice, in the French Riviera. Oranges, olives, and flowers are cultivated, and there are tobacco factories and perfumery works. Pop. 11,800.

**Anti-Burghers**, Scottish secessionists who, in 1747, condemned the 'burgess oath,' and adopted the name General Associate Synod. See PRESBYTERIAN CHURCH.

**Antichlor**, a name given by bleachers and papermakers to any substance used to neutralize small

quantities of free chlorine which the cloth or paper retains. If not removed, the chlorine would act injuriously on the fabric, destroy the dyes, and damage the machinery. In paper it would bleach the inks used in printing or writing, and in time destroy the fibres. Thiosulphate of sodium (hyposulphite) and sulphite of sodium are the principal antichlors. The presence of free chlorine is indicated by a very simple test. A quantity of any ordinary starch is boiled in water, and a few crystals of potassium iodide added. When the solution is cold, a few drops of it on the fabric or paper pulp containing chlorine is at once turned blue. The antichlor is then added to the bulk of the pulp until the test produces no blue colour.

**Antichrist.** In the New Testament the word occurs only in the Epistles of John (1 John 2:18, 22; 4:3; 2 John ver. 7). It may mean either a false claimant to the Messiahship or an antagonist to the true Messiah. Of the former aspect of the personage or personages denoted by the name, we have illustrations in the discourses of Jesus—'false prophets,' 'false Christs' (Matt. 7:15; 24:11, 24; Mark 13:22; Luke 21:8); while the Johannine passages noted above furnish examples of the latter. In 2 Thess. 2:2-12 Paul amalgamates the two in the figure of the 'man of sin,' the lawless one, who, meanwhile mysteriously held in check, will be at length fully revealed as the blasphemer and adversary of God; only, however, to be finally overthrown at Christ's second coming. Next we have the antagonistic powers of the Book of Revelation: the beast that rises from the abyss and wars successfully against the two witnesses, ch. 11; the dragon of ch. 12; and the two beasts of ch. 13, one of which blasphemes God, while the other bears the character



of a false prophet, and deceives men by his miracles. It is not easy to frame from these data a consistent figure of antichrist. In the view of the early eschatologists, the antichrist is a definite personality, a Jewish pretender to the Messiahship who is to appear towards the end of the world, rebuild Jerusalem and establish himself there, and, performing great signs and wonders, gain the allegiance of the world. The two witnesses who withstand him are Enoch and Elijah, who convert some from their delusion; but at length, the true Messiah having come to the rescue of the faithful, the forces of antichrist are shattered and himself slain. With this as our starting-point, we may endeavour (1) to find a fulfilment of the prophecy regarding antichrist. The Westminster Confession of Faith, for instance, and indeed most of the reformers, identify him with the Pope; others, again, regard Mohammed as antichrist. But whatever points of resemblance may exist between the mysterious personality of Scripture and these or other individuals, the whole method of interpretation is preposterous and unwarranted. (2.) It is a more promising mode of inquiry to seek to trace the elements of the figure of antichrist which may have been suggested by the adverse experiences of the early Christian Church. Paul's teaching regarding the 'man of sin' was doubtless influenced by the bitter opposition which his preaching evoked among the Jews; while it was natural enough that the cruelties wreaked upon the Christians by the persecuting emperors Caligula and Nero should seem to exalt these men to the unholy eminence of being incarnations of the unseen powers that defy God. (3.) Finally, we may not unprofitably seek for some ancient tradition which, with gradual transformations and accre-

tions, at length developed to the idea of the potent adversary of all that was divine—an earthly representative of Satan, as Christ was of God. Now, as a matter of fact, we find in Jewish tradition the sinister figure of such an adversary, traceable, as some think, even to the Tiamat of Babylonian mythology, and embracing such opponents to the divine purposes as Gog (Ezek. 38 *f.*; *cf.* Rev. 20:8), the beasts of Dan. 7, Belial or Beliar (2 Cor. 6:15), and Satan himself. Here we seem to find the key to the problem of antichrist. See Alford's *2 Thess.* for a very exhaustive list of identifications; also Bousset's *Der Antichrist* (Eng. trans. 1896).

**Anticlimax**, a rhetorical figure in which the expressions, after rising in intensity, suddenly fall to a lower level—*e.g.* 'For the cause of liberty we would sacrifice everything, including even our wife's relatives' (*Artemus Ward*).

**Anticline**. The rocks of the earth's crust lie, as a rule, in folds or undulations; and when a series of beds has been so folded as to form a crest or arch, they are said to lie in an anticline. In most cases the crest has been planed away by denudation, and the configuration of the surface has little or no relation to the folding of the beds beneath. In such a denuded anticline we have on each side of the central line a series of beds which dip in opposite directions, and away from the centre. Traced outward from that line, the beds will be found to follow in the same order on each side—the lowest bed being that which occupies the central position. Such an anticline may be very small, say 100 yards across, or it may cover half the breadth of a continent. In mountain chains it is usual to find a great number of anticlines running side by side almost parallel. See MOUNTAINS.

**Anti-Corn Law League**, formed in 1838-9, with headquarters at Manchester, to effect the repeal of the corn laws in Britain, was led by Cobden, Bright, Villiers, Joseph Hume, and Roebuck. With meetings, oratory, a paper (the *League*), organization, and agitation, it was an aggressive and effective body. Its objects having been achieved in the royal assent given to the repeal (1846-9) of the corn laws, the league was dissolved by its promoters. See CORN LAWS; also *The Political History of England*, xii. (1907).

**Anti-corrosives**, the materials employed to hinder the rusting or solution of iron structures that are exposed to air or water. They differ in nature according to the circumstances—such as, whether the iron is to be exposed to hot or cold, or to fresh or salt water; and may be divided into two classes, according to whether they act as mere protectives, or whether they act galvanically—*i.e.* transferring the corrosion to a mere electropositive metal attached to the iron. The practice of dipping water-pipes into a hot tarry composition, or of coating iron with a layer of its magnetic oxide, as in the Bower-Barff process, are examples of the first class; while galvanizing—*i.e.* coating iron with zinc, or the fixing of masses of zinc in boilers—exemplifies the second. The most recently introduced anti-corrosive process for protecting steel and iron, known as coslettizing, consists of immersing the metal in a hot solution of phosphorus in which are some iron filings. The surface of the iron is converted, to a minute depth, into a mixture of ferrous and ferric phosphates, which are extremely resistant to corrosion. The process has been much used for the treatment of cycle tubes.

**Anticosti**, a cigar-shaped island in the Gulf of St. Lawrence, Canada, which it divides into two channels, is about 140 m. long, and 35 m. wide at its broadest part. It is low-lying and sterile. The fisheries are good, but not much frequented. In 1886 it was purchased by M. Menier of chocolate fame, who during the last few years has brought in settlers and has done much to develop the agricultural and mining resources of the island.

**Anticyclone**, an area of high barometric pressure surrounded by nearly circular isobars. The barometer is highest in the centre, and gradually falls as it proceeds outwards. The air in the centre is calm, cold in winter and warm in summer; while the winds blow spirally outwards round the centre, in the direction of the hands of a watch in the northern, and in the opposite way in the southern hemisphere. Radiation is a marked feature of anticyclonic weather, the sky being usually blue, the air dry, and cold in the shade but hot in the sun, and hazy, with heavy dew or hoar frost at night. (See BUYS-BALLOT'S LAW.)

**Anticyra**, or ANTICIRRHA, the name of two towns of ancient Greece—one in Phocis, on a bay of the Gulf of Corinth; the other in Thessaly, on the Spercheus R. Both were famous for the production of hellebore, the specific remedy in antiquity for madness.

**Antidiphtheritic Serum**. See SERUM THERAPY.

**Antidote**, any substance which prevents or counteracts the effects of poison. Some antidotes form with the poison insoluble or harmless compounds—*e.g.* chalk forms with oxalic acid an insoluble, and therefore innocuous, oxalate of lime. Vegetable poisons cannot thus be counteracted. If an alkaloid has been taken, we must rely on the stomach pump or tube,

on emetics, and on the administration of the physiological antagonist of the poison—*e.g.* chloral hydrate in strychnine poisoning. Atropine is an antidote to morphine, physostigmine to atropine. See POISONS.

**Antietam**, riv., rising in Alleghany Mts., Pennsylvania, U.S.A., and flowing s. into the Potomac R. near Sharpsburg. Here, in Sept. 1862, a stubborn battle was fought between the Federals under M'Clellan and the Confederates under Lee.

**Antifebrin**, the trade name for acetanilide or phenyl-acetamide,  $C_6H_5NHCOCH_3$ , prepared by boiling aniline with glacial acetic acid. It is a colourless crystalline solid, slightly soluble in water, and with a pungent taste. Used in medicine, in 3 to 10 grain doses, as an antipyretic and analgesic, in place of quinine, though it should not be taken except under medical advice.

**Anti-fouling Compositions**, substances for application to the under-water parts of ships to prevent the adherence of seaweeds, barnacles, etc. They act on the principle of providing a coating that will either give way when the plant or animal attains any considerable size, or that contains an ingredient inimical to life. With wooden ships, copper or Muntz metal sheathing is quite effective, acting chiefly, but not wholly, on the second principle; but with the introduction of iron ships, the destructive galvanic action between the two metals rendered such a protection impossible without the interposition of a costly wooden sheathing. Slow-moving iron sailing-ships can be treated with a greasy composition of the first class; but as this would be washed off steamships, a coating of the poisonous variety only can be applied. Many such paints, of various degrees of efficiency, have been

patented, the most effective being those which contain insoluble mercury compounds, such as the cyanide or oxide, which are slowly given off from the vehicle enclosing them.

**Antigo**, co. tn. of Langlade, co. Wisconsin, U.S.A., 205 m. N.W. of Milwaukee. Pop. 7,000.

**Antigone**, daughter of Œdipus by his mother Jocasta. Antigone is represented as a maiden of noble and unselfish character. Her devotion to her father led her to accompany him when exiled from Thebes, and her affection for her brother Polynices gave her courage to defy the prohibition of Creon, then ruler of Thebes, which forbade the honouring of Polynices' corpse with the rites of burial. For the latter offence she was buried alive. It is particularly in Sophocles's play, called by her name, that her character is developed; but she appears also in his *Œdipus Coloneus*, in the *Seven against Thebes* of Æschylus, and in the *Phœnissæ* of Euripides, who wrote an *Antigone* himself, of which only a few fragments remain. The Latin poet Statius treated the subject in his *Thebaid*, and the Italian dramatist Alfieri also composed an *Antigone*. See SOPHOCLES.

**Antigonish**, seapt. of Nova Scotia, cap. of Antigonish co. It has a Jesuit college and a Catholic seminary. The co. borders the Gulf of St. Lawrence. Pop. tn. 1,600; co. 14,000.

**Antigonus**. (1.) One of the generals (381–301 B.C.) of Alexander the Great of Macedonia, after whose death he became ruler of Greater Phrygia, Lycia, and Pamphylia. Aspiring to the sovereignty of Asia, he defeated and killed Eumenes (316 B.C.), and for several years waged war with Seleucus, Ptolemy, Cassander, and Lysimachus. After defeating Ptolemy's fleet (306), he took the title of king. Finally, he

**Antigua**

was defeated by Lysimachus at Ipsus, in Phrygia (301), and fell in the battle. (2.) Surnamed GONATAS, son of Demetrius Poliorcetes and grandson of (1); assumed the title of King of Macedonia in 283 B.C. Pyrrhus of Epirus drove him out of his kingdom in 273, but he regained it the next year. He died in 239. (3.) Surnamed DOSON ('about to give'), as he was lavish in promises, but slow to perform; son of Demetrius of Cyrene, and grandson of Demetrius Poliorcetes. On the death of Demetrius II. of Macedonia he married his widow, and became king. He defeated Cleomenes of Sparta at Sellasia, and took Sparta (221). He died in 220.

**Antigua.** (1.) British isl. (108 sq. m.), one of the Leeward group, W. Indies; presidency and seat of government. The island was discovered by Columbus in 1493. Barbuda and Redonda are dependencies. Cap. St. John; pop. 9,000. The island exports sugar, pine-apples, rum, and molasses. Pop. 35,000. See Oliver's *History of Antigua* (1894). (2.) Town, Guatemala, 25 m. s.w. of the city of Guatemala, between the volcanoes Fuego and Aqua. Pop. about 15,000.

**Anti-incrustators.** See BOILER COMPOSITIONS.

**Antilegomena** (Gr. 'things spoken against'), a term applied by Eusebius to 2 Peter, James, Jude, Hebrews, 2 and 3 John, and Revelation, which were not at first admitted into the canon by every section of the Church.

**Anti-Libanus.** See LEBANON.

**Antilles.** See WEST INDIES.

**Antilocapra**, or PRONGBUCK, an interesting N. American ruminant, sometimes placed among the antelopes, from which it differs in having branched horns which are periodically cast off and renewed, while the antelopes, like all the Bovidæ, have simple horns

which do not fall off. The prongbuck is a graceful animal, about three feet in height.

**Antilochus**, one of the heroes of the Trojan war, son of Nestor and friend of Achilles, renowned for beauty and bravery; fell in battle while trying to save the life of his father, but was revenged by Achilles. The ashes of the three friends, Antilochus, Achilles, and Patroclus, were placed in the same grave near the Hellespont.

**Antimachus**, THE COLOPHONIAN, a Greek poet who flourished during the latter period of the Peloponnesian war. His works, of which the chief were the *Thebais*, an epic, and *Lyde*, an elegy, exist now only in fragments. Quintilian placed him first after Homer. See Bergk's *Poetæ Lyrici Græci* (1843).

**Antimony**, Sb, 120.2, rarely occurs native, but chiefly as stibnite, antimony sulphide,  $Sb_2S_3$ . It is, however, not profitable to smelt ore which contains less than half its weight of the metal. The operation is carried out in a furnace which contains twenty plum-bago crucibles capable of holding 40 lbs. of metal each. The ground ore, mixed with one-tenth of its weight of salt, is placed in the crucibles, and scrap iron added. In this way sulphide of iron and metallic antimony are obtained. The contents of the crucibles are poured into moulds and allowed to cool, the antimony readily separating from the iron sulphide. This metal contains 90 to 95 per cent. of antimony, and is twice remelted to obtain the purer 'star antimony.' The purity of the metal is judged by a characteristic fern leaf or star pattern on its surface. The world's annual production is about 3,000 tons, most of which has, up to the present, been smelted in England. The price fluctuates greatly; £35 to £40 a ton is its average value. Antimony is a bluish-white, brittle

crystalline metal, and possibly also exists in an allotropic form which is amorphous and explosive. Sp. gr. 6.7. It is not acted on by air at the ordinary temperature, but when heated it burns brilliantly, forming the oxide. It melts at 450° C. It is a poor conductor of heat and electricity, is oxidized by strong nitric acid, but is not acted on by dilute sulphuric or hydrochloric acids. Antimony expands on solidifying, and imparts this property to its alloys, such as type-metal; hence its value in making fine and sharp castings. Other important alloys are Britannia metal and anti-friction metal.

The principal compounds of antimony are the sulphides, chloride, and tartar emetic. The black sulphide,  $Sb_2S_3$ , as found native or prepared by fusion, is a shining crystalline solid, used in the preparation of matches and percussion caps, and in pyrotechny. The orange sulphide, which is prepared by precipitation of a salt of antimony by hydrogen sulphide, is of the same composition; while kermes mineral also contains oxide and alkali. The golden sulphide is the pentasulphide; while antimony cinnabar, used as a paint, is an oxysulphide. Antimony trichloride, or 'butter of antimony,' is a caustic deliquescent solid, used for 'browning' gun-barrels; and tartar emetic is a potassium antimonyl tartrate, prepared by heating cream of tartar with antimonious oxide. Tartar emetic is, like other antimony compounds, used in medicine, and is a cardiac depressant, a powerful emetic, and deadly irritant poison. Tartar emetic is also used as a mordant in dyeing. See TOXICOLOGY.

**Antinomianism**, the constantly recurring tendency among Christian mystics to realize so fully the higher possibilities of spiritual experience, that they lose hold of the sane and necessary con-

ventions of morality. The opposite tendency is sometimes called 'legalism.'

**Antinomy**, a Kantian term to denote an apparent conflict of reason with itself: *e.g.* it may be argued with apparently equal truth both that the universe is infinitely extended in space and that it has spatial limits.

**Antinori**, MARCHESE ORAZIO (1811-82), Italian traveller and scientist, who explored the region of the Upper Nile in 1860-1; the north of Abyssinia in 1868; and in 1876 Shoa, where he died.

**Antinous**, page and favourite of the Emperor Hadrian, who was greatly attracted by his wonderful but melancholy beauty, and made him his constant companion. When Antinous was drowned in the Nile (120 A.D.), the emperor perpetuated his memory by numerous statues and bas-reliefs, caused him to be deified, erected a temple in his honour, and having rebuilt the city of Besa near to the scene of his favourite's death, called it Antinoöpolis.

**Antioch**. (1.) Town of Syria, on the Orontes R., 60 m. w. of Aleppo, first the Syrian and afterwards the Roman capital; a great city of Bible times, ranking in importance next after Rome and Alexandria. Built by Seleucus Nicator about 300 B.C., and named by him after his father, it became notorious for its wealth and luxury, and for the turbulence of its inhabitants. There the name 'Christian' was first used (Acts 11:26). It was the centre whence missionaries were sent to the Gentiles. (See Acts 13:1; 15:22-25; Gal. 2:11, 12.) Chosroës, king of Persia, destroyed it in 538; but it was rebuilt by Justinian, and called by him Theupolis. Its importance declined on its capture by the Saracens in 658, but in the time of Chrysostom it is reputed to have had a population of 200,000.

**Antiochus**

From 1098 to 1268 it was the capital of a Christian principality. After a gradual decline it was almost destroyed by an earthquake in 1872, but has since recovered, and has now a population of 26,000 (Mohammedans, Greeks, and Armenians). There are warm springs in the vicinity, and the town has a trade in silk and other local products. See *Résumé chronologique de l'Histoire des Princes d'Antioch* in *Revue de l'Orient Latin*, vol. v. (1896); Benni's *Tradition of the Syriac Church of Antioch* (1871); Ramsay's *Historical Geography of Asia Minor* (1890). (2.) Town in Asia Minor, 200 m. E. of Smyrna, visited by Paul and Barnabas, and called Antioch in Pisidia (Acts 13:14). They were driven out by the Jews, but afterwards returned (Acts 14:21).

**Antiochus**, the name borne by most of the kings of Syria belonging to the family of Seleucus, who founded the dynasty; hence called that of the Seleucidæ. Two of the name demand particular attention. (1.) ANTIOCHUS THE GREAT (reigned 223-187 B.C.), in the early part of his reign, carried on unsuccessful war, first with Egypt, then with Parthia and Bactria. In 198 he conquered Palestine and Cœle-Syria, and afterwards became involved in war with the Romans. Hannibal, after his defeat at Zama, took refuge at his court, and urged him to invade Italy; but he did not take the advice. In 192 he crossed into Greece, and the next year was defeated by the Romans at Thermopylæ, and forced to return into Asia. In 190 he was again defeated near Magnesia, in Asia Minor, and obtained peace in 188 on condition of ceding all his possessions east of Mt. Taurus and paying a heavy indemnity. In trying to extract money for this purpose from a rich temple in Elymais,

he was murdered by the people of the place in 187. (2.) ANTIOCHUS EPIPHANES, son of Antiochus the Great, King of Syria (175-164 B.C.). From 171-168 B.C. he waged war with success against Egypt. He is notorious for his oppression of the Jews and their religion. In 170, and again in 168, he took Jerusalem, and endeavoured to suppress the worship of Jehovah, probably introducing instead the worship of himself. But the Jews revolted, under Mattathias and his sons the Maccabees, and defeated Lysias, the general of Antiochus. He soon afterwards died in madness, which both Jews and Greeks attributed to his sacrilege, and he was nicknamed *Epimanes*, 'maniac,' instead of *Epiphanes*. For both the above, see the *Books of the Maccabees* in the Apocrypha, and Bevan's *House of Seleucus* (1902).

**Antioquia**, a dep. of Colombia, occupied by branches of the Central Cordillera and of the Cordillera of Citara. The soil is poor. Gold, platinum, iron, galena, cinabar, coal, and rock salt are found. The N. part is almost exclusively a mining region; Medellin is the centre of a mining and commercial district. Besides minerals, leather, coffee, india-rubber, and Panama hats are exported. Area, 11,500 sq. m. Pop. 160,000. Cap. Medellin. The town of Antioquia, on the l. bk. of the Cauca, 200 m. N.W. of Bogota, is the seat of a bishop, and has a fine cathedral and an active trade in sugar and maize. Pop. 9,000.

**Antiparallel.** If, in a triangle ABC, a line is drawn cutting AB in F, and AC in E, so that the angle AEF is equal to the angle ABC, FE is said to be *antiparallel* to BC with respect to the angle A.

**Antiparos.** See PAROS.

**Antipater** (d. 319 B.C.), a most distinguished general in the time of Alexander the Great and Philip of Macedon; appointed by the

latter, on his invasion of Asia, regent of Macedonia. In 331 B.C. he defeated the Spartans under Agis, and a coalition of the Greek states at Crannon (322), though he was at first (323) defeated by Leosthenes and besieged in Lamia. He used his victory with moderation, though his demand for the surrender of Demosthenes caused the latter's death, as he took poison to avoid capture.

**Antipatharia**, or BLACK CORALS, a group of Actinozoa, with horny skeleton. The individual polypes have tentacles in multiples of six.

**Antipathy.** See DISGUST.

**Antipatris** (Acts 23:31), a city on the edge of the Sharon plain, on the main road from Jerusalem to Cæsarea; named after Antipater, father of Herod the Great. Now the ruined mound at Râsel-Ain.

**Antiphanes** (408-334 B.C.), the most famous of the Middle Attic comedians; his plays number over 260. Extant fragments have been collected by Kock in *Comicorum Atticorum Fragmenta* (1884), and by Meineke (1839-57).

**Antiphilus** OF EGYPT, a painter of the 4th century B.C., was a pupil of Ctesidemus, and is ranked by ancient critics next to Apelles and Protogenes. He painted portraits of Philip and Alexander of Macedon, and Ptolemy, son of Lagos.

**Antiphon** (480-411 B.C.), Attic orator and teacher of rhetoric, who wrote speeches for others to deliver in the law courts. The fifteen speeches which have come down to us show a rhetorical style less developed than that of the later orators. He played an important part in the overthrow of the democracy, but after the fall of the Four Hundred (411 B.C.) was condemned to death. See ed. of the text by Blass (Ger., 1881); Jebb's *Attic Orators* (1876).

**Antiphony**, a piece of sacred music sung in alternate parts replying to each other. Antiphonal singing has been practised from the earliest times in the Hebrew Church, and many of the Psalms show that they were intended to be sung in this manner. In the Christian Church it has been in use since the 1st century. See ANTHEM and MOTET.

**Antipodes.** (1.) The name given to those inhabitants of the earth who are diametrically opposite to each other—*i.e.* feet to feet. (2.) A. ISLANDS, a group of uninhabited rocky islets, belonging to New Zealand, in the S. Pacific, about 475 m. S.E. of Stewart I.; the land most nearly opposite to Great Britain on the globe.

**Antipope.** See PAPACY.

**Antipyretics** are agents which lower temperature in fevers. They act far more readily on the abnormal than on the normal temperature, and they work either by increasing the constant normal loss of heat, or by lessening its production, or, indirectly, by removing the cause of abnormal production. Cold baths are most rapid and powerful antipyretics; but in using them it is essential to remember that the temperature is likely to continue dropping after the bath is stopped, that a subnormal temperature must be avoided, and that, therefore, the bath must cease before the normal temperature is reached. The hot bath is also antipyretic, so is the wet pack; and such drugs as antimony, ipecacuanha, and jaborandi are antipyretic by inducing perspiration. Alcohol is antipyretic by dilatation of the superficial blood-vessels, thus cooling the blood at the body surface; also by lessening heat production, presumably through diminishing oxidation within the body. Quinine, antipyrin, phenacetin, and other similar preparations, are widely used. An aperient draught will

**Antipyrin**

very often lower temperature indirectly, by removing a toxin or other irritant.

**Antipyrin**, or PHENAZONE,  $C_{11}H_{12}N_2O$ , a synthetical drug, is a white, crystalline, inodorous solid with a bitter taste. It is chiefly used in medicine as an antipyretic and analgesic, and is now largely used in place of quinine. It gives relief in neuralgia, headache, toothache, etc., and is said to decrease the excretion of sugar in diabetes. In sea sickness it has been administered with success. It should only be taken on the advice of a medical man.

**Antiquarian Society** OF U.S.A., founded in 1812, headquarters at Worcester, Mass., has published *Proceedings* since 1849.

**Antiquaries**, SOCIETY OF, London, was constituted in 1717, and received its charter in 1751. It had a predecessor in a society formed in 1572 by Camden, Archbishop Parker, Sir R. Cotton, and others, but suppressed in 1604. It has published *Archæologia* since 1779, and *Proceedings* since 1843. The letters F.S.A. indicate fellowship of this society.

**Antiquaries of Scotland**, SOCIETY OF, was instituted in 1780, and publishes yearly *Proceedings*. It has been, since 1851, in official charge of the Scottish National Museum of Antiquities—originally the society's own collection.

**Antique**, prov. (839 sq. m.) w. coast of Panay, Philippines; weaving and cattle-rearing; cap. San José de Buenavista. Pop. 10,000.

**Antiquities**. See ARCHÆOLOGY.

**Anti-rentism**, a movement amongst the leaseholders of certain counties in New York State during the years 1839-47 to resist the feudal dues appertaining to the Dutch manorial and patroonship rights still remaining, though virtually abolished in 1775. In 1839 the heirs of one of the largest

landowners in Albany Co. endeavoured to evict those tenants who had not paid the feudal rents. The tenants resisted, the movements spread, anti-rent associations were formed, and disturbances occurred. Repressive measures were adopted, and the resistance was put down. In 1846 feudal tenures of all kinds were abolished, and agricultural leases were limited to an extreme period of twelve years. See Cheyney's *Anti-Rent Agitation in New York* (1887).

**Antirrhinum**, or SNAPDRAGON, is a genus of the foxglove order. The common garden species is *A. majus*. When the plant is found wild in Britain, it may be regarded as a garden escape.

**Antis**, a historical people of Peru; gave their name to the Andes Mts. and to the Antisuyu or eastern division of the Inca empire. They are the Campas of the early Spanish writers, and are now represented by the Chunchos about the head-waters of the Ucayali. The Antis were fierce warriors and reputed cannibals.

**Antisana**, snow-covered volcanic cone of the Andes (19,335 ft.), in Ecuador, 35 m. S.E. of Quito; now dormant, though partially active during Alexander von Humboldt's visit in 1802. The village of Antisana stands on its slopes at a height of 13,000 feet.

**Anti-Semite Movement**. See JEWS.

**Antiseptics and Antiseptic Surgery**. The theory of antiseptic treatment is based upon the conviction that sepsis, or putrefaction, and other infectious disorders, are started by minute organisms, bacteria, and their products, which are not a part of the body, but which are introduced from without; and antiseptics are those substances or measures which prevent sepsis, either by preventing the approach of the bacteria, or by destroying



them or their power to do harm if they do approach. In surgery the term antiseptic is used to cover the prevention of all bacteria, not those of putrefaction only; and the same means are often used, first to disinfect, and afterwards to keep aseptic. Heat is antiseptic, and burns and scalds are aseptic for the time being. Cold is antiseptic, and thus meat, fruit, and other perishable foods are kept sweet in freezing-chambers. Sunlight is death to many bacteria, which flourish in moisture, warmth, and darkness. Absolute dryness of atmosphere is antiseptic; and so, in some places, meat may be preserved by exposure to the sun, and is often preserved by smoking.

Carbolic acid, corrosive sublimate, and various other preparations of mercury, many coal-tar derivatives, silver salts, boracic acid, and many aromatics, are used most generally in surgery. The less powerful the antiseptic the better, provided it does its work; for obviously the weaker the drug the less chance of either irritation to the tissues, which often results from carbolic acid, or of poisoning by absorption, which may follow the use of corrosive sublimate in large quantities. But as an antiseptic need not be so strong as a disinfectant, the disinfection is first carried out, and a weaker solution used afterwards for antiseptic purposes. The surgeon and his assistants sterilize their hands as far as possible with hot soap and water and various antiseptic solutions; all instruments are sterilized, mostly by boiling and afterwards keeping in trays of antiseptic solution; and all towels, sponges, etc., are sterilized by steam or otherwise. Some surgeons operate in boiled rubber gloves, or gloves of steamed cotton thread, with sterilized instruments and sponges, etc., using sterilized water con-

taining no antiseptic, and claim that the result is perfectly satisfactory. This is not antiseptic, but *aseptic* operating, and is most to be commended when the operator is working on uninfected tissues. The introduction of antiseptic methods in surgery is due to Lord Lister.

### Anti-Slavery Movement.

See SLAVERY.

**Antispasmodics**, drugs which relieve or prevent involuntary muscular spasm, and the pain which often accompanies it. Involuntary spasm may affect voluntary or involuntary muscles—cramp of the thigh or calf muscles being an example of the first, and asthma or colic of the second. Anæsthetics (*e.g.* chloroform), sedatives (*e.g.* bromides), narcotics (*e.g.* opium and its alkaloids, and stramonium and the nitrites), acting on unstriated muscle, are all antispasmodics. Warmth and friction also tend to relieve spasm; and tonics, such as arsenic and quinine, are indirectly useful where the spasm depends partly upon the general health, as in asthma, laryngismus stridulus, and infantile convulsions.

**Antispast**, a tetrasyllabic foot—thus, ∪ - - ∪.

**Antisthenes** (c. 445–370 B.C.), Athenian philosopher, pupil first of Gorgias, then of Socrates. He was the founder of the Cynic school of philosophy, and taught that virtue alone is the true end of life, pleasure—probably sensual pleasure—being merely an evil. The Stoics developed his ideas into their system. He wrote many works, of which only two rhetorical exercises, on Ajax and Odysseus, have come down to us. See Zeller's *Socrates and Socratic Schools* (1877).

**Antistrophe** (Gr.), in rhetoric the repetition of the same word at the conclusion of successive clauses—as, 'Wit is dangerous, eloquence is dangerous, every-

thing is dangerous that has efficiency and vigour for its characteristics.'

**Anti-Taurus.** See TAURUS.

**Antithesis**, a bringing together and setting in opposition to each other of distinct ideas—*e.g.* 'He dazzles more, but pleases less.'

**Antitoxin.** See SERUM THERAPY.

**Anti-trades**, winds in the upper air blowing in a direction contrary to that of the trade winds of lower levels. Above the N.E. trade winds the higher aerial currents, or anti-trades, are from the S.W. In the southern hemisphere they blow from N.W. The direction of the anti-trade winds has been shown by the dispersion of finely divided matter ejected from volcanoes, and carried to a great height.

**Antitrinitarianism.** See UNITARIANISM.

**Antitype.** See TYPE (in Theology).

**Antium**, Italy. See ANZIO.

**Antivari**, tn. and episc. see of Montenegro, 3 m. from the Adriatic Sea, 18 m. W. by N. of Scutari; was transferred to Montenegro by the treaty of Berlin in 1878. Pop. 2,200.

**Antivenene.** See SNAKE POISONING.

**Anti-Vivisection Society**, founded in London in 1876, for the purpose of opposing vivisection. See VIVISECTION.

**Antlers** are outgrowths of the frontal bones, which occur in deer under many forms, and may be functionally compared with horns, which have quite a different structure. During their period of growth antlers are covered with a vascular, hairy skin, known as 'velvet,' which is exceedingly sensitive and well supplied with blood. As the period of growth is completed the velvet dries up, is rubbed off, and leaves the bare and insensitive bone to constitute a powerful weapon of offence

and defence. The antler is not attached directly to the skull, but to a stalk or pedicle of varying length, the junction of antler and pedicle being marked by a bony ring, the 'burr.' Beneath the burr bone absorption takes place, with the result that, late in the season, the antler falls of its own weight, or is knocked off by the deer, to be renewed again in the following spring. Except in the reindeer, antlers are confined to the male sex, and are altogether absent only in the musk-deer (*Moschus*) and the Chinese water-deer (*Hydropotes*). Their degree of development varies enormously, from the minute points of the Chinese *Elaphodus* to the huge structures found in the extinct Irish deer or the living elk. A point of great interest is the parallelism between the yearly increase in complexity of the antlers of living deer, and the similar increase in a series of fossil forms of different ages.

**Antlia Pneumatica**, 'the Air-Pump,' a southern constellation, placed by Lacaille, in 1752, between Argo and Hydra. One of its stars, S Antliæ, is variable in a period of 7 hours 47 minutes.

**Ant-lion** (*Myrmeleon*), an insect belonging to the order Neuroptera, which as larva has a remarkable method of trapping other insects on which it feeds. In loose sand the larva excavates a conical pit, at the base of which it buries itself. An ant or fly, near the edge of this pit, dislodges some of the loose sand. This rouses the ant-lion, which throws sand at the struggling victim until it is brought within reach of its jaws. The juices are then sucked, and the carcass flung to a distance by movements of the head. The ant-lion, when full fed, pupates within its pit, the adult escaping as a winged, flylike animal. There is no British species, but several occur on the Continent.



*Typical Forms of Antlers.*

Nos. 1-9. Red deer (1, burr, enlarged). 10-14. *Cervus tetraceros* (fossil). 15. Wapiti deer.  
 16. Reindeer. 17. Fallow deer. 18. Moose. 19. Roebuck. 20. Irish deer (fossil.)

**Antofagasta.** (1.) Port, Chile, in prov. of same name. The narrow-gauge railway to Oruro in Bolivia, of which 275 m. are within Chilean territory, starts from here. Besides Bolivian goods, some nitrate, copper, borate of lime, silver, and salt are exported. The place was founded in 1870, and developed through the discovery of minerals, and especially of saltpetre. Pop. 33,000. (2.) Province, the largest of Chile. Area, 46,600 sq. m. Pop. 114,000.

**Antoine, ANDRÉ** (b. 1858), French actor, born at Limoges. In 1887 he founded the *Théâtre Libre*, Paris, an association for producing plays of unconventional type and literary quality. It was imitated in London, Berlin, and New York, and ceased to exist in 1894; but in 1897 Antoine started the *Théâtre Antoine* in Paris. In 1906 he was appointed director of the Odéon Theatre in Paris.

**Antokolsky, MARC** (1842-1902), Russian sculptor, born of poor Jewish parents at Vilna; went to St. Petersburg, where he worked at engraving and studied sculpture. Success first came when Alexander III. bought his statue of Ivan the Terrible (1871), now in the Hermitage, St. Petersburg. After some years in Italy, Antokolsky went to Paris (1880). His chief works are: *Christ before the People* (1874), *Sister of Mercy tending Wounded Soldiers*, *Mephistopheles* (1881), *Spinoza* (1882), *Death of Socrates* (1876), and busts of Turgeniev, Tolstoy, Alexander II., Alexander III., Nicholas II., Peter the Great, etc.

**Antomarchi, FRANCESCO** (1780-1838), Italian surgeon, born in Corsica, and physician to Napoleon I. at St. Helena. After the death of the ex-emperor he published a cast of his head, the genuineness of which gave rise to much discussion. He wrote *Les Derniers Moments de Napoléon*

(1823). On the outbreak of the Polish revolution he proceeded to Warsaw, and devoted himself to the care of the wounded. He died in Cuba. See Lord Rosebery's *Napoleon* (1900).

**Anton, ROBERT** (c. 1616), a Cambridge graduate, author of *Philosophers' Satyrs* (1616). The work is specially interesting on account of its references to contemporary writers.

**Antonelli, GIACOMO** (1806-76), cardinal and statesman, born at Sonnino, near Terracina. He held various offices under Pope Gregory XVI., and Pius IX. created him a cardinal (1847), and appointed (1848) him premier in the Liberal cabinet which framed the *Statuto*, or 'Constitution.' The ministry was short-lived, and the Pope, accompanied by Antonelli, fled (1848) to Gaeta. On their return to Rome (1850) he again became premier, which along with other offices of state he held till his death.

**Antonello da Messina** (1444-93), Venetian painter, born in Sicily, who persuaded Van Eyck to reveal the secret of his rich and enduring colouring. He settled in Venice, and became very popular as a portrait painter after the Flemish master's method. Of his authentic pictures, the National Gallery, London, possesses a portrait, his earliest known picture, *Salvator Mundi* (1465), and a *Crucifixion* (1477). There are fine portraits in the Louvre, also in Berlin, Venice, and Rome.

**Antonienhütte**, tn., Silesia prov., Prussia, 7 m. E.S.E. of Gleiwitz; has zinc and coal mining. Pop. 8,500.

**Antonina**, port, Paraná, Brazil, on bay of, and 15 m. N.W. of Paranagua. Pop. 10,000.

**Antonine Itinerary**, a work, in two parts, giving a survey of the principal land and sea routes in the Roman empire, with the names of the stations and the

distances between them. It was published in the reign of the Emperor Antoninus Caracalla, but was based upon a survey made between the dictatorship of Julius Cæsar (44 B.C.) and the reign of the Emperor Augustus.

**Antonine's Wall**, the more northern of the two Roman walls in Great Britain; stretches from the Firth of Forth westward to the Clyde, a distance of about 40 m. It is a long *vallum* built of sods, upon a stone foundation. Its estimated height was 20 ft., on a base 24 ft. thick. Along its northern front ran a V-shaped fosse, about 20 ft. deep by 40 ft. in width, with a counterscarp on the farther side; and there were some twelve supporting forts or camps at irregular intervals. It has been calculated that the wall required a garrison of 50,000 men. Inscribed tablets prove that it was the work of the 2nd, 6th, and 20th Legions and their auxiliaries under the Emperor Antoninus Pius. In or near the forts have been found gold, silver, and bronze coins of Antoninus, Vespasian, Trajan, Hadrian, Nero, Titus, Domitian, Faustina, Commodus, and Constantine. The *vallum* is still traceable. The popular name is Graham's or Grime's Dyke. See *The Antonine Wall* (1899), published by the Glasgow Archæological Society; also their *Transactions* (1902). For recent investigations see *Proc. Antiquarian Society of Scotland*.

**Antoninus Pius** (86-161 A.D.), Roman emperor, born near Lanuvium, was adopted by Hadrian in 138 A.D., and succeeded him in 139, reigning until 161—his period of rule, along with those of his immediate predecessors, Trajan and Hadrian, and that of his successor, M. Aurelius, forming the Golden Age of the Roman empire. His reign was remarkable for its absence of history—in those times a

record of war, tumult, and crime. An able and virtuous prince, he remained faithful to his profligate wife, Faustina.

**Antonio**, PRIOR OF CRATO (1531-95), pretender to the Portuguese throne, was the son of Dom Luis, second son of John II., and of a Jewess, Yolanda da Gomez; was appointed prior of Crato, and, later, constable of the kingdom. In 1578 he was made prisoner by the Moors at the battle of Alcazar Kebir, but was soon liberated. In 1580, on the death of King Henry, he was proclaimed king of Portugal, but was defeated by Spaniards under the Duke of Alba at Alcantara (Aug. 24, 1580), and compelled to fly to France. In 1582 he made an unsuccessful attack on the Azores, with the aid of Catherine de' Medici; and in 1589 another unsuccessful attack on Lisbon, with the aid of an English fleet under Drake. His second son, Christopher, wrote his life (1629).

**Antonius**, the name of several distinguished Romans. (1.) MARCUS ANTONIUS (143-87 B.C.), called *Orator*, consul in 99 B.C., was one of the aristocrats who supported Sulla, and, when Marius and Cinna seized Rome in 87, was executed by them. He is introduced as one of the characters in Cicero's *De Oratore*. (2.) GAIUS ANTONIUS, son of the above, was expelled from the Senate in 70 B.C., but was Cicero's colleague as prætor in 65, and as consul in 63. He was a partisan of Catiline, but Cicero secured his loyalty to the state by yielding to him the province of Macedonia; and his army defeated Catiline, though, because of his friendship for the latter, he relinquished the command to one of his lieutenants. He plundered his province, and in 59 was condemned for extortion, though Cicero defended him. He retired to Cephalonia, but was recalled by Cæsar to Rome in 44

B.C. (3.) MARCUS ANTONIUS, the famous Mark Antony of the Second Triumvirate, son of Marcus Antonius Creticus and Julia, sister of L. Julius Cæsar. Antony was born about 83 B.C., and was brought up in the house of Lentulus, a fellow-conspirator with Catiline. He joined Cæsar in Gaul (54), and by his influence was elected quæstor (52). Cæsar's most ardent, but often treacherous, supporter, he was with him until the battle of Pharsalia (48), when he commanded the left wing. He became consul with Cæsar (44). When Cæsar was murdered on the Ides (15th) of March, Antony, by his famous speech over Cæsar's body, inflamed the people against the assassins. He had previously received from Calpurnia, Cæsar's widow, all Cæsar's private papers and treasure, and had seized the public treasury. On March 17 his position was strengthened by a resolution of the Senate to ratify all Cæsar's arrangements—the *Acta Cæsaris*. But before long a new rival crossed his path. This was Octavian (afterwards Emperor Augustus), the great-nephew and adopted son of Cæsar, who joined the senatorial party, led by Cicero, against Antony. It was at this time that Cicero composed the famous Philippic orations against Antony, which emboldened the Senate and people to declare him a public enemy. In April 44 Antony was severely defeated at Mutina (where he was besieging D. Brutus) by the consuls Hirtius and Pansa, who both fell in the battle. Antony retreated over the Alps, and there joined Lepidus, who effected a reconciliation between Antony and Octavian; and the three formed the Second Triumvirate for five years. The first result of their union was a proscription, involving the murder of Cicero and others. In 42, the triumvirs, thanks mainly to

Antony, defeated Brutus and Cassius at Philippi. Then passing into Asia to collect supplies, Antony met Cleopatra in Cilicia, and followed her to Egypt. Meanwhile his wife Fulvia and his brother Lucius had made war on Octavius in Italy. But as Fulvia died, he married Octavius's sister Octavia (40), and received as his share of the Roman world the provinces east of the Adriatic. In 37 the triumvirate was renewed for five years. In 36 he invaded Parthia, with little success; but in 34 he overran Armenia, bringing away its king captive to Alexandria. Antony now entirely gave up the character of a Roman citizen, and appeared as an Eastern despot by the side of Cleopatra. The disgust caused in Italy by this aroused Octavian to overthrow him. The war was decided by the sea-fight of Actium (Sept. 2, 31 B.C.). Antony fled after Cleopatra to Alexandria, where, on receiving a false report of Cleopatra's death, he killed himself. Perhaps few Romans were of greater individual power and energy than Antony, but his love of pleasure and unbridled ambition made him impossible as ruler of the Roman world. Few of the ancients are better known to us, thanks to Shakespeare's studies of his character in *Julius Cæsar* and *Antony and Cleopatra*. There is also a life of him by Plutarch. Cicero's *Letters* and *Philippics* give contemporary but biassed evidence as to his career. A very interesting and somewhat novel view of his character is given by Guglielmo Ferrero (*Greatness and Decline of Rome*), vol. iv. appendix (trans.) 1908, which no student of this important period of Roman history can afford to neglect. (4.) GAIUS ANTONIUS, brother of the triumvir, prætor in Macedonia in 44; being captured by Brutus in 43, was put to death in revenge for Cicero's murder.

**Antonomasia** (Gr.), the use of an epithet, patronymic, or appellative instead of a proper name, as when we say 'the son of Peleus' for Achilles, or the 'swan of Avon' for Shakespeare.

**Antony, MARK.** See ANTONIUS, MARCUS.

**Antony, ST., OF PADUA** (1195-1231), born at Lisbon; became a Franciscan in 1220, and was soon renowned for his Biblical and patristic lore. As a revival preacher he attained great success, and on his death was canonized. He is usually represented as the patron saint of the lower animals, probably because of the legend that he preached to the fishes. In the Roman calendar his feast is June 13. Representations of him by Murillo are in the cathedral and museum of Seville. His monument stands in St. Antony's church, Padua. See the biographies of Seeböck (1878), Salvagnini (1887), Scrinzi (1888), Hilaire (1890), and Lepitre (1901).

**Antony OF THEBES, ST.,** or 'Antony the Great' (?251-356), was born in Upper Egypt. He gave his large fortune to the poor, and lived as a hermit in the wilderness near the Nile for twenty years. The fame of his sanctity spread abroad, and his anchorites induced him to found a monastery near Memphis—his immediate following at his death numbering 15,000. The effect of his preaching and of his holy example was sufficient to cause monasticism to be adopted in every country of Christendom. He died about 356 A.D. His life was written by Athanasius. The temptations of St. Antony, and other incidents of his life, many of them legendary, have afforded numerous subjects for sacred art. See Verger's *Vie de Saint Antoine le Grand* (1890).—**ST. ANTONY'S FIRE**, a pestilential disease of the middle ages. See PLAGUE.

**Antraigues, EMANUEL LOUIS HENRI DE LAUNAY, COUNT D'** (1755-1812), French politician, author of *Mémoires sur les Etats-Généraux* (1788), which, by its advocacy of liberty, helped to bring on the revolution (1789). Chosen deputy in 1789, he joined the royalist party, and in 1790 was sent to St. Petersburg and Vienna in the Bourbon interest. He settled in England, and in 1812 was murdered near London. See *Life* by Pingaud (1893).

**Antrim. (1.)** Maritime co., N.E. of Ireland, including Rathlin I., and having Loughs Neagh and Beg in the s. and s.w. Area, 1,096 sq. m. Pop., excluding the co. bor. of Belfast, 200,000. Mountainous in the E. and N., where it fronts the Atlantic in a series of noble basaltic cliffs (see GIANT'S CAUSEWAY), the surface sinks gradually to the extensive bog tracts of the interior. Flax (21 per cent. of the total for Ireland), cereals, and oats are grown, 31 per cent. of the surface being under cultivation; and cattle, sheep, and pigs are reared. There are extensive deposits of iron ore and salt, and limestone is largely worked. Chief seat of the Irish linen manufacture. Cottage industries (hand embroidery) are common, and there are several large distilleries; while the fisheries of the coast are important. It was colonized from England and Scotland at the Settlement of Ulster, in the reign of James I. **(2.)** Market tn., cap. of above co., 14 m. N.W. of Belfast, with linen weaving and bleaching, paper manufacture, etc. Antrim Castle, a round tower, and Shane O'Neill's Castle are in the vicinity. Antrim was founded in 495. Pop. 1,800.

**Antrim, GLENS or GLYNNS OF,** narrow valleys which open out upon the sea through the high coast-line of Antrim. The most charming are Glenarm, Glenariff, Cushendall, and Cushendun.

**Antrim**

**Antrim**, RANDAL MACDONNELL, 1ST MARQUIS OF, and 2ND EARL OF DUNLUCE (1609-83), a Catholic nobleman, one of the Kilkenny Council; created a marquis by Charles I. in 1643, in anticipation of his raising a royal army for service in England. He promised 10,000 men, but failed to raise them. In 1644 he sent 1,600 men to Scotland to assist Montrose.

**Antrum of Highmore.** See NOSE.

**Ants**, STINGS FROM. See STINGS.

**Antseranana**, or ANTSIRANE, ct. tn., near N. point of Madagascar, on Diego-Suarez Bay. It is the chief French naval station in the Indian Ocean, and a military centre. Pop. 5,000.

**Ant-thrush**, a popular name applied to certain tropical and sub-tropical birds which feed chiefly on ants.

**Antung**, tn. and open port, Manchuria, on the Yalu R., a few miles from its mouth. The foreign trade is valued at £300,000, and the trade with China at £700,000, per annum. There is railway communication with Mukden. Near here was fought the battle of the Yalu (May 1904). Pop. 20,000.

**Antwerp.** (1.) The most N. prov. of Belgium. Area, 1,093 sq. m.; pop. 900,000. The surface is mostly level and fertile, and produces grain, potatoes, flax, etc. The Scheldt and its tribs., the Rufel and the Nethe, are the principal rivers. (2.) (Fr. *Anvers*), a fortified city, seapt., and cap. of prov. Antwerp, Belgium, on the r. bk. of the Lower Scheldt, 27 m. by rail N. of Brussels. The docks and quays stretch along the river front, and are principally at the N. end of the city. These were completed in 1903 and 1907, and new docks, begun in 1908, are still in course of construction. A big loop in the river, just above the

city, is to be cut off by the construction of a new canal 5 m. long, and a new river bed and 9 new docks (each 3,936 ft. long and 656 ft. wide) are to be made of it, besides 5 dry docks. When all these works are constructed, Antwerp will possess a quayage length of 154,207 ft., instead of the 42,653 ft. possessed in 1905, making it one of the largest ports in the world. The river bed has been dredged so as to give a width of 1,150 ft. and a minimum depth of 26½ ft. right up to the quays. In 1909, 6,470 vessels, with a tonnage of 11,940,332, visited the port, and, in addition, some 5,000,000 tons reached the city from the interior by river and canal. (See BELGIUM.) Antwerp is also engaged in diamond-cutting, wool-washing, sulphur-refining, the manufacture of candles, waxcloth, thread, etc., brewing, distilling, and shipbuilding. The old fortifications have been converted into boulevards, and the city has a fine park and zoological garden. The Gothic cathedral contains magnificent pictures by Rubens, and has a noble spire, hung with a remarkably fine peal of bells. In the Place Vert is the well-known statue of Rubens. The museum contains a unique collection of the master's pictures, and works by Quentin Matsys, Jan van Eyck, Roger van der Weyden, Steen, Rembrandt, Hals, etc. Other notable institutions are an ancient printing-house, the Musée Plantin-Moretus, the town hall, various churches, the Bourse, Rubens's house, etc. The town is the main military bulwark of Belgium, being defended by an unbroken line of fortifications strengthened by deep moats and supported by an extended line of isolated forts. There are also devices for inundating a large portion of the adjacent country in case of necessity. Rubens, Jordaens, Teniers, Van Dyck,



**Anu**

Matsys, and other painters, lived at Antwerp. Its commercial prosperity dates from the 11th century. After the middle of the 16th century it was the largest seaport and the richest city in the N. and N.W. of Europe, and was the money market of European princes. Then followed the ruinous effects of the Spanish Inquisition and soldatesca, the siege by Alexander Farnese in 1585, and the closing of the Scheldt in 1648. A trade revival took place when Napoleon I. recognized the advantages of Antwerp as a naval base; and its union with Holland in 1815 gave an additional impetus. The present prosperity of the city dates from 1863, when Antwerp bought back from the Netherlands the right to levy the Scheldt tolls, and declared the navigation of the river free to all nations. The annual trade is valued at over 100 millions sterling, of which approximately two-thirds are imports. Pop. 315,000. See Rowland's *'Le Port d'Anvers,'* in *L'Economiste Français*, vol. ii. (1899); and Robinson's *Antwerp, an Historical Sketch* (1904).

**Anu**, a Babylonian deity, supreme god of heaven.

**Anubis**, an Egyptian deity, usually represented in the form of a man with a dog's head. He was the god of embalming, and the assistant of Osiris in weighing the hearts of the dead. The Greeks identified him with Hermes, and he was worshipped in Rome as Mercury.

**Anupshahr**, tn., 58 m. S.E. of Meerut, United Provinces, India, on the Ganges; much frequented by pilgrims. Pop. 8,600.

**Anura**, an order of tailless amphibia to which the frogs and toads belong, including the most highly specialized members of the class.

**Anuradhapura**, ruined city and ancient capital (437 B.C.-750

A.D.) of Ceylon, 64 m. S.W. of Trincomalee. It has a bo tree (*Ficus religiosa*) venerated as a shoot of the tree under which Gautama became Buddha. Pop. of dist. over 79,000, of tn. 3,000.

**Anuria**. See URINARY DISORDERS.

**Anus**. See RECTUM.

**Anville**, JEAN BAPTISTE BOURGUIGNON D' (1697-1782), French geographer, born at Paris. His memoirs and maps on ancient geography are still indispensable. His chief works were *Atlas Général* (1737-80), *Traité des Etats formés en Europe après la Chute de l'Empire d'Occident* (1771), and *Géographie Ancienne* (1782).

**Anwari**, AUHAD UDDIN (d. between 1191 and 1196), Persian poet and astrologer. His verses exhibit consummate skill and great satirical powers.

**Anzengruber**, LUDWIG (1839-89), Austrian dramatic writer and novelist, spent most of his life in narrow circumstances, but won lasting fame by his tragedies of domestic (peasant) life—*Der Pfarrer von Hirschfeld* (1870), *Der Meineidbauer* (1871), *Das Vierte Gebot* (1878), *Mahl und Stein* (1889), and *Der Fleck auf der Ehr'* (1889). He also gained success in comedy, of which *Die Kreuzelschreiber* (1872) is typical. But in the novel, again, he reaches a high level in his characterization and description of the life of the common people—e.g. in *Der Schandfleck* (1876; rewritten 1884) and *Der Sternsteinhof* (1885). His *Gesammelten Werke* were published in 10 vols. in 1890 (3rd. ed. 1897). See good *Biography* by A. Bettelheim (2nd. ed. 1897).

**Anzin**, the most important coal-mining centre of France, dep. Nord, 1 m. from Valenciennes. Annual production of coal about 4,000,000 tons. It has also metallurgical industries, and manufactures steam-engines, machinery, chain cables, etc. Pop. 14,500.

**Anzio, Porto d'** (anc. *Antium*), small seapt., 33 m. s.e. of Rome, Italy. In ancient times it was a stronghold of the Volscians. Caligula and Nero were born here. It was a favourite Roman watering-place, and art treasures (*e.g.* the Apollo Belvedere) have been discovered there. Pop. 3,500.

**Aoki, SHUZO** (1844), Japanese statesman; was ambassador (1874 and 1892) in Berlin. Foreign Secretary of State in Japan three times—in 1885, 1889, and 1898. In 1897 he conducted the negotiations for the revision of the treaties of Japan with the different European powers, and (1898-1900) was Minister of Foreign Affairs, and 1906-7 was Japanese ambassador to U.S.A.

**Aomori.** See AWOMORI.

**Aonla**, tn., 20 m. s.w. of Bareilly, United Provinces, India; contains the tomb of Ali Mohammed, a Rohilla leader (d. 1751). Pop. 14,000.

**Aorist** (Gr. 'indefinite'), a tense of the Greek verb expressing indefinite past time, and corresponding to the English simple past tense, 'did,' 'went,' 'came.' There are two aorists in the Greek verb, known as 'first' and 'second' aorists, but there is no distinction between them in use.

**Aorta.** See HEART. The chief diseases of the aorta are atheroma, fatty degeneration, calcification, and aneurism.

**Aosta** (anc. *Augusta Prætoria*), tn. and episc. see of Italy, prov. Turin, 50 m. n.w. of Turin. Its strategic position at the junction of the passes over the Great and Little St. Bernard induced Augustus to found there (25 B.C.) a military colony. The walls are in great part those constructed by the Romans. Other ruins are the triumphal arch of Augustus, the double prætorian gate, and the remains of a theatre, amphitheatre, and bridge. Modern buildings include the 14th century cathedral,

the 12th century church of Sant' Orso, and the prior's house (1490). Birthplace of Anselm. Pop. 8,000.

The VAL D'AOSTA is one of the most charming valleys of the Piedmontese Alpine country. See Eyssenhardt's *Aosti* (1896) and Ferrero's *Valley of Aosta* (1910).

**Apaches**, N. American aborigines, the southernmost branch of the Athapaskan family, who formerly ranged over the southwestern parts of the United States, and the northern provinces of Mexico, between 30° and 35° N. They were fierce, predatory tribes, but have now been mostly exterminated or swept into reservations (*e.g.* Oklahoma), where, with their Navajo kinsmen, they number about 24,000. The name is now applied to the lawless and criminal marauders of modern Paris.

**Apaffi.** (1.) MICHAEL I., prince of Transylvania (1632-90), who remained faithful to the Porte until the unsuccessful siege of Vienna (1683). Then he entered into a treaty with the Emperor Leopold I. of Hungary (1687), who guaranteed his independence. (2.) MICHAEL II. (1677-1713), son of above, maintained his claim to the throne of Transylvania against Count Tekeli, mainly by aid of the emperor. On his death Transylvania was incorporated in the empire.

**Apamea**, on the Orontes, anc. tn. of Syria, s.e. of Antioch. Formerly called Pharnake, it was enlarged and fortified by Seleucus Nicator. It was completely destroyed in the 7th century by Chosroes II. of Persia. Numerous ruins exist near the little fort of Kalaat-el-Medik.

**Aparri**, port at mouth of the Rio Grande, Cagayan Prov., N. of Luzon, Philippine Is. Pop. 18,000.

**Apatin**, tn. on the l. bk. of the Danube, 10 m. s.w. of Zombor, Hungary; produces hemp, madder, and silk. Pop. 14,000.

**Apatite**, the principal natural phosphate of the crystalline rocks. As phosphoric acid is an essential constituent of the food of both plants and animals, vegetable and animal life are dependent on the existence of apatite in the earth's crust. The phosphates in sedimentary rocks and in soils are derived from the apatite set free by the disintegration of the older crystalline rock masses. Apatite is a phosphate of calcium with fluoride or chloride of calcium, or more usually a mixture of these last two ( $\text{FCa}_5\text{P}_3\text{O}_{12}$ ). It has various forms, but always crystallizes in hexagonal prisms, with a hardness of 5, and a not very perfect cleavage. It is soluble in dilute nitric acid, and with ammonium molybdate the solution gives a yellow precipitate (test for phosphates). From several places in Switzerland come transparent and colourless, or white and cloudy, crystals. These are found in fissures in gneiss and crystalline schists. It is more frequently of a sea-green or bluish-green colour; fine crystals of this variety come from Norway and many parts of N. America. Asparagus stone, osteolite, and moroxite are names given to other forms. Apatite is mined at Kragerö in Norway; and in S. Burgess (Canada) there is a vein, 3 ft. thick, of pure sea-green apatite, from which large quantities have been extracted. The microscope shows that apatite is always present in such rocks as granite, gneiss, and diabase, as very small transparent crystals, usually long and pointed, and never visible to the naked eye. The lime phosphate known in commerce as apatite contains many impurities.

**Ape**, a term sometimes used to designate the anthropoid apes only, and sometimes quite indefinitely for the monkeys, baboons, and their allies of the order Primates.

**Apeldoorn**, tn., Gelderland, Netherlands, 11 m. by rail s.w. of Deventer; manufactures paper. Near it is Castle Loo, the summer residence of the royal family. Pop. of comm. 35,000.

**Apelles**, the most celebrated painter of ancient Greece, contemporary of Alexander the Great, his patron. Born in Colophon, he went to Macedonia during the reign of Philip; there Alexander gave him the exclusive right to paint his portrait. Two of his greatest pictures were, *Alexander wielding a Thunderbolt*, in the temple of Artemis in Ephesus; and *Aphrodite Anadyomene* (i.e. rising out of the sea), in the temple of Æsculapius in Cos. Other celebrated pictures are, *Alexander entering the Triumphal Car*, *Hercules*, and *Artemis*. His peculiar excellence was grace—i.e. perfection of proportion and harmony in the treatment of his subjects in grouping, drawing, and colouring. See Wustmann's *Apelles Leben und Werke* (1870).

**Apelt**, ERNST FRIEDRICH (1812–59), professor of philosophy (1840–59), Jena, author of philosophical works: *Epochen der Geschichte der Menschheit* (1845; 2nd ed. 1852); *Theorie der Induktion* (1854); *Religions Philosophie* (1860).

**Apennines** (anc. *Mons Apenninus*), one of the principal mountain ranges in Europe, running the entire length (some 750 m.) of the Italian peninsula, and continued through Sicily. At their n.w. extremity they touch the Maritime Alps, the dividing line being drawn at the Pass of Altare, at the head of the Bormida valley. The range bears different names (e.g. Ligurian, Etruscan, Roman, Neapolitan, Calabrian, and Apuan). The Calabrian Apennines and the Apuan Alps are of granite, gneiss, and crystalline slate; the rest of the system is composed mainly of sandstones and limestones of Cretaceous and

Tertiary age, the older rocks being conspicuously absent. Bosses of intrusive gabbro, trachyte, basalt, diorite, etc., are found. In the Central Apennines the most characteristic feature is the abrupt emergence, above the broad base of the Tertiary strata, of huge ellipsoidal high limestone plains of older formation. On the E. side of the Sibylline Mts., reaching 8,010 ft. in Mt. Vittore, there has been a gigantic subsidence, exposing the mountain wall for a vertical height of 6,500 ft. In the Abruzzi, two parallel chains separated by the valley of the Aterno, the loftiest and most rugged stretch of the system occurs: the E. has the huge knot of the Gran Sasso d'Italia, culminating in the snow-capped Monte Corno (9,580 ft.); farther to the S.E. rises Monte Amaro (9,170 ft.). The Calabrian Apennines terminate in the volcanic upheaval of Aspromonte (Monte Montalto, 6,425 ft.), overhanging the Gulf of Messina. The N. Apennines subside into the valley of the Po; the Central make a steep plunge towards the Adriatic; on the W. or Tyrrhenian side the slope is more gradual, and the Apennines enclose several longitudinal valleys—e.g. the Chiana, the Pistoja-Florence plain—parting the different lateral chains from the main range. The Apennines are, as a rule, bare and picturesquely rugged in their higher altitudes, but their lower slopes are clothed with forests. The system is poor in minerals, but is especially rich in marble. The Romans made roads over the Pietra Mala Pass (2,960 ft.), between Florence and Bologna; the Furlo Pass (flanked by rocky walls of over 1,500 ft.), debouching upon the Adriatic coast at Fano; the Via Salaria, between the Sibylline Mountains and the Gran Sasso; and the Caudine Forks, between Naples and Benevento. The Bocchetta

Pass (2,560 ft.) connects Genoa with the upper valley of the Po. Railways now unite the two coast belts. See Stokes's *Six Months in the Apennines* (1892); Partsch's '*Die Hauptketten des Centralen Apennins.*' in *Verhandl. d. Gesch. f. Erdkunde zu Berlin* (1889); Marinelli, in *Atti*, of the First Ital. Geog. Congress, vol. ii.; *Globus* (1899); *L'Appennino Bolognese* (1881); and *L'Appennino Modenese* (1895).

**Apenrade**, port and seaside resort on the Baltic, in the Prussian prov. of Schleswig-Holstein, 30 m. N. of Flensburg by rail. Trade in coal, grain, fodder, and timber. Pop. 7,000.

**Aperients**, or LAXATIVES, are the mildest class of purgatives, intended to assist the natural action of the bowels. They act by moderately increasing peristalsis, or in some cases—e.g. belladonna—apparently by allaying a spasm. As examples of 'natural aperients,' one may instance hot or cold water taken on an empty stomach, ripe fruits generally, coffee in some cases, whole-meal bread, oatmeal biscuits, and porridge. Instances of aperient drugs are castor oil, senna, olive oil, sulphur, cascara sagrada, and glycerin, all in comparatively small doses; most of these in large doses become so purgative in their action as to be classed among cathartics. Some writers classify aperients as (1) laxatives, (2) purgatives—the latter being subdivided as (a) cathartic, and (b) drastic. See CONSTIPATION; also MINERAL WATERS.

**Apex Beat.** See HEART.

**Aphasia** (Gr. 'absence of speech'), total or partial loss of the power of speech, either in its spoken or its written form. The term always covers loss of the power of expression by spoken words, accompanying some morbid condition of the brain: but some extend the meaning, and

include the misunderstanding of what is said (word-deafness), and inability to read words (word-blindness). Again, the inability to make the movements necessary to express oneself, whether by gesture, writing, or speech, is distinguished as *motor* aphasia, from inability to understand familiar gestures and written or spoken words, which is *sensory* aphasia. Aphasia, in any of these cases, is the term used only when consciousness is unaffected, and the intellect otherwise normal. The causes are lesions affecting the nerve-centres concerned, such as hæmorrhage, emboli, thrombi, and adjacent tumours. With the first two causes aphasia may follow almost instantaneously; with the other it is of slower growth. Temporary aphasia may be caused by fright, excitement, any severe illness, or, indeed, any cause disturbing normal cerebral circulation. Treatment consists in first dealing with the cause of the disorder, and then in educating the brain—the education being the same as that of a child. See also AMNESIA and APHEMIA.

**Aphelion** (Gr. 'away from the sun'). The planets revolve round the sun in elliptical orbits; and the sun is situated, not at the centre of these orbits, but at one of the two points known as the foci. The greater axis of each ellipse is the line passing through the centre and the foci. At one extremity of this axis the planet is at its greatest distance from the sun, and at the other extremity at its least distance. The former is known as the aphelion, the latter as the perihelion. The earth is in aphelion early in July, in perihelion in the beginning of January. In the former position we are distant about  $94\frac{1}{2}$  millions of miles from the sun, in the latter about  $91\frac{1}{2}$  millions.

**Aphemia** (Gr. 'absence of speech') is a term strictly re-

served for speechlessness, or difficulty in speech, arising from disease affecting the lines of communication between the speech-centre and the tongue, but not implicating the centre itself, and so differing from aphasia and amnesia. It applies only to spoken words.

**Aphidides**, a group of minute Hymenoptera, including forms which are parasitic upon aphides. The adult insects lay eggs within the body of the aphides, and these eggs develop into minute larvæ, which grow at the expense of the host. The host in consequence becomes distended, and may be distinguished among its healthy fellows by its tense, glistening body. When the larvæ are full fed, they pupate within the body of the host, and the latter dies. Common forms belong to the genera *Aphidius* and *Trioxyis*. The aphidides belong to the family Braconidæ, which includes many parasitic forms useful in keeping down agricultural pests.

**Aphis**. Aphidæ are insects known to gardeners as plant-lice or green-fly, and to entomologists as a family of bugs (Hemiptera-Homoptera). All feed upon plant juices, and their destructive power is intensified by the enormous rapidity with which they reproduce, and the elaboration of the arrangements by means of which they migrate from one host to another, or from one region of the same host to another.

The life history is always complicated. In its simplest form it may be given as follows:—In spring, wingless female aphides hatch from winter eggs, and bring forth living young, which develop without previous fertilization (parthenogenetically), and become themselves capable of parthenogenetic reproduction after about ten days. The result is to form a rapidly-increasing colony, whose members attach themselves

to the succulent parts of plants, and being well fed are capable of continuing their prolific multiplication until the growth of the plant is checked by the approach of autumn, or by the attacks of the aphides. Any check to nutrition, however produced, leads to the production of winged forms, capable of migrating to a new host, but much less prolific than the imperfect wingless forms. In autumn there invariably appear truly sexual forms, male and female, from whose union fertilized eggs arise, which are capable of withstanding the winter cold. It would seem, however, that these sexual individuals are not necessarily identical with the winged forms, for perfect females seem to be always without wings, and perfect males often so.

A remarkable physiological peculiarity of the aphides is their habit of excreting from the food canal surplus food material in the form of a sugary secretion ('honey-dew'). The insects attach themselves to their plant host by means of their beaks, and absorb food to such an extent that much of it passes through the body in only a slightly altered condition, and is highly prized by other insects as food. The fact that ants are very fond of this secretion, and actually domesticate the aphides in order to obtain it, has long been known. Under ordinary circumstances the honey-dew is washed from the leaves by rain, but during seasons of drought it forms a sticky varnish over the affected plants.

In colour aphides closely resemble their surroundings. They are greatly relished as food, not only by birds and other insect-eating vertebrates, but also to a much greater extent by other insects, notably the 'ladybirds' (*Coccinellidæ*). The cottony threads of 'American blight' (*Schizoneura lanigera*), the false cones or galls

produced by *Chermes* on the spruce fir, are instances of protective coverings formed by aphides. A specially destructive form is *Phylloxera vastatrix*, an introduced aphid, which has wrought great damage in vineyards in Europe.

All aphides are soft-skinned insects of small size, possessing a three-jointed suctorial beak, long antennæ, two-jointed feet, and usually remarkable tubes or siphons on the fifth abdominal segment. These were formerly believed to secrete the honey-dew, but this is now known to be an error. See Sharp's 'Insects,' Part II., in the *Cambridge Natural History* (1899); Buckton's *Monograph on Aphides* (Ray Society, 1879-83); Ormerod's *Injurious Insects* (2nd ed. 1890).

**Aphonia** (Gr. 'voicelessness'), loss of voice, sometimes due to disease of the larynx or vocal cords, sometimes to nervous disorders. See VOICE.

**Aphorism**, a concise statement of some truth, generally more or less abstract, such as, 'Wisdom is knowledge in action.' The adjective 'aphoristic' is applied to the style of writers who convey their meaning in a series of abstract and isolated sentences, omitting the usual logical connectives. The chief examples of this in English are contained in the works of Bacon and Emerson.

**Aphrodite**, called VENUS by the Romans, the goddess of love and beauty. As her name (*Ἄφροδίτη*) indicates, she sprang from the sea-foam, though in the *Iliad* Zeus and Dione are said to be her parents. Commonly represented as the faithless wife of Hephæstus (Vulcan), her lovers were many, including, amongst the gods, Hermes (Mercury), Ares (Mars), Dionysus (Bacchus), and Poseidon (Neptune); and amongst mortals, Anchises and Adonis. But like Ares she is not at home in the Homeric Olympus, and is

not treated as an equal by the other older Olympians (J. E. Harrison's *Prolegomena of Greek Religion*, 1908). She generally bears one of the three epithets, Urania, Pontia or Thalassia, and Pandemos. By the famous judgment of Paris, described in Tennyson's *Enone*, she was declared the most beautiful of the goddesses. Her girdle had the miraculous power of granting invincible charms to others. In works of art she is constantly represented with her son Eros (Cupid). The dove, swan, swallow, and the bird called iynx drew her chariot, or served as her messengers; and these, with the myrtle, rose, apple, and poppy, were sacred to her. Of the statues which remain may be mentioned the celebrated Venus of Milo in the Louvre, found in 1820 on the island Milos; the Aphrodite of Capua; and the Medicean Aphrodite in Florence. The chief seats of her worship were Cythera and Cyprus. Her worship was of alien origin. Undoubtedly, also, the worship of the Phœnician goddess Astarte, brought in by Phœnician traders in early days, helped to form the conception which the Greeks had of Aphrodite. Compare also VENUS.

**Aphthæ**, small gray and yellow catarrhal patches, occurring singly or in groups, on the mucous membrane of the mouth, usually in teething infants. The most common position is within the lower lip, and towards the tip of the tongue. Treatment consists in attention to digestion, and local application of borax powder.

**Apia**, seapt. on the N. coast of the German dependency Upolu, and cap. of Samoan Is., lat. 13° 49' N., long. 171° 44' W.; anchorage for large vessels, though exposed to N. winds: four German and American warships were wrecked here in 1889, the British warship *Calliope* alone escaping without

injury. Apia exports copra and cocoa beans. Pop. 4,000.

**Apianus**, PETRUS (Lat. for PETER BIENEWITZ, 1501-1552), German mathematician and cosmographer, professor of mathematics at Ingolstadt (1527); author of *Cosmographicus Liber* (1524), *Astronomicum Cæsareum* (1540), *Inscriptiones Sacrosanctæ Vetus-tatis*, etc. (1534). His work on cosmography contains some of the best maps of his time.—PHILIPP APIANUS (1531-89), his son, geographer, was professor of mathematics at Ingolstadt (1552-68), and later at Tübingen. See Günther, *Peter und Philipp Apianus* (1882).

**Apicius**, the name of three celebrated gluttons, though it has been suggested that only one was a real character, the other two being reproductions of the type. MARCUS GABIUS lived in the reign of Tiberius (14-33 A.D.). Having squandered most of his fortune on gluttony, he hanged himself rather than live without the means of enjoying his favourite indulgence. There is a book on cookery ascribed to him, but really of much later date, ed. by Schuch (1874).

**Apion** (1st cent. A.D.), Greek rhetorician, native of Libya, who removed to Rome A.D. 30, and taught rhetoric; author of numerous works now lost, including a history of Egypt in 5 vols., commentaries on Homer's poems, and a polemic against the Jews, which evoked a reply from Josephus.

**Apios**, a N. American genus of climbing plants of the pea order, producing starchy, edible, pear-shaped tubers on underground shoots. The only species, the *A. tuberosa*, a native of the Atlantic States of America, is known as the ground-nut or wild bean.

**Apis** (in the hieroglyphics *Hapi*, 'the hidden'), a sacred bull worshipped by the Egyptians at Memphis. Originally, perhaps, a