

local divinity, in historical times he appears as the incarnation of the god Ptah. Later he was looked on as the incarnation of Osiris, or even of the sun, and through a false etymology was connected with the Nile. Tradition varies as to the precise nature of his marks, but, as a rule, he had a black hide, with certain markings on the forehead and back, and a peculiar knot in the shape of a scarabæus under the tongue. He was not allowed to live more than twenty-five years. If he died before his allotted span, he was embalmed and buried in a splendid sarcophagus in a special part of the temple of Serapis, called the Serapeum. After his death he became an Osiris or Osiris-Hapi, whence by corruption came the name of Serapis, which the Greeks and Romans gave to the Egyptian god. The birthday of the bull (which coincided with the rise of the Nile) was celebrated every year as a national festival. Mariette's discoveries of the Serapeum at Memphis (1856) threw much light upon the cult of Apis. See Mariette's *Le Sérapéum de Memphis* (1882), and S. Dill's *Roman Society from Nero to Marcus Aurelius* (1905).

Aplanatic, a combination of lenses so arranged as to bring parallel rays to a focus without spherical or chromatic aberration.

Aplerbeck, vil., Prussia, in Westphalia, 4 m. s.e. of Dortmund; has coal and iron mines. Pop. 10,000.

Apnoea (Gr. 'breathlessness'), strictly applied only to that form of breathlessness which is caused by hyperoxygenation of the blood, when breathing, for the time, has become unnecessary.

Apocalyptic Literature, a peculiar type of Jewish literature which generally originated in the time of Israel's oppression. Holding fast the justice of God, and conscious of the misery of their

present condition, the writers foretell a glorious future for the righteous nation, a resurrection for the righteous individual. They thus furnish a Jewish philosophy of history. In form these writings are pseudepigraphic prophecies, issued under the name of some famous Israelite of a former age, and claiming to be supernatural revelations. From this assumed standpoint the writers predict the future of Israel and of the world, and intentionally veil their meaning by the use of symbols, parables, and visions, although naturally they cease to be definite on reaching their own time, which is represented as the time of judgment and of Messianic deliverance. The aim throughout is at once didactic and hortatory: where the former element preponderates, the chief object in view is the glorification of the law, or the unfolding of divine mysteries; where the reverse is the case, the main purpose is to comfort the godly and warn the sinner. These apocalyptic writings, of which the Book of Daniel is the earliest example, did much not only to quicken the Messianic hope, but also to produce among the people that political unrest which culminated in the revolt against the Romans in A.D. 66. Among those extant in whole or in part, the most important for the history of the Jewish religion are the Apocalypse of Baruch, the Book of Enoch, the Ascension of Isaiah, the Book of Jubilees, the Assumption of Moses, the Testaments of the Twelve Patriarchs, the Psalms of Solomon, and the Sibylline Oracles. For these works, see Schürer's *Hist. of the Jewish People* (II. iii. p. 44 ff.), 1890, and Prof. Charles's article in the *Encyc. Biblica*.

Apocalyptic Number. See NUMBER OF THE BEAST.

Apocarpous, in botany a term used to designate fruits made up

of separate carpels, the product of a single flower.

Apocatastasis, the return at length of all lost souls and fallen angels to divine forgiveness: an opinion held by Origen and others.

Apocrenic Acid, a compound discovered by Berzelius in soil that contains rotting vegetable matter. It is formed by oxidation of crenic acid, a product of vegetable decomposition.

Apocrypha. From being applied in a laudatory sense to the secret or esoteric writings of the Gnostics and other sects, this term came to be used (*e.g.* by Augustine and Jerome) as the designation of works the origin of which was veiled in mystery. Of these the vast majority were forgeries, issued under one or other of the illustrious names of Christian or Israelitish history. By Athanasius the term was used as virtually equivalent to 'heretical;' but in the Western Church the meaning associated with it was rather that of 'pseudonymous.' From this, 'apocryphal' naturally came to signify 'non-canonical;' and then was gradually appropriated as the technical designation of those books which, although included in the Septuagint and the Vulgate, were never admitted into the Hebrew canon.

The Apocrypha proper include the following, arranged in the order of the English Bible: 1 Esdras; 2 Esdras; Tobit; Judith; the Additions to Esther; the Wisdom of Solomon; Ecclesiasticus; Baruch; the Song of the Three Holy Children; the History of Susanna; Bel and the Dragon; the Prayer of Manasses; 1 Maccabees; 2 Maccabees. (Two other so-called books of Maccabees—3 Maccabees and 4 Maccabees—are contained in some important mss. of the Septuagint).

The books may be classified critically as genuine, legendary, pseudepigraphic, and supplement-

tary additions to canonical books, or ethnologically as Persian-Palestinian, pure Palestinian, and Jewish-Alexandrian. But it is simpler to arrange them according to their literary character as narrative, prophetic, and didactic. Most of them belong to the first class. Only 1 Maccabees, however, can rank as history. It furnishes an authentic record of the forty years from the accession of Antiochus Epiphanes to the death of Simon (B.C. 175-135). 2 Maccabees covers only about half of the same ground, and is by comparison very inaccurate and highly coloured. 1 Esdras is a combination of the canonical Ezra with a legendary tale. The additions to Esther and the additions to Daniel (the Story of Susanna, the Song of the Three Children, and the Story of Bel and the Dragon) are purely fabulous. Tobit is an almost idyllic work of fiction, and Judith is a romance. To the second or prophetic division belong the Book of Baruch (including the Epistle of Jeremy and the Prayer of Manasses), and 2 Esdras, the last named being the only specimen of apocalyptic literature contained in our Apocrypha. The didactic books of the collection are Ecclesiasticus—or, as its Greek title is, the Wisdom of Jesus, the son of Sirach—and the Book of Wisdom. See further the separate articles.

Although some of them (*e.g.* Ecclesiasticus and 1 Maccabees) were originally written in Hebrew, none of these books ever found a place in the Jewish canon, from which all books written after the cessation of prophecy appear to have been rigidly excluded (*cf.* 1 Maccabees 9:27 with Josephus, *c. Apion*, 1-8). But the Jews of Alexandria, unlike their Palestinian brethren, drew no sharp distinction between prophets and hagiographa, and did not scruple to include in the Septuagint other sacred writings besides the

22 books of the Hebrew canon. As the Greek Bible remained practically the Bible of the Christian Church for centuries, the place given by it to the Apocrypha certainly conferred upon some of these books an exaggerated importance. But in relation to Jewish history, and apart altogether from the question of canonicity, the apocryphal books as a whole are of singular interest and value. Except the writings of Josephus, who was largely indebted to them, the Apocrypha form indeed the only source of information to speak of for the period between the Testaments. In this connection, 1 Maccabees, as a trustworthy historical record, is of priceless worth; and most of the other books afford significant glimpses into the internal condition and religious feelings of the people. Generally speaking, and in spite of the chilling influence of a rigid Pharisaism, they mark an advance in the religious life of the Jews as compared with the position reached in the time of Nehemiah. There is reflected in them a deeper reverence for the law, a purer monotheism, a stronger Messianic hope, and a clearer apprehension of a future life. Some of them also present an interesting combination of Jewish thought and Greek philosophy, especially in the Book of Wisdom.

The Apocrypha are, however, inferior to the canonical Scriptures in originality and strength. Instead of the freshness and simplicity of the earlier literature, we have the mechanical stiffness, the artificial and florid language, and the imitation of older models which show that the nation had begun to live on its past. That books should have been issued under assumed names was perhaps a necessity in times of persecution; but such distortions of Old Testament narratives (Wisd. 11:2-20)

and contradictory statements (2 Macc. 1:15-17; 9:5-29) as sometimes occur, as well as the introduction of ostensibly genuine but really fabricated official documents (1 Macc. 12:20-23; 2 Macc. 1:1-9; Esth. 16), clearly indicate that these writings are on a lower plane than the canonical books.

The judgment of the Christian Church as to the Apocrypha has been far from uniform. Some of the New Testament writers (St. Paul, St. James, and the author of the Epistle to the Hebrews) were evidently familiar with them. They were excluded from the canon of Melito, bishop of Sardis (c. A.D. 172). By many of the early fathers, however, they are referred to in the same terms as the canonical books. Among the Greek fathers they are so treated by Clement and Origen, and among the Latin fathers by Irenæus, Tertullian, and Cyprian. After Jerome's time the tendency was to refrain from founding upon them in matters of controversy. This writer adopted the Hebrew canon, but allowed an 'ecclesiastical' use of the Apocrypha. To this position Ambrose, Augustine, etc., adhered. At the reformation the Roman Catholic Church virtually adopted the Greek Bible, and the Protestant Church the Hebrew. The Council of Trent (1546) accepted as canonical all the books embraced in the Vulgate—*i.e.* the whole of the Apocrypha except the Prayer of Manasses, and 1 and 2 Esdras. Till about the end of the 17th century all English Bibles contained the Apocrypha. Coverdale's Bible (1535) was the first in which they were placed by themselves under a separate title at the end of the O.T. They were also printed in most copies of the Geneva Bible (1560). Within the Reformed Church itself the fortunes of the Apocrypha have been varied. In the Sixth Article of the Church of England it is declared that 'the

other books [viz. the Apocrypha] the church doth read for example of life and instruction of manners; and yet doth it not apply them to establish any doctrine.' The Westminster Confession, on the other hand, asserts that they 'are of no authority in the Church of God, nor to be any otherwise approved or made use of than other human writings' (ch. i. 3). See Fabricius's *Codex Pseudepig. Vet. Test.* (1713 and 1723); Bretschneider's *Die Dogmatik der Apokryphischen Schriften d. Alt. Test.* (1805); Fritzsche and Grimm, in the *Kurzgefasstes Exegetisches Handbuch* Series; Nicolas's *Des Doctrines Religieuses des Juifs, pendant les 2 Siècles antérieures à l'Ère Chrétienne* (1860); Langen's *Das Judenthum in Palestina zur Zeit Christi* (1866); Ewald's *Hist. of Israel*, vol. v. (Eng. trans. 1874); Stanley's *Jewish Church*, vol. iii. (1876); Bissell, in Lange Schaff's *Comm.* (1880); Churton's *Uncanonical and Apocryphal Scriptures* (1884); Wace and Salmon's *Speaker's Comm.*: 'Apocrypha'; Stade's *Geschichte des Volkes Israel* (1881); Schürer's *Hist. of the Jewish People in the Time of Jesus Christ* (Eng. trans. 1890); Strack and Zöckler's *Apokryphen d. Alt. Test.* (1891); Kautzsch's *Die Apok. und Pseudepig. des Alt. Test.* (1898). For the text, see Ball's *The Variorum Apocrypha*; Fritzsche's *Libri Apocryphi Vet. Test. Græc.* (1871); and Swete's *Cambridge Septuagint* (1894).

Besides the O.T. Apocrypha proper, 'an unspeakable quantity of apocryphal writings' (Iren. 1:20) were current in the early centuries of our era. Those that survive group themselves naturally into two divisions, according as they link themselves on to the Old or to the New Testament.

Old Testament.—1. Poetical.—This category includes the very interesting collection of eighteen psalms called *The Psalms of Solo-*

mon. These short poems (see Fritzsche's *Libri Apoc. Vet. Test. Græc.*, 1871) give expression to the clearest faith in the resurrection, and depict the triumphant rule of the Messianic King. Of Pharisaic authorship, they probably date from the middle of the 1st century B.C. In this connection mention may also be made of a psalm on David's victory over Goliath, which appears as Ps. 151 in the Greek Psalter; and of three apocryphal psalms in Syriac—viz. a thanksgiving of David, a prayer of Hezekiah, and a psalm on the restoration.

2. *Legendary.*—Many haggadic histories—*e.g.* of David, the Captivity, etc.—exist only in manuscript translations preserved in great libraries. *The Testament of Adam*, a Jewish romance purporting to give a biographical account of Adam and Eve subsequent to the Fall, is found in Greek, Latin, Syriac, Arabic, and Ethiopic fragments. *The Book of Jubilees*, so called from its adoption of the jubilee period of forty-nine years as the basis of reckoning in its system of chronology, is a haggadic commentary on Genesis, written from the standpoint of Pharisaic legalism, and dating probably from the 1st century A.D. Preserved in Ethiopic. *The Testaments of the Three Patriarchs* describe circumstantially the deaths of Abraham, Isaac, and Jacob; and *The Apocalypse of Abraham* tells the story of Abraham's conversion. In the *Life of Asenath* we have an attractive Jewish sketch of the circumstances attending her marriage with Joseph. *The Testament of Solomon* recounts that monarch's magical supremacy over demons, and his ultimate downfall. All these books have been more or less Christianized. *Liber Antiquitatum Biblicarum*, a compendium of Bible history down to the death of Saul, by Pseudo-Philo, and

existing only in a Latin version, appears, however, to be pre-Christian. *The Book of Jasher*, a haggadic commentary upon the Hexateuch, and a Hebrew Midrash called *The Book of Noah*, practically complete the list.

3. Apocalyptic.—(1.) *The Book of Enoch*. (See ENOCH, THE BOOK OF.) (2.) *The Apocalypse of Baruch*. (See BARUCH, THE APOCALYPSE OF.) (3.) *The Assumption of Moses* purports to have been addressed to Joshua by Moses prior to his death. After handing over to his successor certain prophetic books, Moses gives a forecast of Israel's history. The book was probably written in Hebrew by a Pharisee during the period A.D. 7-30. It is referred to by Origen (*De Prin.* iii. 2, 1) as the source of the legend about the strife between the archangel Michael and Satan regarding the body of Moses; but it was only in 1861 that Ceriani published part of an old Latin version discovered by him at Milan. (4.) *The Testaments of the Twelve Patriarchs*. (See TWELVE PATRIARCHS, TESTAMENTS OF.) (5.) *The Ascension of Isaiah*. A composite work containing (a) the account by a Jewish author of the martyrdom of Isaiah; (b) the vision of Isaiah, which is of Christian origin; (c) an apocalyptic section by a later editor. Written originally in Hebrew, and preserved in Ethiopic. Date, 1st century A.D. (6.) *The Sibylline Oracles* are a heterogeneous collection of Jewish and Christian matter, the earliest portions of which are separated from the latest by about five hundred years. In form they resemble the utterances of the ancient sibyl prophesying the fate of the world from the beginning, who is made to address the heathen world in Greek hexameters. For further details regarding these books, see Schürer's *Hist. of the Jewish People*, II. iii. (1886).

New Testament.—1. Gospels.—There are extant a large number of uncanonical gospels in more or less fragmentary form, but they are all of later date than our canonical gospels, and are devoid of historical worth. (1.) *The Aramaic Gospel of the Hebrews*, which contains some independent sayings of Jesus, was used by Jewish Christians in Palestine. It is coloured by Ebionitic views, and *The Gospel of the Ebionites* is perhaps only another form of it. The gospel of Peter is Docetic and anti-Jewish. (2.) *The Gospel of the Egyptians*, quoted by Clement of Alexandria, and mentioned by Epiphanius, was used by the Encratites. It exhibits Gnostic and mystic tendencies. (3.) *The Logia* is the name given to seven 'sayings of our Lord,' first published in 1897 from a Greek papyrus (5¼ × 3¼ inches) discovered at Oxyrhynchus. They partly resemble sayings contained in the canonical gospels, and partly present features that are novel. (4.) Several gospels deal in a legendary way with the infancy and childhood of Jesus. Of these, the best known are *The Protevangelium of James*, an *Arabic Gospel of the Infancy*, and *The Gospel of Thomas*. (5.) Others—e.g. *The Gospel of Nicodemus*, with the *Letters of Pilate*, and *The Narrative of Joseph of Arimathea*—treat of the Saviour's trial and passion. (6.) Of *The Gospels of Matthias and Bartholomew*, mentioned by Origen and Jerome respectively, nothing definite is known. The same is true of *The Gospel of Apelles*. *The Gospel of Marcion* was used by his own sect, and some regard it as having been a form of St. Luke's Gospel.

2. Acts.—These are probably of later date than the earliest of the apocryphal gospels. The Acts of Peter, John, Thomas, and Andrew are usually ascribed to one Leucius, and seem to belong to the 2nd cen-

ture. The Acts of Paul and Philip may be referred to the same period. The Acts of the remaining apostles are of later origin. Of the thirteen extant writings of this class, the most interesting perhaps, and certainly the oldest romance of its type, is *The Acts of Paul and Thekla*. Tertullian speaks of it as having been composed in honour of Paul by a presbyter of Asia. It recounts the heroic devotion shown by a virgin of Iconium converted under Paul's preaching.

3. Apocalypses.—These include *The Apocalypse of Esdras* and *The Apocalypse of John*—the one a feeble imitation of the apocryphal 2 (or 4) Esdras, and the other of the canonical Book of Revelation; *The Apocalypse of Paul*, detailing the revelations made to him when caught up into paradise; *The Apocalypse of Peter*, containing a history of the world from its beginning till the appearing of Antichrist; *The Apocalypse of Bartholomew*, which sets forth the favours bestowed upon the apostles in answer to the prayers of Christ; *The Apocalypse of Mary*, describing her descent into Hades; and *The Apocalypse of Daniel*, which deals with the consummation of the world.

4. Miscellaneous.—(1.) *The Abgarus Epistles*, consisting of a letter from Abgar, king of Edessa, to Jesus, inviting Him to his city, and a reply from the Saviour, declining the invitation, but undertaking to send an apostle, Eusebius found in Syriac at Edessa, and rendered into Greek (*H.E.*, i. 13). (2.) *The Didache*, or 'Teaching of the Apostles,' is a handbook of ethics and ecclesiastical procedure, dating perhaps from the middle of the 2nd century, and first published in 1883. (3.) *The Preaching of Peter*. Of this book fragments have been preserved by Clement of Alexandria. They consist of sayings of Jesus addressed to the apostles,

and of warnings against Judaism and polytheism. (4.) There are also some spurious epistles of Paul to the Laodiceans, Alexandrians, etc. See Fabricius, *Codex Apoc. N.T.* (1719; 2nd ed. 1743); Nicolas, *Etudes sur les Evangiles Apocryphes* (1866); Hilgenfeld, *N.T. extra Canonem Receptum* (1884); Bleek, *Introd. to the N.T.* (Eng. trans., 2nd ed. 1875); James, *Apocrypha Anecdota* (1897), i., ii.; Lipsius and Bonnet, *Acta Apostolorum Apoc.* (1891), i., ii. For an English translation of the apocryphal Gospels, Acts, and Revelations, based on Tischendorf's edition of these writings, see vol. xvi. of Clark's *Ante-Nicene Christian Library* (1867, etc.).

Apocynaceæ, an order of plants represented in Britain by the blue periwinkles, which cover banks and ground under trees with their evergreen, privet-like leaves. Most of the genera belong to the tropics, and many of the plants are poisonous. Most species have a milky juice, which in certain cases forms caoutchouc; some are tropical climbers known as lianas. Among the most important species are several producing india-rubber, trees yielding dita and other medicinal barks, cow-tree of Demerara, and ordeal-nut tree of Madagascar.

Apodictic, or APODEICTIC (Gr. 'proving'), in logic, a term applied to judgments which admit of no contradiction, their truth being implied in the nature of thought or reason.

Apogee (Gr. 'away from the earth'), that point in its orbit at which the moon is farthest from the earth—the point where it is nearest the earth being known as *perigee*. At apogee the distance is 253,000 m., at perigee 222,000 m.

Apogeotropism. See GEOTROPISM.

Apol, L. F. H. (1850), Dutch painter of winter and snow scenes. In 1880 he went with the William Barents expedition to

the Arctic seas, and produced many pictures—*e.g.* *Nova Zembla* (1896). His *January Evening in the Hague Wood* is in the Amsterdam Museum.

Apolda, an industrial tn. in the duchy of Saxe-Weimar, Germany, 9 m. E.N.E. of Weimar; manufactures hosiery, bells, preserved foods, etc. Pop. 21,000.

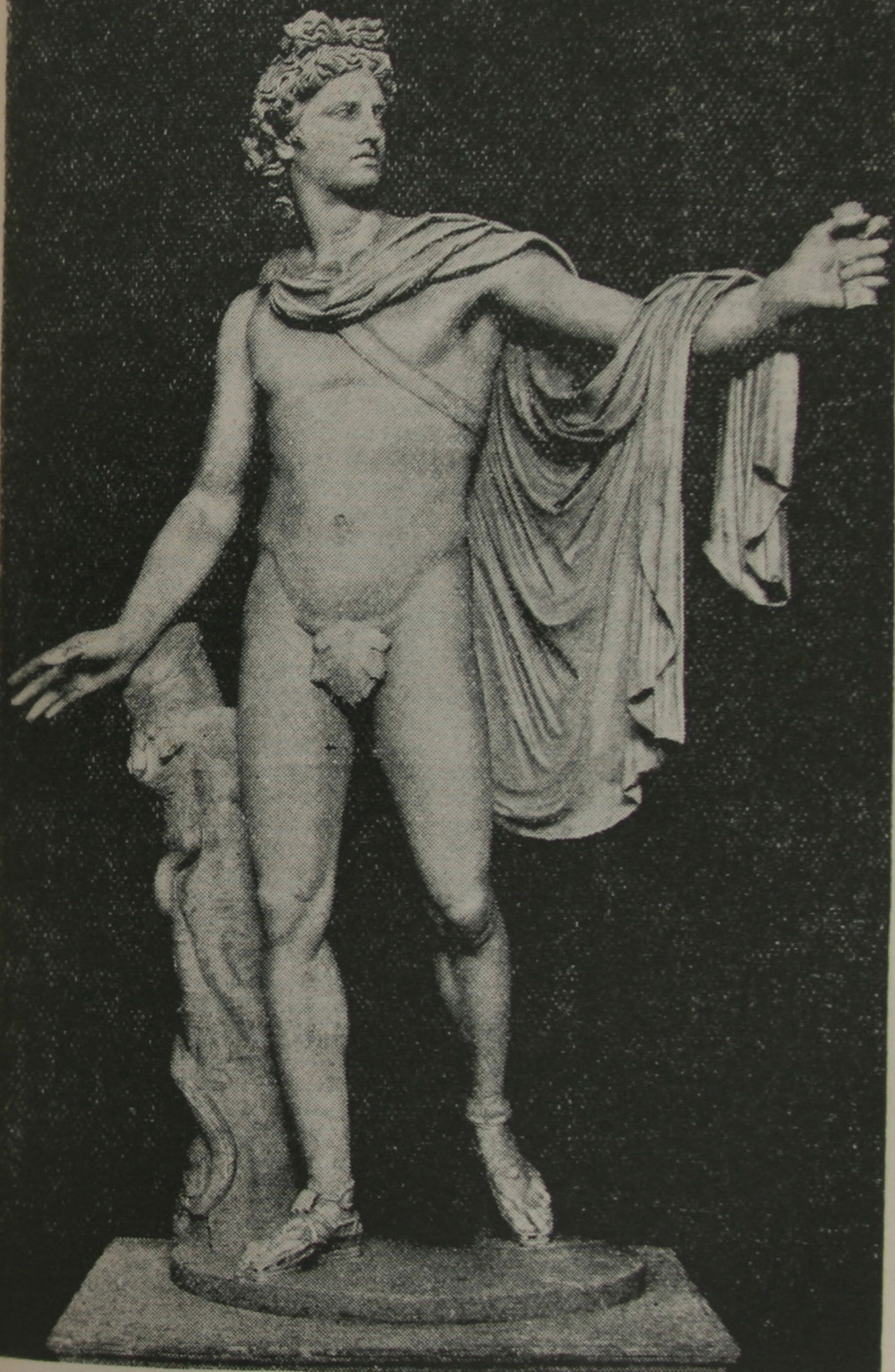
Apollinaris, a spring in the Prussian prov. of Rhineland, situated in the valley of the Ahr, about 5 m. from Remagen. It was discovered in 1851, and yields the well-known alkaline Apollinaris water.

Apollinaris. (1.) THE ELDER, native of Alexandria (4th century A.D.), became presbyter of Laodicea, and was associated with his son in an attempt to reproduce the Old Testament in the form of classical poetry, and the New in the form of the Platonic dialogues. (2.) THE YOUNGER (d. 390 A.D.), bishop of Laodicea, son of the above, a controversial theologian upon whose teaching a sect, the Apollinarians, founded their creed. He denied the true humanity of Christ, asserting that the place of human mind was in Him taken by the Divine Reason, or *Logos*. The sect spread rapidly in Syria and the East, and after the death of Apollinaris split into two divisions—the Vitalians and the Polemeans, who carried their doctrine so far as to assert that the very body of Christ was divine. These tenets were condemned in 373, 381, 388, 397, 428 A.D., and gradually merged into the Monophysite heresy.

Apollo, one of the great gods of the Greeks, and next to Zeus the most widely worshipped; son of Zeus and Leto (Latona), and twin-brother of Artemis. He was born in the island of Delos. He was worshipped as the god of punishment, sending death by his arrows—all sudden deaths were ascribed to him; as the god of deliverance,

and so the father of Æsculapius; as the god of prophecy, especially at Delphi, Delos, and Branchidæ; as the god of song and music, the patron of poets, and the leader of the choir of the nine Muses; as the god of sheep and cattle, especially in the story of his connection with Admetus; as founder of cities and political life—no Greek colony was founded except under the advice of his oracle; and as the god of the Sun—that is, the god of spiritual light. He is above all the god of the Dorians, whose predominance in Greece increased his influence. In Christian times a parallel was drawn between the relations of Zeus and Apollo and those of the first and second Persons in the Trinity. Apollo, though worshipped at Rome (his first temple was built in 430 B.C.), was not originally a Roman god. The sacred games in his honour were not instituted at Rome till 212, when the Senate, in the agony of the struggle with Carthage, pandered much to the religious fears and excitement of the populace. (See W. Warde Fowler's *Gifford Lectures*, 1910). Augustus made his worship very prominent at Rome, through adopting him as his patron god, and founding a new temple in his honour at Rome, 28 B.C. The wolf, swan, raven, hawk, cock, and crow were all sacred to him.

The APOLLO BELVEDERE, the most famous statue of the god, discovered in 1495 among the ruins of ancient Antium, and now in the Vatican, Rome, is perhaps the noblest representation of the human form. The figure is fully seven feet high, and formerly held a bow in the left hand, which, with the right fore arm, was restored by Montorsoli, a pupil of Michael Angelo. The statue is supposed to be a Roman copy of a bronze votive statue at Delphi, probably dating from the 3rd century B.C.



The Apollo Belvedere.

Apollo of Rhodes. See COLOSUS OF RHODES.

Apollodorus. (1.) Greek painter, born in Athens (fl. B.C. 400). He is considered as the inventor of *chiaroscuro*, for he was the first to succeed in blending tones and in handling light and shade. (2.) Greek poet (300-260 B.C.), born at Carystus in Eubœa, writer of forty-seven comedies, two of which were borrowed by Terence, who fully recognized his great merits. (3.) A Greek grammarian of Athens (fl. c. 140 B.C.); wrote many works, all lost except the *Bibliotheca*, a systematic account of the myths and legends of Greece as far as the time of Theseus. The work is of great value as a mythological commentary to the Greek poets. It has been edited by Heyne (1803), Clavier (with French trans. 1805), in Müller's *Fragmenta Historicorum Græcorum* (1841), and by Bekker (Teubner Series, 1854). (4.) APOLLODORUS of Damascus, architect in Rome during the reigns of Trajan and Hadrian, designed and erected the Forum Trajani and its famous column. He also built a bridge across the Danube, remains of which can still be seen near the town of Turnu-Severinu, Roumania. He wrote a book about war-machines, entitled *Poliorcetica*, republished in Wescher's *Poliorcétique des Grecs* (1867). He was exiled and killed in 129 by order of Hadrian.

Apollonia. (1.) An important ancient town in Illyria, not far from the mouth of the Aous R. (modern Voyutsa), 7 m. from the sea. It was founded by the Corinthians and Corcyreans, and in Roman times was famous as a place of learning, the Emperor Augustus and Mæcenas among others having studied there. (2.) Ancient town of Thrace, a colony of Milesia; it held a famous statue of Apollo, which was carried to Rome by M. Lucullus in 72 B.C.

Apollonius. (1.) PERGÆUS (3rd century B.C.), known in his own age as the 'great geometer,' was born at Perga in Pamphylia. He passed his life in Alexandria, in the schools of the successors of Euclid, at the time when the Ptolemies IV. and V. were kings of Egypt. Of his many books, only the *magnum opus* on conic sections and the *De Sectione Rationis* have come down to us. The work on conics contains nearly 400 theorems, many of them original. Apollonius was the first to make use of the terms 'ellipse' and 'hyperbola,' and was the discoverer of many important qualities of curves. See Heath's *Apollonius of Perga* (1896). The chief editions are by Halley (1710) and Heiberg (1891-3). (2.) RHODIUS (c. 240-180 B.C.), born at Alexandria, was famous both as poet and scholar. He taught rhetoric at Rhodes. Returning to Alexandria, he succeeded Eratosthenes as chief librarian of the Great Library. His only surviving work is an epic poem in four books, the *Argonautica*, describing the adventures of the Argonauts. It is the work of a scholar, a learned epic as contrasted with the natural epic of Homer; but it maintains a high level of style, and is remarkable for its treatment of the character of Medea and of her love for Jason. It is, in fact, the first love poem of antiquity; Virgil imitated it freely in the 4th book of his *Æneid*; a later Roman poet, Valerius Flaccus, copied it closely in his *Argonautica*; it showed the way to the Greek romance writers; and may perhaps be considered the remote parent of the modern novel. Eds.: Text only, Merkel (Ger.), 1854; with notes and trans., in French, by La Ville de Mirmont, 1893; Eng. prose trans., E. P. Coleridge (1889). (3.) MOLOX, Greek rhetorician of the 1st century B.C.; studied at Rhodes.

came to Rome, where he taught rhetoric to Cicero (B.C. 88). His numerous works are wholly lost. (4.) TYANEUS 'of Tyana' (c. 4 B.C.-96 A.D.), a Pythagorean philosopher. A remarkable life of him by Philostratus (c. 200 A.D.) has come down to us. He travelled through Asia Minor, Parthia, and India, where he discussed philosophy with the Brahmans; then returned to Greece, and visited Rome. Later he went to Alexandria—where he encouraged Vespasian in his attempt to secure the imperial throne—and to Ethiopia. He claimed superhuman powers, and many miracles are ascribed to him—some so like those of the gospels that it has been conjectured that his whole story is a fabrication, intended by its author as a rival to the Christian narrative. But the evidences of his existence are too strong to be disregarded. He certainly was a man of remarkable powers and influence, and many notable sayings are attributed to him. None of his writings are extant. See PHILOSTRATUS; also *Life* by F. W. G. Campbell (1908). Froude's *Short Studies*, vol. iv. (1878-83) may be read. (5.) DYS-COLOS ('bad-tempered'), originator of scientific grammar; born in Alexandria; flourished during the reigns of Hadrian and Antoninus Pius. Bekker edited his works in 1817, the most notable of these being that *On Syntax*. See Egger's *A. Dyscole* (1854); Lange's *System der Syntax des A.* (1852).

Apollonius of Tyre, a Latin romance of the 3rd or 4th century, is undoubtedly derived from a lost Greek original. It contains the story of Antiochus, king of Syria, who, in selfish affection for his daughter Tarsia, keeps off suitors by a baffling riddle. Apollonius, king of Tyre, discovers the answer, but is obliged to save himself by flight. An abridgment is included in the

Gesta Romanorum. The earliest English version (1510) was made from the French *Appollyn, Roy de Thire*. An ancient Anglo-Saxon translation was printed by Thorpe in 1834. The story forms the foundation of Shakespeare's *Pericles* (1609). See E. Klebs's *Die Erzählung von Ap. von Tyrus* (1899).

Apollo, a Jew of Alexandria, who, embracing Christianity, became noted, first in Ephesus and afterwards in Corinth, as an eloquent preacher of the gospel. Misinformed at first regarding the ordinance of baptism, he was set right by Aquila and Priscilla. His name became the rallying-point for one of the four parties in the Christian community at Corinth. Tradition makes him one of the Seventy; and Luther, followed by many moderns, ascribes to him the authorship of the Epistle to the Hebrews. See Conybeare and Howson's *St. Paul*, ch. xiv. (2nd ed., 1856), and commentaries on Acts (18:24 *f.*) and 1 Cor. (1:12).

Apollyon, a Greek word signifying 'destroyer,' employed to translate the Hebrew word *Abaddon*, represented in Rev. 9:11 as the angel 'having dominion over the locusts which came up from the bottomless pit at the sound of the fifth trumpet.' The name *Asmodeus* (Tobit 3:8) is the Græcized form of a Hebrew word of similar meaning. He is best known as the antagonist of Christian in the *Pilgrim's Progress*.

Apologetics is the science of the Christian *apology* or 'defence.' It is well defined in the sub-title of Professor Bruce's work (*Apologetics*, 1891) as 'Christianity defensively stated.' Within the New Testament itself, in the Acts, we have apologetic elements—viz. a defence of Christianity against the charge of being politically mischievous. The Christian apologists of the early centuries, too, were largely on the defensive

against the vilest charges. Since the close of the age of Christian persecution, the Christian Church has had to cultivate the apologetic appeal to conviction—always its proper method.

Four subdivisions may be named:—

1. Independently of the Christian revelation, it may be held that reason, or conscience, proves the being of God, the existence of a soul, freedom of will, and immortality. Most Christians hold that revelation presupposes a natural theology. Conceivably, indeed, Christianity might be the first distinct self-manifestation of God in the world. Yet, even if that were true, revelation must throw fresh light on the world it entered, and must gather to itself something that might be called natural religion. (See THEISM.)

2. Passing now to the Christian revelation proper, apologetics involves the truth of the broad outlines of New Testament history. (Apologetics have never pledged themselves to the existence of infallible inspiration.) This is sometimes spoken of as historical evidence. But let us distinguish carefully. Historical testimony, whether within the New Testament or outside of it, does not prove the existence of a divine revelation or redemption. It proves only that there was such a being as Jesus of Nazareth, who advanced stupendous claims. This is at most a preliminary stage in the Christian argument. The oldest Christian document is 1 Thessalonians; and the student of apologetics ought to know by heart the order of the Pauline Epistles, and the various degrees of certainty or uncertainty with which their genuineness may be asserted. But even in the New Testament we have nothing to compete with the gospels as affording information regarding Christ. Much less important, though still of great in-

terest, are the questions of the historical value of the Book of Acts, and of the genuineness of the other books of the New Testament, or the problems of Old Testament criticism. On all these historical questions the Christian apologist holds a 'watching brief.' He cannot for a moment admit Jowett's assertion, that we know very little really about Christ; or the view of Amiel and Professor Percy Gardner, that Christianity ought to be transferred from the region of history to that of psychology. But the apologist must beware of straining the evidence. His supreme concern is the truth; and when violent attacks, like that of the Tübingen School, have been repelled, he must thankfully see the points at issue handed over for treatment to disinterested science.

3. External evidence. While some of the best work of English 18th century writers belongs to the preceding head (Paley's *Horæ Paulinæ*, 1790; Lardner's *Credibility of the Gospel Hist.*, 1727-55), their typical subject is miracle, and the typical book is Paley's *Evidences* (1794). The miracles, as a divine seal, prove that the message spoken by Christ, or by His authorized representatives, is to be received as from God. Along with miracles, prophecies are also relied on—predictions, miracles of foreknowledge. The late J. B. Mozley (*On Miracles*) represents the same point of view. On this theory, the proper proof of Christianity is external to its substance. Modern study of the Old Testament, while making the argument from prophecy more important than ever, has made it difficult to say how far we can regard prophecy as a strictly, and technical, miraculous process, or how far we can prove this to others' satisfaction. There is less uncertainty as to the nature of alleged physical miracles, but their credibility is much canvassed. Some

modern theologians, in the supposed interests of science, deny all miracles. Others (e.g. Harnack), in the supposed interests of a deeper faith, exclude miracles from playing any part in the Christian argument. It will be best to follow the guidance of the New Testament, and to assign to miracles an important yet subordinate place as evidence (cf. John 14:11). Impartial study will confirm the historicity of most of the miracles of the New Testament record.

4. Internal evidence. The appeal to this form of evidence was introduced into Great Britain by Thomas Erskine of Linlathen, and by Chalmers. The phrase is, unfortunately, ambiguous. Even Paley, in *Horæ Paulinæ*, may be regarded as discovering internal evidence in the 'undesigned coincidences' between Acts and Epistles. We mean something different—the evidence of Christian experience; the evidence found in what Christianity is, not in anything 'external' to it, however closely associated. (Rothe and the best modern apologists regard even the Christian miracles, not as an external 'seal,' but as part of the revelation.) Another misapprehension must be guarded against. We do *not* mean to transfer Christianity from history to psychology. We mean experience of the historical Christ; and the topics of importance will be the character and sinlessness of Jesus—the *Gesta Christi*, or His influence in history—the testimony of the Christian Church and of Christian believers—all leading up to the final evidence described in 2 Cor. 4:6. On this view we cannot *prove* the truth of Christianity to others, or even to ourselves, but we can bear witness to God's voice. This internal evidence furnishes the proper and supreme reason for believing in Christ; while it has its roots in the conscience of every man.

Besides books already mentioned, Bruce's *Chief End of Revelation* (1881) may be specially commended, and a reference may be added to Row's *Manual of Christian Evidences* (1887), to Dr. Newman Smyth's *Old Faiths in New Light* (new ed. 1882), and other books, to R. Mackintosh's *First Primer of Apologetics* (1900), to the *Apologetics* of Delitzsch (1869), and (trans.) of Ebrard (3 vols. 1886-7); also the translation of Luthardt's *Apologetic Lectures on Fundamental Truths of Christianity* (2nd ed. 1869), and other works.

Apologia pro Vita sua, religious autobiography by Cardinal Newman (1864), explaining his position in the Oxford movement, and his reasons for joining the Roman Catholic church; and incidentally attempting to refute Kingsley's accusation that 'truth for its own sake need not be, and on the whole ought not to be, a virtue of the Roman clergy.'

Apologue (Gr.), a fictitious narrative used to convey moral lessons; it is a general term of which fable, parable, etc., are the varieties. For the differences between apologue and allegory, see ALLEGORY. One of the shortest and best examples is the scornful Biblical apologue of the cedar and the thistle (2 Ki. 14:9). In English literature the most noteworthy apologues are, perhaps, Robert Henryson's *Town Mouse and Country Mouse* (1621); the fable of the rats and mice who resolved to bell the cat, in Langland's *Piers Plowman*; and the apologue of the Bee and the Spider at the commencement of Swift's *Battle of the Books*, from which last Matthew Arnold derived his famous phrase, 'sweetness and light.'

Apomorphine, HYDROCHLORIDE OF, is produced by heating morphine or codeine in sealed tubes with hydrochloric acid. It appears as small, grayish needles,

turning to green in the presence of air and light. It is the most powerful and certain of all emetics, and is given as a hypodermic injection.

Aponogeton. See PONDWEED.

Apophysis, a prominent elevation or process of a bone which has no independent centre of ossification, being thus distinguished from an *epiphysis*. A slender apophysis is termed a 'spine;' blunt, a 'tubercle;' a tubercle with broad base, a 'tuberosity.' In botany, a swelling under the base of the spore-case of some mosses.

Apoplexy, the state of insensibility caused by the rupture of a cerebral vessel, or the blocking of one by an embolus. The term apoplexy is disused by modern writers; the disease is described as cerebral hæmorrhage, cerebral effusion, and so on. The predisposing conditions which produce lesions in the blood-vessels of the brain are usually connected with kidney diseases, abuse of alcohol, syphilis, and the degeneration of blood-vessels in advanced life. (See VESSELS, DISEASES OF.) Violent muscular exertion, mental excitement, or anything that throws an increased strain upon degenerated vessel walls, may cause a rupture. An apoplectic seizure is often preceded by premonitory symptoms, such as giddiness, loss of memory, headache, tingling in some part of the body, or some local loss of muscular power. The attack is more or less sudden in its onset. The patient may fall down suddenly, utterly motionless and unconscious; or he may feel powerlessness and lethargy slowly creeping over him. The blow may fall chiefly on the mental faculties, or it may be felt most in the muscles and in the nerves of sensation. The patient may die at once, or he may recover, with impaired powers. The extent of permanent

paralysis sometimes cannot be determined for some weeks after an attack. With slight lesions it may pass off entirely. There are, however, several other conditions with which apoplexy may be confounded: for instance, drunkenness, other narcotic poisoning (*e.g.* by opium), epilepsy, syncope or fainting, and uræmic convulsions, all have their points of likeness. Unequal pupils are strong evidence in favour of apoplexy.

Treatment.—After an attack absolute stillness is needed in bed, with the head a little raised, and with hot bottles to the feet if they are cold, and ice to the head if the face shows much flush. Stimulants should not be given unless the pulse is failing, and then only in small quantities. Croton oil or calomel is often given as a purge, if the pulse is strong enough; and venesection is also used, to lower the blood pressure.

Aposiopesis (Gr.), an abrupt breaking away from a sentence, and leaving it unfinished, for the sake of greater effect.

Apospory. See FERN.

Apostasy, originally a soldier's desertion in war; later, in early Christian times, the desertion or perversion from the true faith, Christian conduct, and the discipline of church or order.

A posteriori. See A PRIORI.

Apostle (Gr. 'ambassador'—*i.e.* not merely the messenger but also the representative of the sender) was the name applied by Jesus to those disciples whom He specially commissioned to preach the gospel and heal the sick. They received a second commission after the resurrection (Matt. 28:19). Their names are found in Matt. 10, Mark 3, Luke 6 (see also Acts 1): note that Simon Zelotes and Simon the Canaanite denote the same individual, while Judas (not Iscariot) seems to be the Lebbaeus (Thaddeus) of other lists. Their number, twelve, corresponding to

the twelve tribes of Israel, does not seem, after Christ's departure, to have been regarded as fixed; for though Matthias was elected to fill the place of Judas (Acts 1:26), thereby maintaining the sacred number intact, we find later that the name apostle is applied to Paul, Barnabas, James the Lord's brother, and even to an Andronicus and a Junias in Rome (Rom. 16:7). The qualifications for the office were—(1) having seen the Lord (Acts 1:22, 1 Cor. 9:1); (2) possession of the signs of an apostle (2 Cor. 12:12); and (3) inspiration and a direct call from above (John 16:13; 1 Cor. 12:28). To the apostles alone seems to have belonged the power to ordain (Acts 6:6); while, as regards the determination of disputed points of doctrine and practice, the decision of those resident in Jerusalem was evidently regarded as of paramount authority (Acts 15). In their apostolic labours their field was the world. See Lightfoot's *Comm. on Galatians* (10th ed. 1890).

Apostle Jug, a stoneware jug with or without a lid, and with the images of the twelve apostles in relief all round it. This was much in vogue in the 16th and 17th centuries.

Apostle Spoons, spoons which terminated in an image of one of the apostles, usually made in sets of thirteen.

Apostles, TEACHING OF THE TWELVE. See DIDACHE.

Apostles' Creed. See CREEDS.

Apostles' Days, the days on which the memories of the several apostles are specially celebrated by the church—*e.g.* Matthew on September 21 (Greek Church, November 16); John, December 27 (Greek Church, September 26); Peter and Paul, June 29; Thomas, December 21 (Greek Church, October 6); Philip and James, May 1 (Greek Church, October 9); Simon (the Canaanite) and Jude, October 28; Bartholomew, August

24 (Greek Church, August 25); Andrew, November 30; Matthias, February 24 (Greek Church, August 9); James, the son of Zebedee, July 25 (Greek Church, April 30).

Apostles' Islands, in Wisconsin, U.S.A., a cluster of 27 islands, area 125,000 acres, in Lake Superior, covered with valuable timber. The Jesuits have several mission stations here. Lapointe, on Madeleine I., is the only town of importance.

Apostolic Acts, APOCRYPHAL BOOKS OF. In the early Christian centuries, from the 2nd onwards, there arose an extensive literature purporting to set forth the labours of the apostles. Much of this fantastic work is attributed to one Leucius, who, according to the Latin version of the *Gospel of Nicodemus*, was the son of the aged Simeon, and whose name bore a convenient resemblance to that of Luke (Lucas), the writer of Acts. At first the church was content simply to repudiate and condemn them; but as this did not suffice to put down the evil, it adopted the ingenious, if rather perilous, course of submitting them to an orthodox recension, so that, from being the credentials of heresy, they became the religious 'chapbooks' of the faithful. According to their contents, these documents were known as acts (*praxeis* or *acta*), travels (*periodoi* or *itineraria*), miracles (*thaumaseis* or *miracula*), or martyrdoms (*marturion* or *passio*). Many of these *Acta* have disappeared; of those that have survived, the following—attached to the names of the various apostles—is a fairly full list.

PETER.—*Martyrium Petri, Acta Petri cum Simone* in Latin, also a *Martyrium* in Greek—all of Gnostic origin; the *Acta Petri et Pauli* and the *Passio Petri et Pauli* (Gr.) are Christian redactions. In these occur the famous *Quo Vadis*

legend, and the disputes of Peter with Simon Magus; cf. the *Clementine Homilies* (see CLEMENT). The interrelation of these writings is a perplexing subject; see Lipsius, *Apoc. Apostelgeschichten* (1883-90), vol. ii.

PAUL.—Besides the above-cited works which refer to Paul, there is the noteworthy *Acts of Paul and Thecla*, known also as the *Martyrdom of St. Thecla*, an original Gnostic work, ascribed by Tertullian to a presbyter of Asia who was deposed for his forgery. In its orthodox form it can be traced to the 4th century. It narrates the adventures and sufferings of a virgin, Thecla of Iconium, a convert of Paul. There are versions in Syriac, Arabic, Ethiopic, and Slavonic. See Schlau, *Acten des P. und der Th.* (1877).

ANDREW and MATTHEW.—A book of *Acta*, which relates that Matthew, while labouring in the country of the Anthropophagi (cannibals), was captured, then rescued by Andrew, who overwhelmed the city with a flood. There are also *Acta* of Andrew and Bartholomew in Ethiopic; and in Greek and Coptic, *Acts and Martyrdom* of Matthew, from which have sprung most of the later traditions about Matthew.

THOMAS.—His *Acta*, originally Gnostic, by Leucius, narrate the labours of Thomas in India; also a *Passio Thomæ* and *Miracula Thomæ* of the 6th century in Latin.

THADDÆUS (Lebbæus or Judas, not Iscariot), called Addai in Syriac.—*Acta* in Greek of the 5th century, which goes back to the Syriac *Doctrine of Addai*, and contains the spurious correspondence between Jesus and Abgar, prince of Edessa. See edition by Philipps, in Syriac, with English trans. (1876).

PHILIP.—*Acta Philippi* in various Greek recensions, and one in Syriac; also a *Passio Philippi*.

JAMES.—The *Martyrdom* of

James in Greek; in Latin as the *Passio Jacobi Majoris*.

JOHN.—His *Acta* are mentioned by Eusebius, Epiphanius, and Augustine—fragments relating his miracles, exile, and death. There are also a *Historia Joannis* (Syr.), *Virtutes*, *Passio*, and *Vita*. See under names of the various apostles; and for literature, the end of article APOCRYPHA, especially the works by Lipsius, Bonnet, Malan, and Wright.

Apostolic Fathers, a name applied to the authors of an important group of writings dating from the transition period between the apostles proper and the theological apologists of the 2nd century A.D. Those usually included under the term are Clement of Rome (*I. Ep.*), Hermas (*Shepherd*), Barnabas (*Ep.*), Ignatius (*Eps.*), and Polycarp (*Ep. to Philippians*). But the designation, so used, is arbitrary. See Donaldson's *Apostolic Fathers* (1874); Möller's *Church History*, i. 108 f.; and articles in this book on all names given above. Editions, Gebhardt, Harnack, and Zahn (1876 ff.; smaller issue, 1901); F. H. Funk (1901); Clark's *Ante-Nicene Christian Library*. The standard edition in English is that of Lightfoot, critical texts and translations.

Apostolic Majesty, title of the kings of Hungary, conferred by Pope Sylvester II. (999-1003) upon the first Christian king, Stephen I., for his zeal in converting the Hungarians. Pope Clement XIII. reconfirmed it in 1758 to Maria Theresa and her successors.

Apostrophe. (I.) A grammatical sign (') denoting the omission of a letter or letters in a word—e.g. ne'er, don't. In the genitive singular of nouns it is used to indicate the suppression of the vowel in the old termination *es*—e.g. son's in place of *sones*. The apostrophe in the genitive plural (as in sons') has

no etymological justification. (2.) A rhetorical figure of speech by which the speaker addresses his remarks directly to the object of them. A more intense form, in which the speaker actually seems to see the object addressed, is termed 'vision.'

Apothecary, a medical practitioner of lower grade than a physician or a surgeon. The qualification is L.S.A.

Apothegm, or APOPHTHEGM (Gr. 'from a word'), a short, pithy, and sententious saying, as distinguished from a maxim, which is a truth useful for practical guidance in life, and from an aphorism, which contains a statement of some abstract truth. The most famous collection in our literature is Bacon's *Apophthegms New and Old* (1625).

Apotheosis, the deification of mortals. Originating in ancestor-worship, its later development among the higher races, as the Greeks and Romans, was due to the desire of men in power to add divine attributes to their honours. Romulus was the earliest case of deification of a Roman king, but the practice was in abeyance until the corrupting influence of Greek religion had taken full effect on Roman ideas at the end of the Republican age. Thus, Julius Cæsar caused his statue to be worshipped in every Roman temple. Augustus was deified in every city of the empire except Rome, and his successors claimed deification as their right. The epithet *divus* then took on the special meaning of a deified man.

Appalachians, the easternmost mountain system of N. America, separating the basin of the Mississippi from the streams flowing directly into the Atlantic. It extends from S.E. Canada in a s.w. direction through the United States as far as N. Georgia and Alabama, a distance of some 1,300 m., through New England, New

York, New Jersey, Pennsylvania, Maryland, Virginia, W. Virginia, Kentucky, Tennessee, N. Carolina, Alabama, and Georgia. The average elevation may be given at about 2,500 ft. The more important ranges are the Adirondacks of New York (highest summit, Mt. Marcy, 5,344 ft.); the Taconic Range and the Berkshire Hills of Massachusetts; the Green Mts. of Vermont (Killington Peak, 4,241 ft.); the White Mts. of New Hampshire, culminating in Mt. Washington (6,293 ft.); the Blue Ridge, stretching s. from Maryland, and rising to 4,000 ft. at Stony Man and the Peaks of Otter, midway across Virginia, and broadening in N. Carolina into a plateau that bears irregular ranges such as the Great Smoky Mts. and the Black Mts., the latter having Mt. Mitchell (6,711 ft.), the highest point E. of the Rockies. The Alleghany Mts. are three parallel ranges s. of New York, and their name is often applied to the Appalachian system as a whole. The Cumberland Range is separated from the S. Appalachians by the headwaters of the Tennessee. The White and Green Mts., the Berkshire Hills, and the Adirondacks are health resorts. West of the Blue Ridge is the Appalachian valley, known as the Shenandoah valley in N. Virginia, and the Tennessee valley farther s.

The rocks of the Alleghany-Cumberland plateau are of Carboniferous age, and coal is found in abundance from Pennsylvania to Alabama, while petroleum and natural gas are obtained in vast quantities. See B. Willis, 'The Northern Appalachians,' and Hayes, 'The Southern Appalachians,' in *The Physiography of the United States* (1895).

Appalachian Tea, also known as CAROLINA TEA and BLACK DRINK, a mixture of leaves of two N. American plants, *Prinos*

glaber and *Viburnum cassinoides*, is used as a substitute for tea.

Appanage, more correctly APANAGE, originally, in French feudal law, grants made to the sons of the sovereign for their support, such as lands or feudal superiorities; these, in the absence of male issue, reverted to the crown. In Scotland the term was applied to the patrimony of the king's eldest son. Since 1337 the Duchy of Cornwall, supplemented by money grants, is the appanage of the Prince of Wales.

Apparitions. See PSYCHICAL RESEARCH.

Appeals. (1.) HOUSE OF LORDS. As a tribunal of appeal, the constitution of the House of Lords is regulated by the Appellate Jurisdiction Acts, 1876 and 1887. At least three Lords of Appeal must attend at the hearing of a case. Lords of Appeal are the Lord Chancellor, the four Lords of Appeal in Ordinary, and peers of Parliament who hold or have held high judicial office. Other peers are not excluded, but by custom they neither attend nor vote. In the case of *Bradlaugh v. Clarke*, in 1882, Lord Denman, a lay peer, voted with the minority. The House of Lords may sit to hear appeals during a prorogation of Parliament, and also during a dissolution if authorized by the King under the sign-manual. Appeals lie from the Court of Appeal in England, the Court of Session in Scotland, and the Court of Appeal in Ireland. They are brought by petition to have an order or judgment reviewed by the King in Parliament. English and Irish appeals must be brought within a year, and Scotch appeals within two years. After the hearing the theory is that the Lords debate the question and put it to the vote, but the speeches made are judgments. If the house is equally divided, the judgment of the court below

stands affirmed, and no costs are given.

(2.) THE PRIVY COUNCIL. As an appellate tribunal, the Privy Council acts through the Judicial Committee, constituted under an Act of 1833, as amended by later acts down to 1908. The committee consists of the President of the Council, the Lord Keeper, and all Privy Councillors who hold or have held high judicial office in the United Kingdom, India, or the colonies, and the king may add two other Privy Councillors. Persons who are or have been judges of the country from which the appeal comes may be summoned as assessors for particular cases, and so may the archbishops and bishops in ecclesiastical cases. Appeals lie from India and all the colonies. The committee also hears appeals in certain ecclesiastical cases (see PUBLIC WORSHIP REGULATION), and appeals under the Naval Prize Acts.

(3.) THE COURT OF APPEAL (in England). This court consists of the Lord Chancellor, any ex-Lord Chancellor, the Lord Chief-Justice of England, the Master of the Rolls, the President of the Probate Division, and five Lord Justices of Appeal, but no judge may hear on appeal a case in which his own decision is under review. The Court of Appeal generally sits in two courts, the Master of the Rolls presiding in Court No. 1, and the senior Lord Justice in Court No. 2. Appeals must be heard by three judges at least, unless the parties consent to a hearing by two judges; but interim or interlocutory orders may be made by two judges, and interim orders in the vacation by one judge. The court hears all appeals from the High Court of Justice, from the Palatine Courts of Lancaster and Durham, and from the Liverpool Court of Passage, and all appeals in lunacy, bankruptcy, workmen's compen-

sation, and agricultural holdings proceedings, and in registration cases and election petitions. By certain Acts of Parliament an appeal is either forbidden, or only allowed by special leave—*e.g.* election appeals and appeals from the Court of Passage. The court may review a finding of fact as well as a decision on a point of law; but it is naturally reluctant to reverse the findings of fact of a judge who has seen the witnesses, and when a case has been tried by a jury, if the court thinks the verdict is against the weight of the evidence, the usual course is to order a new trial. The court may, but seldom will, admit fresh evidence on appeal. It has absolute discretion as to costs.

(4.) THE COURT OF CRIMINAL APPEAL (in England), as constituted by the Criminal Appeal Act, 1907, consists of the Lord Chief-Justice and eight judges of the King's Bench Division, appointed by him with the consent of the Lord Chancellor. All appeals must be heard by an uneven number of judges, not less than three. Any person convicted on indictment has a right to appeal against his conviction on questions of law, and, with the consent of the court, or on the certificate of the judge who tried him, on questions of fact also. With the leave of the court he may also appeal against his sentence. In exceptional cases there may be a further appeal to the House of Lords.

(5.) DIVISIONAL COURTS. These courts consist of two judges of the High Court, either of the King's Bench Division or the Probate Division. They hear practically all appeals from quarter sessions, county courts, and other inferior courts, but in some cases leave to appeal must be given by the inferior court; and an agreement not to appeal is

binding on the parties to a county court action. An appeal from a divisional court (but only by leave of that court) lies to the Court of Appeal.

(6.) QUARTER SESSIONS hear appeals from all courts of summary jurisdiction when imprisonment without the option of a fine is the sentence, and in other cases where an appeal is specially provided for by statute. See SESSIONS OF THE PEACE.

(7.) AN APPEAL was formerly an action brought for a felony at the suit of a subject instead of the king, with the double object of obtaining the punishment of the offender and redress of the private injury. The four kinds of appeal which survived within recent times were those of murder, larceny, rape, and mayhem, which could be brought by the person injured, or, in the case of murder, by the wife or heir of the deceased. A previous acquittal on indictment was no defence, but the 'appellee' could plead 'not guilty, and I am ready to defend the same by my body.' He was then entitled to trial by battle. (See BATTLE, TRIAL BY.) This was done in the case of *Ashford v. Thornton* in 1818 (1 *Barnewall and Alderson's Reports*, p. 405), after which all appeals and 'wager of battel' were abolished by the statute of 59 Geo. III., c. 46.

(8.) In SCOTLAND, besides the final appeal to the House of Lords, there is an appeal—(1.) From the Outer to the Inner House of the Court of Session. It is by reclaiming note, and lies from all interlocutors of the Lord Ordinary, though in some cases leave is required. (2.) From the sheriff court to the Court of Session when the value of the case exceeds £50, and the interlocutor appealed against is one sisting process, or giving interim decree for money, or disposing of the whole merits of the case, or leave is given.

An appeal also lies to have a case tried by a jury, and in some cases to have the process removed. The appeal may be either from the sheriff or direct from the sheriff-substitute. (3.) From the sheriff-substitute to the sheriff-principal in many cases under the Sheriff Courts Act (1907). (4.) To the High Court of Justiciary from all inferior courts of criminal jurisdiction when a question of law is involved. (5.) To the Circuit Courts of Justiciary from inferior courts in criminal cases not involving death or dememoration (generally offences under special statutes); and in civil cases up to £25. (6.) To quarter sessions from special and petty sessions. There is no appeal from the High Court of Justiciary to the House of Lords.

Appearance. (1.) In law. Within eight days of the issue of a writ of summons in an action, the defendant, if he means to defend the action, must deliver a 'memorandum of appearance' at the central office of the supreme court or the district registry, as the case may be, saying, 'Enter an appearance for A. B. in this action,' and containing the name of his solicitor, etc.; and notice of the appearance must be given to the plaintiff. This procedure is substituted for the old form requiring the defendant to appear in person. (2.) In philosophy. See PHENOMENON.

Appellants, or LORDS APPELLANT, the name given to Thomas, Duke of Gloucester, uncle of Richard II., and his associates, the Earls of Derby, Arundel, Nottingham, and Warwick, who in 1387-8 'appealed' or impeached for treason the king's advisers, notably De Vere and De la Pole (Suffolk). They controlled the deliberations and shaped the vindictive action of the 'Merciless' Parliament of 1388. In May 1389 Richard de-

clared himself of age, and capable of governing; and in 1397 he suddenly seized the appellants, *i.e.* Warwick, Arundel, and Gloucester, of whom the first-named was imprisoned, the second executed, and the third died in prison, probably by violence.

Appendant and Appurtenant. These words are applied to incorporeal hereditaments. A right is appendant when it is attached by implication of law and is suitable to a holding: *e.g.* common appendant is a right of common attaching to arable land. Advowsons can be appendant to a manor, common of turbary to a house, lands to an office. A right that is appendant can only be created by prescription, while a right which is appurtenant may be created by grant or prescription. See APPURTENANCES and INCORPOREAL CHATTELS.

Appendicularia, a minute tunicate, often found in great abundance at the surface of the sea. It is free-swimming, and periodically forms and throws off a delicate investment which is carried about by the animal. The special point of interest is that the large tail contains a distinct, persistent notochord and a dorsal nerve cord, structures which occur in the larvæ only of the sedentary ascidians, and are a proof of the vertebrate affinities of these remarkable animals. The little appendicularia is, in consequence, often regarded as a permanently larval form.

Appendix and Appendicitis. The appendix vermiformis is a slender, round, tapering process given off from and opening into the inner and back part of the cæcum, near the ileo-cæcal valve in the human intestine. It is usually $3\frac{1}{2}$ in. long, though it varies greatly; its diameter is about equal to that of a goose quill. It is a rudimentary organ; hence its vitality is low, and it is

liable to inflammation (appendicitis or perityphlitis). Appendicitis occurs at all ages, most frequently between twenty and thirty. It is started most commonly by the irritative action of substances passing through the bowel. It may be acute or chronic, with consequent ulceration and perforation, leading to peritonitis and various complications, resulting from the spread of inflammation to neighbouring organs. The usual symptoms are pain and tenderness. The temperature usually rises, in very severe cases reaching 104° - 105° ; it is rarely normal. With early care recovery is the rule; but recurrence is common, and neglect may easily lead to complications, such as peritonitis, followed by death. The treatment of slight cases, taken in hand early, consists in rest for the part, ensured by fluid diet limited in quantity, opiates to ease the pain and to restrain the muscular spasm of the bowel, with poultices. Early operative treatment for removal of the appendix is necessary if the inflammation proves uncontrollable.

Appenzell, canton in N.E. of Switzerland. Its name (*Abbatis Cella*) indicates its former possession by the abbots of St. Gall. In 1401 and 1405 the victories of Vögelinseck and the Stoss freed it from the rule of the abbots; in 1411 it became an ally, and in 1513 a full member, of the Swiss Confederation. In 1597, owing to religious disputes, it was divided into half cantons—Inner Rhodes (cap. Appenzell), Romanist and pastoral; and Outer Rhodes (cap. Trogen), Protestant and industrial. Inner Rhodes (in which rises Mt. Sentis, 8,216 ft., the culminating point of Appenzell) has an area of 61 sq. m., of which 55 sq. m. are productive; pop. 14,000. Outer Rhodes has an area of 101 sq. m., of which 98 sq. m. are productive; pop. 56,000.

Both halves are practically entirely German-speaking, and have preserved their primitive democratic assemblies, which meet annually. Many spots in Inner Rhodes are resorted to in summer for the whey cure; in Outer Rhodes the muslin and cotton industry is the chief occupation. The largest town in the canton (Outer Rhodes) is Herisau; pop. 13,500. See Richmond's *Appenzell* (1895).

Apperception, a term introduced by Leibniz to denote perception of which we are conscious, as distinguished from the multitude of perceptions which pass without any notice. This use of the word forms a point of departure for two later modes of usage—(1) the logical or Kantian, in which the term 'synthetic unity of apperception' signifies the logical unity of all knowledge, the principle that all partial knowledges must be coherent—*i.e.* must be capable of taking their place in a single system of knowledge; (2) the psychological usage, in which the term 'apperception' signifies the process of mental assimilation, the process in which a new presentation receives significance by virtue of being referred to already existing knowledge—*e.g.* certain motions of a flag become a signal for one who knows the code. By some psychologists apperception is used as equivalent practically to attention.

Apperley, CHARLES JAMES (1779-1843), English writer on sport; contributed popular articles to *The Sporting Magazine* (1821) over the name 'Nimrod,' and published 'The Chase, the Turf, and the Road' (in *Quart. Review*, 1827), *Memoirs of the Life of John Mytton* (1837), *Nimrod Abroad* (1842), *The Life of a Sportsman* (1842, with biography 1874), and *Hunting Reminiscences* (1843).

Appert

Appert, BENJAMIN NICOLAS MARIE (1797–c. 1850), French philanthropist, who interested himself especially in soldiers and prisoners, and in education in the army. In 1822 he was convicted of assisting the escape of political prisoners, and was imprisoned. He travelled all over Europe, visiting schools, hospitals, and prisons, and published his observations in his *Journal des Prisons* (1825–30). Besides philanthropic works, he wrote *Dix Ans à la Cour du Roi Louis-Philippe* (1847).

Appiani, ANDREA (1754–1817), nicknamed 'The Painter of the Graces,' a famous Italian fresco painter; born and died at Milan. He was patronized by Napoleon. His best works are a series of frescoes (*Amor and Psyche*) at Monza, and those in the Royal Palace at Milan.

Appianus, or APPIAN, the historian of Rome, was born at Alexandria, but lived in Rome from about 100–140 A.D. His history was written in Greek, and gave a separate account of each district until it became part of the Roman empire. The subjects of the different books were—(1) the Kingly Period of Rome; (2) Italy; (3) the Samnites; (4) the Gauls; (5) Sicily and the other Islands; (6) Spain; (7) Hannibal's Wars; (8) Libya, Carthage, and Numidia; (9) Macedonia; (10) Greece and Asia Minor; (11) Syria and Parthia; (12) Mithridates; (13–21) the Civil Wars from Marius and Sulla to Actium; (22) the Hundred Years from Actium to Vespasian's Accession, 69 A.D.; (23) Illyria; (24) Arabia. Only eleven books are extant—6–8, 11–17, and 23—with some fragments of the others. Appian is merely a compiler from previous writers; he cannot claim any excellence of style or historical acumen; yet his authority for the civil wars, in the absence of other histories, is of great value. Editions: Text, Bekker

(1852–3), Mendelssohn (1879–81)—both German. See Hannak's *A. und seine Quellen* (1869).

Appian Way (Lat. *Via Appia*), Italy, an ancient Roman military road which connected Rome with Alba Longa, and thence led on to Capua, Beneventum, and Brundisium. It was called 'the queen of roads' (*regina viarum*), and was begun by the censor Appius Claudius in 312 B.C. Immediately outside Rome it is lined with interesting memorials of the past, chief among which are the church Domine quo vadis, the temple or rather tomb of the Deus Rediculus, the ancient tomb known as the temple of Bacchus, the catacombs and the church of St. Sebastian, the circus of Maxentius, the round mausoleum of Cæcilia Metella, the tomb of M. Servilius Quartus, and various other tombs, the reputed Villa Quintiliana, the tomb known as Casale Rotondo, the 12th century tower called Torre di Selce, and the ruins of the old Latin town of Bovillæ.

The new Appian Way runs from Rome to Albano, parallel to the above; it was made by Pope Pius VI. in 1789. Beside it stand the ruins of the basilica of St. Stephen (4th century), and the Acqua Santa baths.

Appin, dist. and vil. on the E. shore of Loch Linnhe, Argyllshire, Scotland, 15 m. N. of Oban. Two m. N. is the castle of Stalker, the ancient seat of the Stewarts of Appin.

Apple, the fruit of a tree (*Pyrus malus*) which grows wild throughout the British Isles, continental Europe except in the extreme north, Asia Minor, and Persia. All cultivated varieties have been derived from the wild (or crab) apple. Its cultivation has spread over the whole world, except where extremes of heat and cold prevent its growth. In Britain the tree flowers in May, following the blossoming of the pear,

and generally escapes the earlier frosts. After the flowers have been fertilized by bees the anthers and petals fall, and the fleshy receptacle swells up to form the main part of the fruit, enclosing the ovary, which becomes the core of the apple. At the depressed apex of a ripe apple the persistent calyx of five withered sepals may be seen, around a canal which leads down past the old filaments of many of the stamens to the bases of the five styles, which stand up freely in the canal. Since more than the pistil enters into the composition of the apple, the fruit is known as a *pseudocarp*, or 'false fruit.' There are over 1,500 varieties of apples in cultivation. After numerous experiments a coreless and seedless variety has been developed in Colorado, specimens of which reached this country in 1905. According to its use, the fruit is classified as dessert (or eating) and kitchen (or cooking) apples. The trees are trained as full, half, and dwarf standards, espaliers, and wall trees. Propagation is by means of seeds, grafts, and cuttings. This fruit was in Greek mythology the symbol of love, because it was given by Dionysus to Aphrodite; of strife, because it was an apple that Eris threw amongst the guests at the wedding of Peleus and Thetis; and of fruitfulness, because Gæa gave golden apples to Hera upon her marriage to Zeus. The apple, further, tempted Atalanta to lose her race for liberty against Hippomenes; and is traditionally believed to have been the fruit which caused the fall of Eve in paradise. In Scandinavian mythology apples were the food of the æsir or gods; and in Teutonic mythology, again, the apple was the symbol of sustaining (another's) love. See FRUIT FARMING; also De Candolle's *Origin of Cultivated Plants* (1872).

Apple of Sodom, or DEAD SEA APPLE, the fruit of a tree said to grow on the site of Sodom; according to Josephus and other ancient writers, it was beautiful to the eye, but turned to ashes when plucked. It is sometimes identified with the *Solanum Sodomium* of N. Africa, which has poisonous effects.

Appleby, munic. bor. and mrkt. tn., on the Eden, Westmorland, England. The castle is mainly of the 17th century, with a fine collection of portraits and antiquities. The grammar school was founded by Elizabeth, and the church of St. Michael in Bon-gate is said to be Saxon. Of importance in Roman times, the town was destroyed by William of Scotland in 1176, and was again laid waste in 1388. During the civil war it was garrisoned for the king by the Countess of Pembroke, but after Marston Moor it fell into the hands of the Parliament. Pop. 1,800.

Appleton, city of Wisconsin, U.S.A., at the foot of Lake Winnebago, 95 m. n.w. of Milwaukee; manufactures paper. It is the seat of Lawrence University. Pop. 17,000.

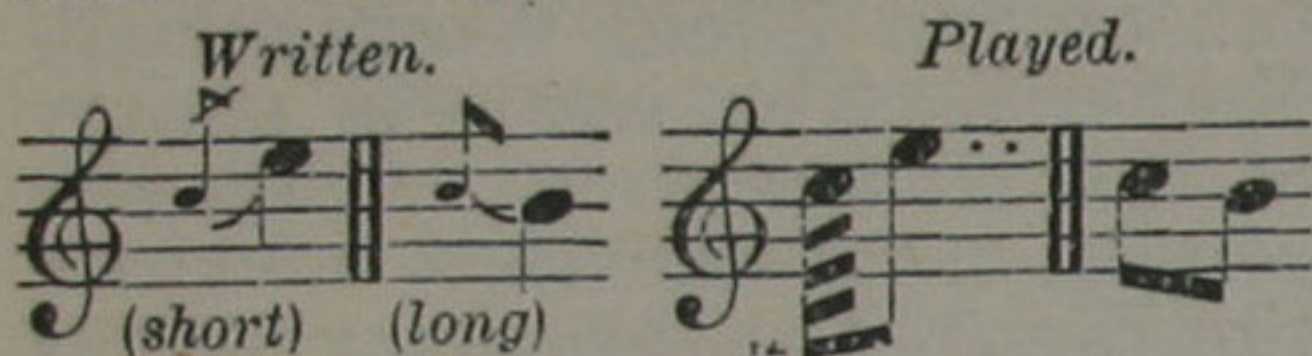
Appleton, CHARLES EDWARD (1841-79), a student of philosophy, on which he lectured at Oxford; moved to London in 1872. He was founder of *The Academy* (1869), of which he was editor until his death. See *Life* by John Appleton and Sayce (1881).

Appleton, DANIEL (1785-1849), American publisher, founder of 'D. Appleton and Co.,' was born at Haverhill, Mass. He went to New York (1825), and began to publish in 1831. He made from the first a speciality of the importation of English books.

Appleton, THOMAS GOLD (1812-84), American author and amateur painter, born in Boston, Mass.; published *A Nile Journal* (1876), *Syrian Sunshine* (1877), *Windfalls*

(1878) in prose; and *Faded Leaves* in verse. See *Life and Letters of Thomas Gold Appleton* (1885).

Appoggiatura, an ornamental note in musical score used to embellish a melody, is a small note prefixed to a principal note, and may be long or short; in the latter case it is generally termed an *acciaccatura*, and has an oblique line across the end of its stem. The



short appoggiatura must be heard distinctly, but takes little appreciable time value from the principal note. In its most common form the long appoggiatura takes half the value of the note to which it is prefixed, unless when placed before a dotted note, when it is given two-thirds of the value; in either case the long appoggiatura receives the accent.

Appomattox Courthouse, vil., Virginia, U.S.A., 24 m. E. of Lynchburg. Here, on April 9, 1865, General Lee and the Confederate army surrendered to Grant, and thus ended the civil war.

Apponyi, ALBERT, COUNT APPONYI (1846), Hungarian politician, famous for his gift of oratory, has sat in the Hungarian Parliament almost continuously since 1872, and since 1878 has been the acknowledged leader of the Conservative National party. In 1905, after the fall of the Tisza ministry, he became one of the most prominent leaders of the opposition party, and from 1906 to 1910 was Royal Hungarian Minister of Public Education. He has published many articles on Hungarian Public Law, besides parliamentary speeches.

Apportionment. Periodical payments in the nature of income, such as rents, annuities, and dividends, are, under the Ap-

portionment Acts, treated like interest on money lent, and considered as accruing from day to day, and apportionable accordingly. Thus, if A and B are successively entitled to a certain income payable quarterly, and A dies between two quarter days, the current quarter's income is apportioned between A's estate and B, instead of the whole belonging to B, as it would by the common law. So, if the reversion to a lease is assigned between two quarter days, the assignor is entitled to the proportionate part of the rent which has accrued due up to the date of the assignment, the remainder belonging to the assignee. Again, if the reversion to part of the land leased is assigned, the assignee gets only a proportion of the whole rent reserved by the lease.

Apposition, a grammatical term expressing the relation between a noun or a pronoun and an explanatory noun or noun clause which agrees with it in case without being a predicate. Thus, in the sentence, 'John the smith came home,' the words 'the smith' are in apposition to John. The tendency in modern English is to regard all appositional adjuncts as part of the subject, and to add the inflections at the end. Hence we say, 'John the smith's wife,' and not 'John's wife, the smith,' as an older writer might have said, or 'John's the smith's wife,' as a precisian might contend for.

Appraisement, in English law, denotes the valuation by two sworn licensed 'appraisers' of goods taken under a distress for rent, the tenant being entitled under the Law of Distress Amendment Act, 1888, to require such appraisement before the landlord can sell the goods. The duty payable on a legal appraisement ranges from 3d. for £5 or under, to £1 for £500 or over. The cost

of the annual license for an appraiser is £2, auctioneers and attorneys being exempt.

Apprehension. See ARREST.

Apprentice, a person who is bound for a term of years to serve a master in some trade or calling in which the master is bound to instruct him. As the apprentice is usually under age when the agreement is made, his father or some other person is made a party to it to guarantee its due performance. The apprenticeship, the term of which cannot legally exceed seven years, must, if it is to be for more than one year, be in writing. Indentures—*i.e.* agreements under seal—are not essential. The stamp on an apprenticeship agreement, whether a premium is paid or not, is 2s. 6d.; but indentures of parish apprentices and apprentices to sea service are exempted. The master can be sued for not properly instructing the apprentice. He is bound to provide an indoor apprentice with proper food, and, if he is ill, with medical attendance, and he is criminally responsible for breach of duty in this respect. Under the Employers and Workmen Act, 1875, which only applies to workmen apprentices in respect of whom a premium of less than £25 has been paid, if a master illtreats an apprentice, a magistrate may order the discharge of the apprentice and the return of any premium that has been paid. On the other hand, if the apprentice absents himself from his duties, a magistrate has power to order him to perform them, and to imprison him for fourteen days in default of his so doing. In the city of London, the city chamberlain has concurrent jurisdiction as to all apprentices, without regard to the amount of the premium. An apprenticeship agreement may, at the option of the parties, be terminated by mutual agree-

ment, by the death of either master or apprentice, a master's bankruptcy or relinquishment of his trade, the expiration of the term agreed upon, or the coming of age of the apprentice; but an apprentice who does not repudiate his indentures on coming of age will be held to have confirmed them. The illness of an apprentice, if it is such as to permanently incapacitate him, would be a good defence to any action by the master for breach of service. The agreement between master and apprentice is personal, and cannot be transferred to another. A master may inflict moderate corporal punishment on an apprentice who is under age. Apprentices to the sea are governed by the Merchant Shipping Act, 1894. See *Austin's Law of Apprentices* (1890).

Approaches. (1.) Siege Warfare. See PARALLELS. (2.) Defence: covered ways by which the supports can reinforce the firing line unmolested.

Approbate and reprobate, the Scottish equivalent of the English equitable doctrine of election.

Appropriation. (1.) OF ECCLESIASTICAL BENEFICES, means the annexing of them to the perpetual use of a religious house or order. Before the reformation, livings were often appropriated to monasteries. After the dissolution, the persons to whom the monasteries and their lands were granted by the king took those livings also which had been appropriated to them, and thus were called lay impropiators, the cure of souls being entrusted to a vicar or perpetual curate. (2.) OF PAYMENTS. When a debtor owes different debts to the same creditor, and makes a payment on account, he is entitled at the time to appropriate the money paid to any debt he

chooses; but if he pays the money generally, without making any appropriation, then the creditor may appropriate the payment to the discharge of whichever debt he likes. If neither the debtor nor the creditor makes any appropriation, the law will appropriate the payment, generally, to the discharge of the earliest debt unpaid. When a current account is kept at a bank, the earliest drawing is appropriated to the earliest payment. (3.) OF SUPPLIES. Except sums directly charged upon the Consolidated Fund, such as judges' salaries, no payment of public money can legally be made without the express sanction of a vote of the House of Commons. The practice is to pass two Consolidated Fund Acts each year, one at the beginning of the session and one later, by which money for current expenditure is authorized to be issued out of the Consolidated Fund. Towards the end of the session the estimates are introduced, and the sum required for each purpose is voted. The Appropriation Act then authorizes the issue out of the Consolidated Fund of the balance of the money required, and it appropriates that money, and also all the money authorized to be issued by the two Consolidated Fund Acts of the session, to the particular services for which it has been voted.

Appropriation Clauses, certain clauses of parliamentary bills, which had for their purpose the commutation of Irish tithes into a rent charge, the reduction of the number of sinecures in the Irish Episcopal Church, and the 'appropriation' of the surplus revenues to the education of the whole people. Various unsuccessful attempts were made from 1833 to 1837 to carry these measures; in 1838 they were passed.

Approver, a legal term formerly applied to one who, being

charged along with others with the commission of a treason or felony, confessed and turned accuser of his accomplices in order to save himself. See KING'S EVIDENCE.

Approximation, in mathematics, denotes a result which, though not rigorously accurate, is sufficiently accurate for the end in view. Tables of logarithms are approximations accurate to a certain number of decimal places, and many equations can only be solved approximately. It is often possible to find, by plotting on squared paper (see GRAPHS), a simple expression to represent approximately a complex mathematical expression.

Appurtenances, strictly, rights which appertain to and pass under a conveyance of real property without being specifically mentioned—*e.g.* easements. But the term is often loosely applied to those things which are generally enjoyed with the principal thing—*e.g.* a grant of a house with its appurtenances may pass the garden. See APPENDANT AND APPURTENANT.

Apraxin. (1.) FEODOR, COUNT (1671-1728), founder of the Russian navy, was made general-admiral of the navy by Peter the Great. He took a successful part in the expedition against Sweden in 1710, and in 1713 he was in command of the fleet against Finland, and forced Sweden to conclude the treaty of Nystad, which gave to Russia the Baltic provinces. (2.) STEPHAN FEODOROVITCH, COUNT (1702-58), nephew of the above, fought under Münnich against the Turks. In 1757 he was appointed commander-in-chief of the army invading Prussia, and gained the battle of Grossjagersdorf (Aug. 30, 1757). Hearing of the illness of the Empress Elisabeth he returned to Russia, and died in prison while awaiting his trial for treason.

Apricena, tn., Italy, in Apulia, prov. of and 25 m. N. by W. of Foggia; has marble quarries. Pop. 7,700.

Apricot (*Prunus armeniaca*), a species of the plum division of the Rosaceæ, supposed by De Candolle to be a native of China, although it is now naturalized in Syria, Armenia, and Egypt. From its abundance in Palestine, Canon Tristram supposes it to be the apple of the Bible. The fruit is variable, about the size of a peach, single-stoned, with a sweet or bitter kernel (seed); golden or orange fleshed; velvety skin of similar colour, with pink or red on the sunny side: a distinct shallow groove runs down one side. The Persian name, *misch-misch*, is applied to the sweetest variety of apricot exported from the Levant, and commonly known as 'musch-musch,' which is often dried and rolled into cakes. The plant has been grown out of doors in Britain for over three and a half centuries, and is usually budded on the stocks of plums. Candied apricots come from the south of France. The older English name of 'apricock' is reminiscent of the Latin name *præcoqua*, 'early ripe.' See De Candolle's *Origin of Cultivated Plants* (1872).

April, MONTH OF. See YEAR.

April Fools' Day. See ALL FOOLS' DAY.

A priori and **a posteriori**. The antithesis of *a priori* and *a posteriori* knowledge has passed through various modifications of meaning. In earlier usage it expressed the contrast between knowledge through causes and knowledge through effects; then, later, the contrast between rational and empirical knowledge. The Kantian usage connects itself with the latter contrast. *A priori* principles are for Kant those that are independent of experience, in the sense that their truth is not

proved by a collection of empirical instances, but is seen to be presupposed in the very nature of a connected or intelligible experience: *e.g.* 'Every event must have a cause' is such a principle. *A posteriori* knowledge, on the other hand, must be referred to particular experience for its proof—*e.g.* the proposition, 'Arsenic is poisonous.' But the expression *a priori* is commonly applied to any knowledge which is general in its character, and thus independent of particular verifications: *e.g.* a general proof of the impossibility of squaring the circle makes it needless to examine particular attempts to solve the problem.

Apron, in engineering, a covering built to protect a surface from the action of flowing water or from heavy shocks.

Apsaras, a race of female beings in Hindu tradition who form attachments with the Gandharvas, and bear a strong resemblance to the swan-maidens and seal-women of European folklore. They were originally water-sprites. Probably the best known is Urvaci, who figures in one of Kalidasa's dramas.

Apse, in ecclesiastical architecture, the easternmost portion of a church; the recess at the end of the chancel. It is semicircular, or, more commonly, consists in plan of five sides of an octagon. It is supposed to represent the raised platform of the secular *basilica* or public hall; some maintain that it was borrowed from the presidential platform of the meeting-room of the early Christian guilds. See BASILICA.

Apsheron (Per. 'sweet water'), a peninsula at the extremity of the Caucasus range, jutting out for 30 to 40 m. eastwards into the Caspian. Geologically it is composed of limestone and sandy clay, and contains saline lakes, petroleum wells (see BAKU), and mud volcanoes.

Apsides, two points in the orbit of a planet or satellite where it is cut by the major axis. These points are at aphelion and perihelion, and the 'line of apsides' is therefore equivalent to the major axis; and since, in the case of the earth and moon, it shifts forward through the effects of perturbation, the anomalistic year or month is longer than the corresponding sidereal period.

Apsley House, at the corner of Hyde Park, London, was built by Baron Apsley, Lord Bathurst, in 1785, on the site of the Hercules' Pillars Inn mentioned in Fielding's *Tom Jones*, and in 1820 was presented by the nation to the Duke of Wellington. It is still the residence of the Wellington family.

Apt (anc. *Apta Julia*), tn., dep. Vaucluse, France, 31 m. s.e. of Avignon; has a cathedral (10th to 11th century); some trade in fruits, truffles, etc. Pop. 6,000.

Aptera, or **APTERYGOTA** (Gr. 'wingless'), a primitive order of insects, including those forms which have apparently never possessed wings. The absence of wings occurs in parasitic forms (e.g. fleas and lice), in larval forms (e.g. maggots and caterpillars), in the workers of ants and termites, in the females of some cockroaches, and so on; but in all these cases the life-history, or a comparative study of allied insects, shows that the loss of wings is secondary—a derived character. In the Aptera, on the other hand, there is nothing to suggest that wings were ever present, and the insects remain permanently at the larval level. As in many larvæ, the regions of the body, especially the thorax and abdomen, are not well marked. The Aptera are all small, delicate insects, and are divided into two sub-orders, Collembola and Thysanura. A good example is the little 'silver-fish' (*Lepisma*), common in kitchens.

Apteryx, or **KIWI**, a bird peculiar to New Zealand. It is very much smaller than its nearest allies, the extinct Moas, but, like them, is without obvious wings. The feathers are hair-like in appearance, and the beak is long and curved, with the nostrils nearly at its extremity. The food consists chiefly of earth-worms, and the birds are entirely nocturnal in habit. Kiwis breed slowly, one or two very large eggs only being laid during the season, and as yet there is no record of the successful rearing of young in captivity. Though now carefully protected, it is to be feared that their extermination is only a matter of time.

Aptornis, a genus of recently extinct wingless birds, probably of the family Rallidæ, the fossil remains of which are found, along with those of the Moa, in the recent formations of New Zealand.

Apuan Alps, in Italy, lie between the Ligurian Alps and the Mediterranean, parallel to the former, and reach an altitude of 6,385 ft. in Monte Pisano. They are outliers of the Apennine system. Their length is about 30 m., and they descend steeply to the sea on the w. Their upper layers are composed of some of the finest white marble in the world, which was known to the Romans, and was rediscovered by Michael Angelo. (See **CARRARA** and **MASSA**.)

Apuleius, **LUCIUS**, Roman rhetorician, b. c. 130 A.D. in Madaura, N. Africa; educated at Carthage and Athens. On the death of his father, who left him a large fortune, he travelled extensively, visiting Italy and Asia. The knowledge he thereby acquired of priestly irregularities forms the groundwork of many of the stories in his *Golden Ass*. On one of his journeys he was hospitably entertained during an illness by a young man, whose mother, a rich

widow named Pudentilla, married him. Her relatives accused him of gaining her affection by witchcraft; and the defence spoken (173) by Apuleius is still extant, under the title *Apologia*. His later life was spent as a rhetorician at Carthage. His most important work is known as *Metamorphoseon, seu de Asino Aureo, libri xi.*, the 'Metamorphosis, or the Golden Ass.' It is a romance; the autobiography of an imaginary Lucius who was turned by an enchantress into an ass, in which shape he observed the follies of men, until the priests restored him to his own form; a satire on the morality of the society of his day, particularly on that of certain orders of priests. The story of Cupid (Amor) and Psyche, in the 4th, 5th, and 6th books, forms the most interesting part of the work. This served as a basis to Raphael for his beautiful frescoes, *Story of Psyche*, in the Villa Farnesina in Rome. Some other writings, mostly philosophical, and of less interest, are still extant, besides the 'Defence' already mentioned. The latest and best edition is J. van de Vliet's *Metamorphoseon* (1897) and *Apologia and Florida* (1900). English translations are: *The Golden Ass*, by Sir G. Head (1851), and by Adlington (1566; new ed. 1892); and *Eros and Psyche*, by R. Bridges (1885). See also J. G. Frazer's *Golden Bough*; Dent's ed. (1903) of W. Adlington's trans. of *Cupid and Psyche*, with Latin text on alternate pages; and Walter Pater's *Marius the Epicurean*, i.

Apulia (Ital. *Puglia*), a territorial div. (compartimento) of S. Italy; stretches along the Adriatic from the river Fortore (w. of the lofty Gargano promontory) to the extreme s.e. corner of the peninsula, C. Santa Maria di Leuca, and thus embraces the three provinces of Foggia, Bari, and Lecce.

Its total area is 7,380 sq. m., and its pop. 2,100,000. Apart from Monte Gargano (5,120 ft.), the n. part of the territory is a level plain—a rich grazing ground in winter, when it supports thousands of sheep, but in summer it is parched and dry. The s. part, between the Gulf of Taranto and the Adriatic, is in part a low, dry limestone plateau, but yields excellent wheat, which is used in the manufacture of macaroni, also barley, maize, beans, lentils, pease, and good olive oil. Wine is generally produced—good, high coloured, and full of body. Other products are fruits (figs, oranges, lemons, olives, etc.) and salt, besides a little cotton, flax, tobacco, and silk. Marble is quarried on Monte Gargano. The people live, for the most part, in large towns, which are, as a rule, situated either on the Adriatic coast or on the edge of the limestone plateau. Among the former are Barletta, Bari, Monopoli, and Brindisi; among the latter, Andria, Bitonto, Putignano, Lecce. The chief ports on the Gulf of Taranto are Taranto and Gallipoli. The summers are hot, and malaria clings to certain swampy tracts along the coasts. For centuries this part of Italy was dominated by Greek civilization, disseminated from the cities of Magna Græcia; but, opposing Rome, it suffered severely in the social war of 90–88 B.C., and again after the failure of Hannibal's designs, which it had supported. After Rome's supremacy crumbled to pieces, the region was divided between the Eastern empire and the duchy of Benevento. During the 11th and 12th centuries it was overrun and subjugated by the Normans, and so passed under the crown of the Two Sicilies. See Gregorovius's *Apulische Landschaften* (4th ed. 1897); Lenormant's *A Travers d'Apulie* (1883). See also ITALY; and for history, NAPLES.

Apure, riv. of Venezuela, an important trib. of the Orinoco, rises in the Andes of Colombia, and flowing in an E. direction, joins the main river below San Fernando. It is navigable for over 600 m.

Apurimac. (1.) River, S. America, rises about 15° s. in the Peruvian Andes, and is a head stream of the Amazon. After its union with the Pirene, it flows under the name of Tambo, and after a course of 500 m. it joins the Ucayali. (2.) Department, S.W. Peru. Has fine grazing lands and forests, and produces sugar, rice, cocoa, and rubber. Area, 8,187 sq. m.; pop. 180,000. Its cap. is Abancay.

Apus, a fresh-water crustacean, about one inch in length, nearly related to the small brine-shrimps. Its interest lies in its primitive structure, which has led zoologists to regard it as near to the extinct ancestors of the Crustacea.

Apus, 'the bird of paradise,' sometimes called Avis Indica, a southern constellation, published by Bayer in 1603 from the observations of Petrus Theodorus. It lies south of Triangulum Australis, within about 13° of the Pole, and includes two variable stars, R and S Apodis.

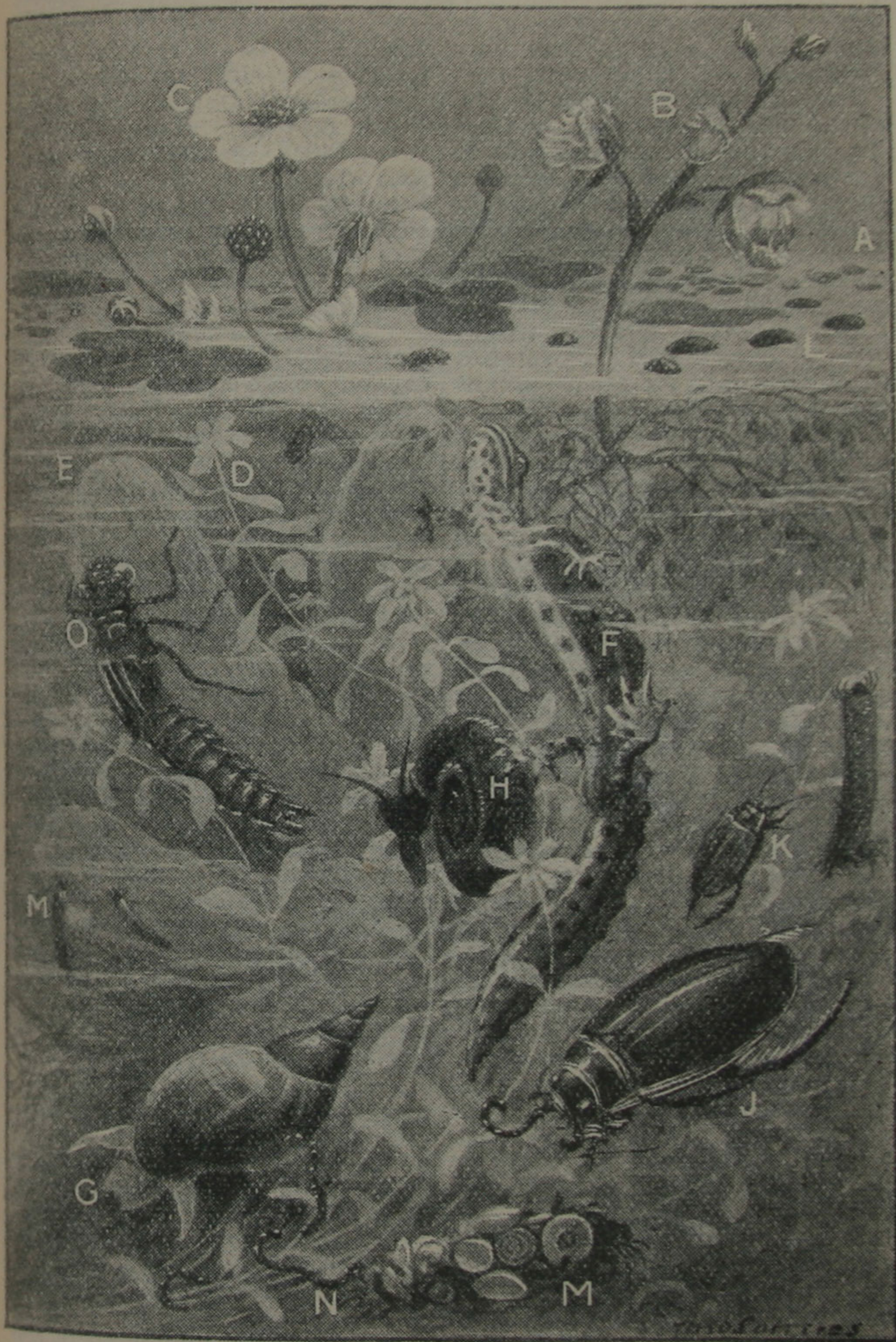
Aqua fortis. See NITROGEN.

Aquamarine, those varieties of beryl which are bluish-green or sea-green. As compared with the pure green beryl or emerald, it is of little value; but its beauty makes it a popular gem. It is found in many places, but comes chiefly from Brazil, Australia, and the Urals. See Streeter's (6th ed. 1898) or A. E. Church's *Precious Stones* (1883).

Aqua regia (Lat. 'royal water,' because it dissolves gold), a mixture of nitric acid with from two to four times as much hydrochloric acid, which sets free nitrosyl chloride and eventually chlorine; to this its solvent action is due.

Aquarium, one or more tanks or vessels containing aquatic plants and animals, living as nearly as possible under natural conditions. The basis of the modern aquarium is the mutual dependence of animals and plants, a principle not fully worked out until the earlier half of the 19th century. The fact that plants absorb the carbon dioxide generated by animals, and liberate the oxygen necessary for their respiration, was first definitely formulated by C. G. B. Daubeny (1833); but the interdependence of animals and plants is not limited to that relation, for plants are able to utilize the waste materials of animals. The popularity of aquaria was at first largely due to the publications of P. H. Gosse, especially his *Aquarium* (1853). Subsequent experience has, however, shown that, except on a small scale, the condition of balance is difficult to preserve; and almost all recent aquaria, whether those of the marine stations or those for public exhibition, have mechanical arrangements for aerating or renewing the water. It is now recognized that, under natural conditions, the wind and waves have much to do with the aeration of water, and in the aquarium the difficulties greatly increase with the depth.

The relative simplicity of the fresh-water aquarium is largely due to the fact that many fresh-water plants are easy to obtain, and grow readily, especially if planted in submerged flower-pots. The Canadian water-weed (*Anacharis*) will grow and flourish without soil, if a few young shoots are thrown into the water. Various species of duckweed (*Lemna*) can similarly obtain all the food they require from water; but as their fronds float at the surface, their aerating value is slight. An interesting plant is the somewhat rare bladderwort (*Utricularia vulgaris*), which, like many other



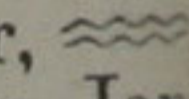
Fresh-water Aquarium.

A, Duckweed; B, Bladderwort (*Utricularia*); C, Water buttercup; D, Water starwort; E, Hornwort; F, Newt; G, Snail (*Limnæa stagnalis*); H, Snail (*Planorbis corneus*); J, Beetle (*Dytiscus marginalis*); K, Beetle (*Acilius sulcatis*); L, Beetle (*Gyrinus natator*); M, Caddis larvæ in cases; N, Bloodworms (larvæ of gnatlike flies); O, Pupa of large dragon-fly.

aquatic forms, develops in autumn 'winter buds,' laden with food material, which sink to the bottom of the pond. In spring they rise towards the surface, and unfold into a trailing mass of stems with threadlike leaves and remarkable bladders. These bladders serve as traps for minute aquatic animals, the bladderwort making up for its lack of roots by its carnivorous habit. If a few winter buds of *Utricularia* are dropped, in spring, into an open shallow pan of water, the vessel will serve as an aquarium in which tadpoles, caddis-worms, and larval beetles may be reared. In addition to its larger inmates, such an aquarium will also contain a number of minute forms, such as Rotifera and Protozoa, which are beautiful microscopic objects. Many other aquatic plants grow readily in aquaria, such as the very common water buttercup (*Ranunculus aquatilis*), water starwort (*Callitriche verna*), hornwort (*Ceratophyllum demersum*); and dealers also supply interesting exotics, such as *Vallisneria spiralis* and water chestnut (*Trapa natans*). Of the animal inhabitants, by far the easiest to keep alive are those capable of breathing both air and water, such as the aquatic amphibians, especially newts, axolotls and larval forms, molluscs such as the water snails, and larvæ of aquatic insects. Fish require care; the beginner is most likely to be successful with sticklebacks and minnows. If the water becomes contaminated with surplus food, the fish are liable to attacks of 'fungus' (*Saprolegnia*). If noticed in time, this may be cured by transferring the affected forms to running water; but if the disease once obtains a hold, there is no cure except the removal of all the inhabitants, and the thorough disinfection of the aquarium.

The salt-water aquarium presents more difficulties than the

fresh, as it is not easy to repair damage wrought by inattention or accident, and an unnoticed death may poison all the other inhabitants. Nor are seaweeds so easy to grow as fresh-water plants. Sea lettuce (*Ulva*) is as good a plant as any, and should be obtained attached to a stone or piece of rock. Of animals, the beautiful anemones, some of which—*e.g.* *Actinia mesembryanthemum* and *Actinoloba dianthus*—are hardy in captivity; the echinoderms—starfishes, sea urchins, brittle stars, etc.; marine worms, such as *Sabella*, *Serpula*, and others; and the marine representatives of molluscs and crustaceans, are well worth cultivation. There are marine aquaria attached to the biological stations of Naples, Plymouth, St. Andrews, and Port Erin in the Isle of Man. Other notable aquaria exist at Brighton (England), Berlin (1869), Hamburg, New York, and Washington. See Taylor's *Aquarium* (1881), also J. G. Wood's *Common Objects of Seashore, including Hints for an Aquarium* (1886).

Aquarius, a southern zodiacal constellation, and the eleventh sign of the zodiac, symbolized by the hieroglyph for water, . The sun enters the sign on January 21, but reaches the formerly coincident asterism only on February 14. None of its stars are of the third magnitude, but it includes the fine binary ζ Aquarii, to which Doberck has assigned a period of 1,625 years, 4 Aquarii with a period of 80 years, a magnificent globular cluster (Messier 2), and the 'Saturn' nebula (N.G.C. 7009), a pale-blue planetary with ringlike appendages.

Aquatic Animals. It has become almost an axiom of modern science that life originated in the water, and numbers of animals, especially the simpler forms, still inhabit that medium. This is true of the vast majority of the



Salt-water Aquarium.

A, *Ulva latissima*; B, Beadlet (*Actinia mesembryanthemum*); C, Plumose anemone (*Actinoloba dianthus*); D, Common starfish; E, Purple-tipped urchin; F, *Serpula contortuplicata*; G, Top-shell; H, Limpet; J, Broad-claw crab.

Protozoa, sponges, Coelentera, and echinoderms. It is the rule for unsegmented worms, except where these are parasitic; and, among annelids, the earthworms and land-leeches are obviously forms which have later acquired a terrestrial habit. Though, among arthropods, the great groups of insects, myriapods, and arachnoids are typically terrestrial, yet the Crustacea are almost all aquatic. Among molluscs, only the gastropod class includes land forms.

In vertebrates, the line which separates the typically aquatic and typically terrestrial forms passes through amphibians, which may, as in the frog, be water animals in youth and land animals in adult life. Nevertheless, the crocodiles, turtles, and water snakes among reptiles, many birds, the sirenians, cetaceans, and seals among mammals, illustrate the fact that members of typically terrestrial groups may return to a purely aquatic life. An important point in these cases is that the aquatic reptile, bird, or mammal retains its terrestrial habit of breathing air by lungs, and shows no tendency to re-acquire gills. In general we may say that above amphibians the aquatic habit, when present in a vertebrate, has been secondarily acquired. The adaptations to the aquatic life are therefore usually more easily studied in such vertebrates than in invertebrates, where the aquatic habit is often the primary one. The whale, for example, as contrasted with an ordinary terrestrial mammal, shows some very striking modifications of structure. The spindle-shaped form, repeated in fish, is less an adaptation to the aquatic life in itself than to swift movement in water. To a similar cause the absence of the hair and of the hind limbs is to be assigned. The use of the tail as the main organ of propulsion is common

among aquatic animals; while the fact that the body loses in water a large proportion of its weight sets the limbs free from the supporting function which they must perform in land animals.

A very common structure in those aquatic animals which are capable of rising and sinking in the water is some form of hydrostatic organ, or internal reservoir of gas. All air-breathing vertebrates have these in their lungs, which were perhaps themselves in origin merely hydrostatic organs; fish have usually a swim-bladder; many cuttles have air-spaces in their 'bone' or float; the pearly nautilus has its chambered shell filled with gas; even many of the Protozoa have bubbles of air in their soft bodies. While many aquatic animals are swift swimmers, and others creep passively at the bottom, the fact that large bodies of water are themselves always in motion renders life in water possible for two sets of animals to whom terrestrial life would be impossible. There are, first, the drifters or 'plankton,' animals which can make no headway against currents, but float idly with them. This fauna consists largely, though not exclusively, of the simpler forms of animal life. Secondly, among aquatic forms there are numbers which are fixed to the ground or to other animals, and depend upon the movements of the water itself for food.

In general we may say that, owing to the physical conditions, simple animals are more abundant in water than on land; but in addition to this primitive fauna, many complex forms have returned from the land to the sea, and such forms often display remarkable modifications of structure associated with the aquatic life.

Aquatic Plants, or **HYDROPHYTES**, are wholly or partially submerged, but do not include

marsh plants. Seaweeds and fresh-water algæ are aquatic. Many of the former are left exposed to the air at low tide, but are prevented from drying entirely by the presence of mucilage, which enters into the composition of their cell-walls. The sliminess of water plants is due to a secretion of mucilage over the surface. The better-known examples of aquatic flowering plants are the water buttercups (*Ranunculus*), some of them with all the leaves submerged, and repeatedly divided into linear segments which enable them to yield readily before currents, and also to increase the absorptive area; others with similar leaves to these, and also floating leaves with the blade in one piece, lying flat on the water; water lilies (*Nymphaea* and *Nuphar*), with large, elliptical, undivided leaves floating on the surface; and the pondweeds (*Potamogeton*), with submerged and floating petioled leaves, or with ribbon-shaped leaves. The Cape pondweed (*Aponogeton*) and Canadian pondweed (*Elodea*) are other examples; but there are many more. The majority of water plants are fixed in the soil, but some, like duckweed (*Lemna*) and water soldier (*Stratiotes*), float, or at least are free from the soil. The whole surface of a water plant in contact with the water absorbs liquid and gaseous food, and, in the case of flowering plants, such absorptive surfaces are almost or entirely devoid of the stomata and cuticle which are commonly found in the epidermal surfaces of land plants; but both stomata and cuticle occur on the upper surfaces of floating leaves. The vascular and fibrous tissues of the stems and leaves are poorly developed, since they are scarcely required, and the roots are reduced. Large air-spaces occur in the cellular tissue of most water plants, and these become filled with oxygen, for the

better respiration of the plant. Most aquatic plants expose their flowers above the surface, and thus are subject to the same means of pollination as land plants. A few only have entirely submerged flowers, as in sea wrack (*Zostera*), which, like very few other plants, is submerged in sea water. Most aquatic plants are perennial. Some—e.g. *Utricularia* (see AQUARIUM)—form dense terminal winter buds in autumn: these drop off, rest at the bottom during the winter, and then develop during the following spring. Others perennate by means of fleshy rhizomes, which store up food. See Willis's *Flowering Plants and Ferns*, vol. i. (Camb. Univ. Press, 1897); Cook's *Fresh-Water Algæ*.

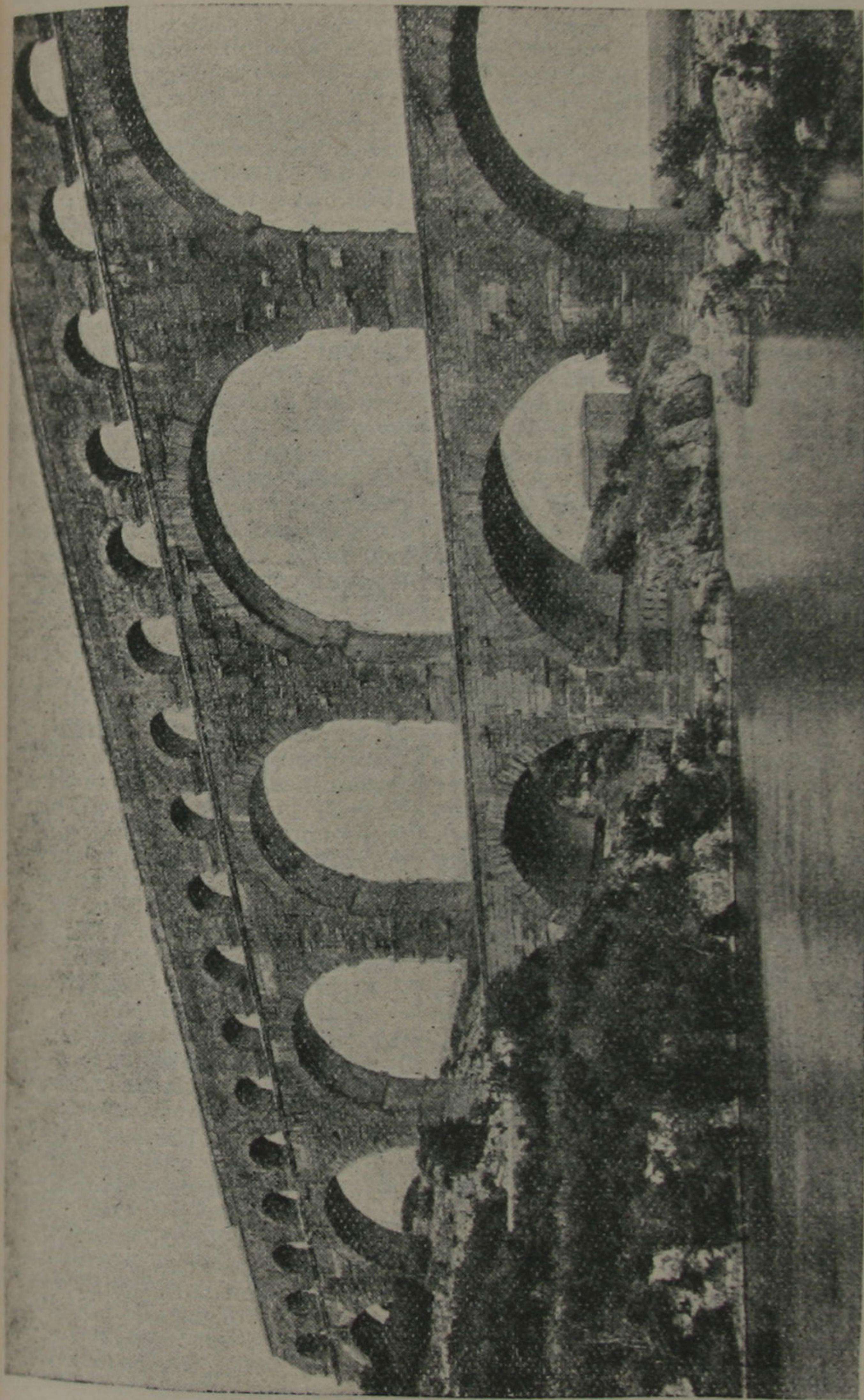
Aquatint, an etching process on copper by which prints are produced imitating the broad effects of India ink and sepia drawings. In this process, areas, not lines, are bitten in by dilute acid on a copper plate covered with black resin, on which the design has already been traced. Devised by Abbé St. Non in the 18th century, and perfected by Jean Baptiste le Prince (1733–81), the process has now fallen into disuse, except for the tints printed in some coloured pictures.

Aqua Tofana, a poisonous liquid, invented by a woman named Teofania di Adamo, who died at Palermo in 1633. Her reputed daughter, Giulia Tofana, afterwards sold the liquid at Rome and Naples in vials, under the title 'Manna of St. Nicholas of Bari.' It was a clear, colourless, tasteless, and odourless liquid, of which only a very small quantity was sufficient to produce death, under symptoms which did not readily arouse suspicion of poisoning. It is supposed to have been a preparation of arsenic, antimony, and lead. See Ademollo's *I Misteri dell' Acqua Tofana* (1881).

Aqueduct, an artificial channel for conveying water. The term is not applied to pipes working under pressure, but only to channels in which the water flows with a free surface; in popular language, refers specially to a channel raised above the level of the ground. The term 'pipe aqueduct' refers to a pipe with water under pressure, not sunk in the ground, but acting as a bridge to span some hollow. The piers and arches of an aqueduct may be of stone, brick, or concrete. The water channel, if of masonry, must be made water-tight with cement or clay puddle. An iron or steel water channel is often used. In America many of the aqueducts carrying irrigation water across valleys are timber structures; trestle bridges are largely used, and the timber channels are called *flumes*. The Romans made little use of pipes under pressure; they raised the channel on arches to keep it at the proper gradient. Where the height was great, they built two or three tiers of arches one above another; and to make the channel impervious to water, the masonry was coated with stucco. Hewn masonry was generally used, but the Tepula aqueduct at Rome was largely constructed of concrete. Some of these early aqueducts are still in a good state of repair, and continue to carry water; a good example is that at Segovia, in Spain, built about 109 A.D.

Before the end of the 1st century A.D. Rome was supplied by nine aqueducts, with a total length of over 270 m., of which about 35 m. was raised above ground on arches. The last of these to be built, the Anio Novus, at one point is 109 ft. above ground-level. It is built above the Aqua Claudia, the two waters flowing in separate conduits on the same arches. The aqueduct *Delle Torrè Spoleto* (Umbria) dates from the 7th or 8th century, and is about 300 ft. high,

with two series of pointed arches. In the Roman provinces there were the incomparable aqueducts at Nîmes, at Segovia and Tarragona, at Metz and Mainz, at Antioch, and at Pyrgos, near Constantinople. The ancient Greek world possessed famous aqueducts at Athens (made c. 560 B.C.), at Samos (c. 625), and at Syracuse (still in use). In France, the aqueduct of Maintenon was constructed in Louis XIV.'s time, to bring water to Versailles; it is 4,400 ft. long, over 200 ft. high, and has three tiers of arches of about 50 ft. span. The first aqueducts of importance in Britain were built towards the end of the 18th century to carry canals. They were of masonry, with the bottom and sides of the canal puddled. The Barton aqueduct, built by Brindley, carries the Bridgewater Canal over the Irwell; the canal water-level is 39 ft. above the river. On the construction of the Manchester Ship Canal in 1887-94, Brindley's aqueduct had to be altered. The Bridgewater Canal did not allow the necessary headway for ships' masts, and a swing aqueduct, pivoted at its centre, was constructed. The aqueduct carrying the Ellesmere Canal across the Dee has a length of 1000 ft., with a height from water to water of 126 ft. In connection with water supply few aqueducts (in the sense of bridges) of any length have been made in recent years, as an inverted siphon of pipes serves the purpose, and is much less costly. Where the valley crossing is short, however, bridge aqueducts are formed. These are generally built of masonry, with a water channel of concrete, iron, or steel, and examples of these are to be seen on all the large water-works of the present day. See further under WATER, WATER CHANNELS, WATER SUPPLY; also Herschel's trans. of Frontinus's books on



Roman Aqueduct at Pont du Gard, Nîmes.

Water Supply of Rome (1899); Hodgkin's *Walls, Gates, and Aqueducts of Rome* (1899); Turneure and Russell's *Public Water Supplies* (1901).

Aqueous Humour. See EYE.

Aqueous Rocks, a term applied to all rock masses which have been laid down beneath water, whether in the form of sedimentary deposits, of accumulations of shells and other animal or plant remains, or of crystalline masses due to concentration by evaporation. See SEDIMENTARY ROCKS.

Aquifoliaceæ, an order composed of evergreen trees and shrubs, represented in Europe by one species, the holly. A South American species yields *maté* or Paraguay tea, and a North American species Appalachian tea. Most of the plants of the order are bitter, tonic, and astringent.

Aquila, an ancient constellation placed S.E. of Lyra, and traversed by the Milky Way. A supposed Euphratean representation of it dates back approximately to 1200 B.C. Some of its southern stars were separately grouped in honour of Antinous (130 A.D.), but the arrangement is now discarded. Nova Aquilæ, photographically discovered by Mrs. Fleming in April 1899, was then of seventh magnitude. Its bright-line stellar spectrum became nebular as it faded. A second Nova was, when discovered in 1905, of magnitude $6\frac{1}{2}$. One of the best known short-period variables is η Aquilæ, which fluctuates from 3.5 to 4.7 magnitude in 7 days 4 hours, and was found by Bëlopolsky in 1895 to be a spectroscopic binary. θ Aquilæ is also a spectroscopic binary with a period of 17.2 days. Of the double stars in the constellation hardly any exhibit decided relative motion.

Aquila, CASPAR (1488-1560), the Latin name of a German theologian, ADLER, who, after suffering imprisonment in 1519-20 for his

advocacy of the reformed doctrines, became professor of Hebrew at Wittenberg (1524), and aided Luther in translating the Old Testament. Becoming Protestant pastor of Saalfeld (1527), he was outlawed by Charles V. (1548), but was restored to his pastorate in 1552. He left sermons and controversial works.

Aquila, PONTICUS, a native of Sinope in Pontus, flourished about 130 A.D. He made a translation of the Old Testament into Greek, of which a few fragments survive in Origen's *Hexapla*. He is said to have been successively a pagan, a Christian, and a circumcised Jew.

Aquila degli Abruzzi. (1.) Province, Italy, in territorial division, Abruzzi and Molise, between the two main chains of the Central Apennines. Cereals, flax, hemp, and fruits are the chief productions. Area, 2,485 sq. m. Pop. 410,000. (2.) Chief tn. of above: episc. see, and summer resort; stands on a plateau at the foot of the Gran Sasso d'Italia, the culminating knot of the Central Apennines, 55 m. N.E. of Rome. Saffron is extensively grown in the vicinity. Lace-making gives employment to many of the women. Aquila was founded by the Emperor Frederick II. in 1240, on the ruins of the ancient *Amiternum*. Pop. 22,000.

Aquilegia. See COLUMBINE.

Aquilaia, or AGLAR, vil., Austria, in Görz and Gradisca, at the head of the Adriatic, 26 m. by rail N.W. of Trieste. It was in ancient times strongly fortified, and, owing to its position at the foot of several Alpine passes, and on the Via Æmilia, was the principal bulwark on the N.E. frontier of Italy. It was founded in 182 B.C., was strongly fortified by Marcus Aurelius, and in the 4th cent. A.D. was the fourth city in point of size and population in all Italy; but in 452 it was captured by Attila, who razed it to the ground, the inhabitants escaping

to the lagoons in which Venice was afterwards built. Aquileia possesses an 11th century cathedral, and has a museum full of valuable Roman antiquities. Pop. 2,500.

Aquin, tn., Haiti, West Indies, on s. coast, 75 m. s.w. of Port au Prince. Pop. 20,000.

Aquinas, THOMAS (? 1226–1274), 'the angelic doctor,' was the son of the Count of Aquino, near which town, situated between Rome and Naples, he was born about 1226. Having received the elements of his education in the monastery of Monte Cassino, he proceeded to the University of Naples, and in his seventeenth year joined the Dominicans. He afterwards studied under the celebrated Albertus Magnus at Cologne; accompanied his master in a three years' sojourn at Paris (where he graduated bachelor of theology); then returned with Albert to the school of Cologne as second teacher and *magister studentium*. The University of Paris having assumed a bitter hostility to the mendicant orders, Thomas sprang to the defence of the latter with tongue and pen; and having received the Pope's special commission to act as the champion of the Dominicans, he vindicated their position with such acumen and address that he procured the discomfiture of their chief opponent, William of St. Amour. Although this strife somewhat delayed his academic progress, so that he was over thirty before Paris granted his doctorate, the career of Aquinas was thenceforward a triumphal march. Called to Italy by Pope Urban IV. in 1261, he lectured with signal success on behalf of the church and his order; in 1272 he was made a professor in Naples; and so great was his devotion to learning, and, be it also said, his modesty, that when great ecclesiastical preferments, such as the archbishopric of Naples and the abbacy of Monte Cassino, were

offered him, he felt it his duty to decline them. He continued his labours in church statesmanship, public lecturing, and writing till 1274, when he was summoned by Pope Gregory to assist in the settlement of the dispute between the Eastern and Western Churches at a council to be held at Lyons. While on the way his overwrought frame collapsed, and he was carried to the Cistercian monastery of Fossa Nuova, near Terracina, where he died, March 7, 1274. His remains were buried at Toulouse. He was canonized in 1323, and made a doctor of the church in 1567.

Aquinas's greatest work is the *Summa Theologiæ*, which exercised an immense influence in his own and later times, and which even to-day forms the main doctrinal standard of Catholicism. It is designed on a magnificent scale, and its great purpose is to exhibit theology as the synthesis and embodiment of all human knowledge, whether of faith or of reason; in a manner it seeks to realize the famous tenet of Scotus Erigena—namely, the identity of philosophy and theology. The ostensible antagonism between natural and supernatural knowledge formed the problem of Aquinas, as of the scholastics generally; and Aquinas, following in the wake of his master, Albertus Magnus, tasks himself to fuse the two, and to show that they are but supplementary aspects of the one indivisible truth, the natural world and the Christian religion being but the twin channels of the Divine self-manifestation. But it was only after Thomas had, with tireless industry, made himself master of both provinces of learning that he projected their synthesis in his *magnum opus*, and his other works may be regarded as only marking stages on the two converging lines by which he proceeded to the consummation of his labours. Thus, on the one hand, we

have his volumes on 'disputed questions,' and his Scripture commentaries (Psalms, Isaiah and Jeremiah, Gospels, Epistles), in which he draws mainly from the fathers; and, on the other, his *De Ente et Essentia*, his *Summa Philosophica contra Gentiles* (dealing with natural religion, and of scarcely less importance than the *Summa Theologica*), and his commentaries on the writings of Aristotle. Thus equipped, he proceeds to his crowning work, the *Summa*, a complete system of human knowledge, the intellectual antitype of the universal empire and the universal church. The *Summa* is in three great divisions, treating respectively of God, Man, and the God-Man, the last having been left incomplete at his death.

It should be noted that by revelation Aquinas understands the delivery of a definite body of doctrines, not the actual presence of a divine life in the world; and that with him faith is an intellectual acquiescence in this system of revealed truth, not a personal trust in a divinely-commissioned Saviour. Aquinas marks the zenith of scholasticism. His great opponent was Duns Scotus, the Franciscan doctor, who, taking the will (*voluntas*) as his principle (as Aquinas had taken *intellectus*, the understanding), really transferred theology to the sphere of practice, and so, separating again the provinces of reason and faith, inaugurated the decline of scholasticism, and prepared the way for modern philosophy and the reformation. See R. B. Vaughan's *Life of St. Thomas of Aquin* (1872) and *Histories of Philosophy* by Erdmann and Ueberweg.

Aquincum, a Roman citadel, near the site of Budapest.

Aquino, tn., Italy, prov. of Caserta, 78 m. s.e. of Rome, is the anc. *Aquinum*, ruins of which remain; birthplace of Juvenal and of Thomas Aquinas. Pop. 2,800.

Aquisgranum, anc. name of Aachen.

Aquitania, a dist. of Gaul, lying between the Garonne and the Pyrenees. Its inhabitants were one of the three races which originally inhabited Gaul; they were not Celtic, but were more akin to the Iberians in Spain, a pre-Aryan population now represented by the Basques, though the modern inhabitants of Aquitaine are probably to a large extent true descendants of the Aquitani. The Romans, the Visigoths, the Merovingians, and the Carolingians successively possessed the district, and its name in the 10th century became corrupted into Guienne. In 1137, by the marriage of Louis VII. with Eleanor, daughter of William X. of Guienne, it became attached to the French crown. After Eleanor's divorce she married Henry II. of England, and brought him the possession as her dowry. It remained in English hands until the battle of Castillon in 1453, after which it was finally restored to France. See Blades's *L'Aquitaine* (1891).

Aquitanus Sinus, anc. name of Bay of Biscay.

Ara, an ancient constellation situated to the s. of Scorpio, and possibly embodying a reminiscence of the mound-altar of the Tower of Babel. (R. H. Allen's *Star Names and their Meanings*, 1899, p. 63.) Among the stars composing it are S Aræ, a short-period variable, and R Aræ, undergoing eclipses once in 4 days 10 hours.

Arabesque, a fantastic scroll and floral decoration employed in the architecture of the Arabs and of the Moors in Spain. The finest examples are to be seen in the palace of the Alhambra, and in the work of Raphael in the Vatican.

Arabi, AHMED, PASHA (1839), leader of the military insurrection in Egypt in 1882. He organized a secret society among the native

officers, and headed a revolt, compelling the Khedive, Tewfik Pasha, to dismiss his ministry, and to grant a liberal constitution. Arabi became under-secretary for war, and subsequently minister of war. In this position, being practically dictator, and supported tacitly by the Sultan, he adopted a policy which the British government had to meet by armed force. Alexandria was bombarded by the British fleet, July 11, 1882; and on September 13, Arabi and his army were defeated at Tell-el-Kebir by the British troops under Sir Garnet Wolseley. Arabi fled to Cairo, and, surrendering, was banished to Ceylon (1883). In May 1901 he was released, and granted a pension of £600 a year. See *Annual Register* for 1882, and article by Wilfrid S. Blunt in *Celebrities of the Century*.

Arabia, known to its inhabitants as *Jezirat-al-Arab*, and to the Turks as *Arabistan*, is a massive quadrangular peninsula of Asia in the s.w. of the continent, lying between the Persian Gulf and the Gulf of Oman on the E., and the Red Sea on the w., with no natural frontier on the N., the conventional boundary being roughly the parallel of 30° N. Length N. to s., 1,500 m.; average breadth, 800 m.; area, 1,200,000 sq. m., or about one-third of Europe. The Red Sea coast, which is extremely deficient in harbours, is fringed with shoals and coral reefs; and there are a few small islands as the Strait of Bab-el-Mandeb is approached, the British island of Perim, at the entrance to the strait, being the most important. The s. coast presents a convex shore to the Indian Ocean, and has a number of good harbours, such as Aden, Dafar, and Keshin. The Oman coast, on the E., has the deep and almost landlocked harbour of Maskat (Muscat); but the sandy shores of the shallow Persian Gulf, to the E. and

N. of the Strait of Ormuz, possess no harbour of importance until El Kuweit (Koweit), at its head, is reached. This place has been mentioned as the terminus of the railway from Constantinople through Bagdad. (See BAGDAD RAILWAY.) Turkey claims that the port is within the sphere of her administration, but this Great Britain will not admit. The gulf contains numerous islands, the chief being Bahrein, which is the centre of the gulf pearl fisheries, valued at £300,000 annually. British influence is predominant in the gulf.

Ptolemy's divisions of the country were *Arabia Petraea* (N.W. and the peninsula of Sinai), *Arabia Felix* (w. and s. coasts), and *Arabia Deserta* (all the rest). The modern divisions are the Sinai Peninsula, between the Gulfs of Suez and Akabah; El Hejaz (Hedjaz, 'the barrier'), fronting the Red Sea, and succeeded by the fertile, well-watered, and well-cultivated country of El Yemen, the littoral from 20° N. to 15° N. being the low-lying sandy strip, covered with coral débris, of Et Tehama; Hadramaut and Mahra, fronting the Gulf of Aden and the Indian Ocean respectively; the mountainous kingdom of Oman, comprising the horn of Arabia; El Hasa, fronting the Persian Gulf; and El Nejd, the oasis-studded middle portion of the interior. In relief Arabia is a table-land (average elevation, 3,500 ft.), sloping steeply to the w. and s.w. and gently in other directions, and bordered by highlands which attain their greatest elevation, and are often precipitous and rugged, in Yemen, Hadramaut, and Oman (9,900 ft.). The mountain mass of Mount Sinai, on the N.W., is only 365 ft. lower. A low and mainly fertile coast strip lies between the highlands and the sea. The peninsula thus consists of a coastal plain, coast ranges, and a central plateau. El Nejd, 'the true home

of the Arab,' with grassy slopes and narrow productive valleys, is joined to the coast range by the ridge of Jebel Aarud or Imarieh, and is bordered by largely unexplored deserts—the simoom-swept sands of the Nefud and the stony Syrian desert lying to the n., and the arid waste of the Roba'a-el-Khali to the s.

The coasts of Arabia are among the hottest regions of the world. The mean temperature of Aden varies from 75° F. in Jan. to 85° F. in July; but the higher parts of the plateau, which have a great range of temperature and almost no rainfall, experience intense cold on winter nights. Scanty winter rains fall in the n., but in the s. the rains occur in summer or early autumn. In some of the mountains of Yemen there are spring rains.

The coffee tree flourishes in Yemen and elsewhere on the coastal escarpment from 1,200 to 4,000 ft.; also the acacia, which yields gum-arabic; spice and incense trees (Hadramaut), date palms, cotton, maize, and rice, are grown elsewhere, especially in Yemen. Sena is cultivated in S. Hejaz and the Tehama, balsam near Mecca, henna on the w. coast, and indigo on the Persian Gulf. Horses and dromedaries are reared in the Nejd, and command high prices; camels, large white donkeys, fat-tailed sheep, goats, and cattle are largely bred. Among wild animals are the ostrich, tiger, panther, lynx, hyæna, and gazelle. Precious stones, silver, lead, and other minerals, are found.

The people (estimated at 3½ millions) are mainly Arabs (Bedouins on the borders of the deserts) and followers of Mohammed. The tribes of the Nejd, Hadramaut, Oman, Mahra, and Kara are practically independent. Oman, however, is under the protection of the British and French governments.

The chief centres of Hejaz (approx. area, 96,500 sq. m.; pop. 300,000), through which pass the pilgrim routes from Syria and Egypt, are Medina, the city of Mohammed's flight and death, Yambo, its port; and Mecca, the prophet's burial-place, annually crowded by pilgrims, most of whom disembark at Jidda, the seat of government. A telegraph line has been laid along the caravan route from Damascus to Medina and Mecca. In 1908 a railway from Damascus to Mecca was completed as far as Medina. The continuation to Mecca will be by way of Rabigh, and probably a line will be constructed from Mecca to Jeddah. The cap. of Yemen (approx. area, 74,000 sq. m.; pop. 750,000) is Sana'a, and its port is Hodeida, which exports the coffee and hides of the province. The latter place has now superseded Mokha. In Hadramaut the cap. is Shibam, lying in a broad valley parallel to the s. coast. Frankincense is exported from Mokalla. The chief towns of the once splendid kingdom of Oman are Muscat, the cap., and Oman, the port on the gulf of the same name.

History.—Arabian history is divided by Islam into two epochs, each with different characteristics. Of the pre-Islamic period only a few facts stand out with any distinctness; one is, that the Romans tried in vain to subdue the peninsula. Arab historians distinguish—(1) Extinct Arabs of prehistoric times; (2) Arabs proper, or the inhabitants of S. Arabia, who are said to be the descendants of Kahtan (the Biblical Joktan); (3) Mostarabs, or Ishmaelites, who entered the country from the n., and became gradually amalgamated with the natives. The beginning of Arab history proper is commonly dated from the breakdown of the great dyke at Mareb, in Yemen, which forced many tribes to seek new

habitations in the north. There they founded a number of small states. One of these tribes, Thamud, settled in the Hejaz (N.W. coast strip). Traces of their existence are still found at the ruins of Al Hijr (Al Ola), the inscriptions on which have been deciphered by European scholars — Doughty, *Documents Epigraphiques* (1884); Euting, *Nabatäische Inschriften* (1885). Little is known of the history of Mecca prior to the epoch of Mohammed. The town enjoyed a certain superiority over the rest of pagan Arabia on account of the Kaaba, or ancient shrine of the national deities. This was a source of much wealth to the town, as it attracted many pilgrims. The care of the Kaaba was in the hands of the family of Koreish. Not far from Mecca was Okaz, where yearly fairs were held, at which poets competed for prizes. In 612 Mohammed proclaimed his new faith. The opposition he encountered was not only of a religious character, but also political; because the wealth of the town, which depended largely on the worship at the Kaaba, was threatened. After ten years' struggle he retired to Medina with a small band of followers. This journey is known as the Hijra or Hegira (erroneously translated by 'flight'), which begins the Moslem era. Through Islam, Arabia entered upon the second or political period of its history. Mohammed founded a theocratic state, as chief of which he united in himself the highest secular and ecclesiastical powers. Only the first four caliphs (lieutenants of Mohammed)—viz. Abu-Bekr, Omar, Othman, Ali (632–660)—held sway over all believers. More from political than religious reasons, a schism arose, which henceforth separated Sunnis (conservatives) from Shiis (sectarians). The dynasty of the Omniads (661–749) represents the

old aristocratic party of Mecca. Through the removal of the court from Medina to Damascus, Mecca and Medina sank to the position of religious centres only, whilst the history of Arabia became merged in that of the Moslem empire. The great reactionary movement of the Wahhabites, at the beginning of the 18th century, made the peninsula again the area of an independent realm, which lasted about one hundred years. Although the Wahhabite armies were eventually defeated by the Turkish and Egyptian troops, they are still powerful in Central Arabia. Insurrection against Turkish authority and intertribal wars are of frequent occurrence, and during 1905 and 1906 severe fighting took place.

Language and Literature.—Arabic forms a branch of the Semitic languages, and belongs to the southern group of the same, which also includes Ethiopic. It would be more correct to say North Arabic, since the southern dialect bears the name Himyaritic. Through the Koran, Arabic was spread over large tracts of Asia, Africa, several islands of the Mediterranean Sea, and Spain. Although it has disappeared from the last-named country, the Spanish language has retained a large number of Arabic words and formations (see Dozy and Engelmann's *Glossaire des Mots Espagnols et Portugais dérivés de l'Arabe*, 1869). Maltese is an Arabic dialect, though much influenced by Italian. In spite of the very numerous dialects, Arabic has retained a certain unity, due to the retarding influence of the Koran and the old poetic literature. As the language remained for many centuries secluded in the Arabian desert, it preserved down to the 7th century much of its originality. It approaches primitive Semitic speech more nearly than any other member of the family. Its importance for the

study of the Semitic languages is therefore apparent. The gradual decay of the language into 'vulgar Arabic' is particularly interesting, as it developed many forms and characteristics peculiar to the northern Semitic languages, classical Hebrew in particular. The ramifications of Arabic grammar are much more numerous than in any kindred tongue. Its possession of terminations of inflection not only secures to its morphology a great variety of forms, but endows it with a syntax to which none of the other Semitic languages can show a parallel. Its capacity of adding short vowels makes it capable of much flexibility, and particularly suitable for metric style. Arabic prosody alone forms a vast chapter in the history of the language. Its vocabulary also is enormous, although as regards its wealth of synonyms some wrong notions are abroad, because many poetic epithets recorded by the old lexicographers are taken literally. The language has preserved roots lost in the other Semitic dialects. Many obscure words in the Old Testament receive light from Arabic. Persian and Turkish teem with Arabic words. There are also more Arabic words in European languages than most people are aware of. Mediæval Arabs were zealous prosecutors of several branches of study. In astronomy many technical terms and names of stars are Arabic.

The classical period of Arabic literature is pre-Islamic, and consists throughout of poems which lived in the mouths of the people. Beginning with short ditties and epigrams of impromptu character, it soon developed more artistic forms, and about one hundred years before Mohammed we encounter a fine array of stately metres. These poems are called *kasidas*, each line consisting of two half-verses, with the rhyme repeated in the second half of each. Although the

productions of this period were in later centuries collected, annotated, and edited by men who loved their native tongue, the texts of many of the poems, as handed down to us, are anything but in a sound condition. The same men also discoursed on the lives of the poets, and arranged their works in groups according to their pre-eminence. One of these are the seven famous *Moallakat* ('the suspended ones'), a name which gave rise to the legend that these poems, having won the prize, were woven in gold brocade and suspended in or on the Kaaba. The truth of this tale has, however, been disproved (Nöldeke, *Beiträge zur Kenntniss der Poesie der alten Araber*, 1864, pp. xviii. *et seq.*), the above term being only a simile for a necklace of pearls which one would hang round the neck. The number 'seven' must, of course, be taken *cum grano*, as the actual number of classical poets is much greater—viz. Amraalkais or Imrulkais, Zoheir, Al-Nabigha, Al-Asha, Tarafa, Amr-ben-Kalthum, Labid, Antara, Alkama, Harith-ben-Hilliza, and others. The first prose composition is the Koran, and it marks the most important epoch in Arab literature. The Koran, which represents the Bible of Islam, consists of about 200 speeches by Mohammed, compiled in 114 chapters (*suras*), according to their length. The attitude of the Koran is, on the whole, hostile to ancient poetry, on account of the pagan and fictitious character of the latter. Yet the proneness of the language to poetic speech is so conspicuous that, in the older portions of the Koran, the exertions of the speaker not to discourse in verse are plainly visible. He could not, however, dispense with rhyme altogether. The Koran was so little able to alter the old poetic traditions that they remained alive for about two hundred years after Mohammed. Islam, however, added

religious subjects to those of the old poetry, which chiefly consisted of wine, the chase, woman, family pride, satire, the sword, the horse, and the camel. The Koran gave an impetus to the compilation of the traditional lore that was needful to establish the minutiae of the Moslem Church, to fix or rather embellish incidents in the life of the prophet, and to collect his real and alleged sayings. This is called the Sunna, and it forms an enormous chapter in Arab literature. The Sunna was followed by writings on the history of the Koran, its reading and exegesis, and biographies of the prophet. At about the same time the Arabs became acquainted with the gist and method of Greek thought, and employed their knowledge to construct a scholastic theology. They philosophized on the nature of God, and the question whether the Koran was eternal or created. The great philosophers Al-Kindi, Al-Farabi, Avicenna (-ibn-Sina), and Averroes (-ibn-Roshd) had no mean influence on the spread of Aristotelian philosophy in Europe. The mere necessity of understanding the Koran awakened linguistic studies, which were subsequently taken up for their own sake, and resulted in compendia of grammar astounding in their hair-splitting elaboration. Dictionaries were compiled, which, in our time, are indispensable to the European student of Arabic. There is hardly any branch of human thought to which the Arabs did not devote their pens. Mathematics, astronomy, and medicine, history, geography and cosmography and their kindred subjects, had their full share of attention. In spite of the Koran, poetry, proverbs, elegant prose, and fiction flourished everywhere, and shot forth new branches. The tales of the *Arabian Nights* belong to the world's literature. The *Séances* of Hariri have been translated into

various European languages, and imitations of the ancient forms of Arab songs may be met with in the works of many modern European poets. See *Abulfeda Historia Antei-Islamica*, Ar. et Lat., ed. Fleischer (1831); *Hamsæ Ispahanensis Annales*, Ar. et Lat., ed. Gottwaldt (1844-9); A. P. Caussin de Perceval, *Essai sur l'Histoire des Arabes avant l'Islamisme* (1847-8); Muir, *Life of Mahomet* (3rd ed. 1894); Weil, *Geschichte der Chalifen* (3 vols. 1846-51); Silvestre de Sacy, *Grammaire Arabe* (2 vols. 1831); W. Wright, *Arabic Grammar* (2 vols. 3rd ed. 1896-8); Flügel, *Die Grammat. Schulen der Araber* (1862); Palgrave, *Through Central and Eastern Arabia* (1871); Sibawaihi's *Buch über die Grammatik*, Ger. ed. by Jahn (1894); Brockelmann, *Geschichte der Arab. Literatur* (2 vols. 1899-1902); Huart, *Littérature Arabe* (1902); Ahlwardt, *Poesie und Poetik der Araber* (1856); Freytag, *Darstellung der Arab. Verskunst* (2nd ed. 1838); *Hamsæ Carmina* (Abu-Tammam), Ar. et Lat., ed. Freytag (2 vols. 1828-51); Guidi, *Tables Alphabétiques du Kitab al Agani* (1895). Arabic text (20 vols. Bulak, 1869). See also the translations of the Koran by Sale (ed. Wherry, 1882-6) and Palmer (1880); Hirschfeld, *New Researches into the Composition and Exegesis of the Qoran* (1902); and Hogarth, *The Penetration of Arabia* (1904); Sedillot's *Histoire Générale des Arabes* (1877); Azoury's *Le Reveil de la Nation Arabe dans l'Asie Turque* (1905).

See also Lady Anne Blunt's *Pilgrimage to Nejd* (1881); C. M. Doughty's *Travels in N. Arabia in 1876-7* (1886), and *Travels in Arabia Deserta* (1888); W. Harris's *A Journey through the Yemen* (1893); L. Hirsch's *Reisen in Süd-Arabien* (1897); Hull's *Geology and Geography of Arabia Petraea* (1886); and Zwerner's *Arabia the Cradle of Islam* (1900).

Arabian Nights Entertainments (Ar. *Alf Laylah wa Laylah*, 'A Thousand Nights and a Night') is believed to be in form and substance the Arabic translation of a Persian book, *Hazár Afsánah*, or 'Thousand Tales.' Mohammed-ibn-Ishak states that the book was compiled by or for Humai, daughter of Bahman Ishak (Artaxerxes), whose mother, according to Al-Masudi, was the Jewess Esther of Old Testament history.

Much difference of opinion exists regarding the authorship and the date of composition of the *Arabian Nights*. Lane maintains that the people, the dress, and the buildings are mainly Arabic, particularly Egyptian; that the social state depicted in each of the stories is the same; and that the book was begun not earlier than 1475, and finished before 1525, by one or two authors, probably Egyptian. Burton, the translator of the whole text, believes that the oldest tales may have been written in the reign of Caliph Al-Mansur (754-775 A.D.); that the thirteen stories common to all the MSS. may belong to the 10th century A.D.; that the work received its present shape in the 13th century, but that the most modern tales were added in the 16th century; and that the book had no single author. Lane's incomplete version (1840) is based upon the Bulak edition; while the edition of Macnaghten (1839-42) was used by Burton.

Arabian Gulf, a name sometimes applied to the RED SEA.

Arabian Sea, the *Erythræan Sea* of the ancients, is the N.W. part of the Indian Ocean, stretching from India to Arabia. Its N.W. extension leads through the Strait of Ormuz into the Persian Gulf. Its S.W. extension is known as the Gulf of Aden, and has connection through the Strait of Babel-Mandeb with the Red Sea. See INDIAN OCEAN.

Arabin, or ARABIC ACID, a constituent of gum-arabic, and probably of other similar gums. Ordinary gum consists mainly of calcium, magnesium, and potassium salts of arabic acid; the latter being separated by the addition of hydrochloric acid to mucilage so as to set free the arabin, which is then precipitated by alcohol. It is obtained in the form of a brittle vitreous mass, soluble in water, with an acid taste, and is capable of forming salts with bases and decomposing carbonates.

Arabis, a genus of the order Cruciferae; a dwarf perennial of various colours. The most common is the *Arabis albida*, white rock-cress, whose masses of white flowers are excellent for garden surfaces or borders.

Arabistan. See KHUZISTAN.

Arabkir, or ARABGIR, tn., Asia Minor, 107 m. N.W. of Diarbekir, on the trade route between Aleppo and Trebizond; manufactures cotton goods. Pop. 30,000.

Aracaju, cap. of Sergipe, a state of Brazil, on the r. bk. of the Cotindiba R., 8 m. from its mouth. Has iron foundries, soap and cloth factories, and exports cotton, sugar, and hides. Pop. 10,000.

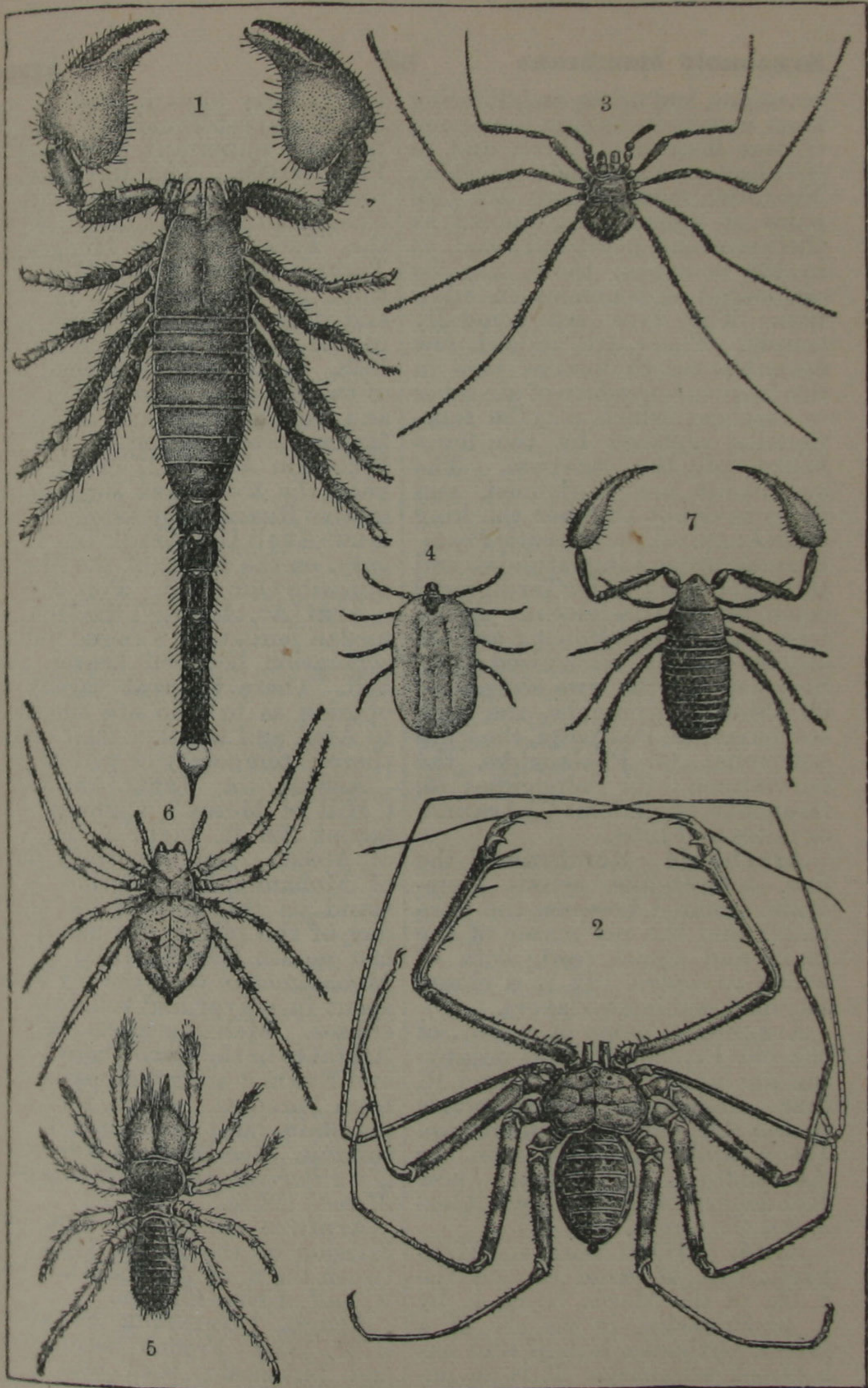
Aracan. See ARAKAN.

Aracati, port of Brazil, in prov. of and 75 m. S.E. of Ceará, on the Rio Jaguaribe, 10 m. from the sea. Large trade in cotton, cattle, and hides. Pop. about 12,000.

Araceæ, or AROIDEÆ, an order of tropical plants represented in Britain by cuckoo pint (*Arum*) and sweet flag (*Acorus*). The spadix is often protected by a spathe. The juices of many species are poisonous, and the stems rich in starch. Cooking dispels the former, and makes the latter edible.

Arachis. See GROUND-NUT.

Arachnoidea, a large group of arthropods, including spiders,



Arachnoidea.

1. SCORPIONIDÆ—*Scorpio indicus* (Linn.), $\frac{1}{2}$ nat. size. 2. PEDIPALPI—*Titanodamon Johnstonii*, $\frac{1}{2}$ nat. size. 3. PHALANGIDÆ—*Phalangium copticum*. 4. ACARINA—*Rhypicephalus annulatus*. 5. SOLPUGIDÆ—*Rhax brevipes* (Gervais), $\frac{1}{2}$ nat. size. 6. ARANEIDÆ—*Araneus tarnensis*, nat size. 7. PSEUDOSCORPIONIDÆ—*Chelifer sesamoides* (Sairguy). (No. 4, somewhat enlarged; 3 and 7, greatly enlarged.)

scorpions, and mites, and differing from insects in having four pairs of legs instead of three, and in the absence of antennæ, or feelers. Near the mouth there are two pairs of appendages, known as chelicerae and pedipalpi; and, as in the scorpion, there may be abdominal appendages in addition. The eyes are generally simple. There are, indeed, few resemblances to insects, save in the frequent presence of air-tubes or tracheæ, which may be functionally replaced by the lung-books of the scorpion. The arachnoids are ill-defined, and there is doubt whether the king crab (*Limulus*), the parasitic *Pentastomum* (order Linguatulida), and the water bears (order Tardigrada) come under this group. Apart from these, the following are the orders usually recognized:—(1) Scorpionidæ, the true scorpions; (2) Pseudoscorpionidæ, the book scorpions; (3) Pedipalpi, the whip scorpions; (4) Phalangidæ, the harvestmen; (5) Solpugidæ; (6) Araneidæ, or spiders; (7) Acarina, or mites and ticks.

Arachnoid Membrane, the fine, cobweb-like, serous membrane situated between the dura mater and the pia mater of the brain and spinal cord, both of which it covers. It is a closed sac, disposed in two layers.

Arachosia, name of a prov. of the old Persian empire, occupying the basin of the Helmand R. (anc. *Etymander*); corresponds to the S.E. part of Afghanistan. Its capital was Arachoton, or Alexandria Arachoton (now Kandahar), founded by Alexander the Great.

Arad. (1.) OLD ARAD, tn., Hungary; cap. of Arad co., on the r. bk. of the Maros, 58 m. E. by S. of Szegedin, is the see of a Greek Orthodox bishop, and has a Greek seminary. It is an important railway centre, being the junction of the Transylvan-

ian railway system, and on the line Budapest-Temesvar. Active trade; important distilleries. Pop. 60,000. The fortifications round the town were several times captured and destroyed by the Turks in the Hungarian-Turkish wars of the 17th century, but were rebuilt in 1763, and played an important part in the Hungarian revolution of 1848. Arad was the second seat of the National Assembly in 1848, and from here Kossuth issued the famous proclamation of Aug. 11, 1849. On August 17 of the same year the town was surrendered to the Russians by Görgei. (2.) NEW ARAD (Uj-Arad), tn., Hungary, on the l. bk. of the Maros, opposite Old Arad. Pop. 6,000.

Araf (Ar. *Al-Araf*), the Mohammedan purgatory, a raised wall of separation between heaven and hell. There is great variety of opinion as to who are admitted to Araf, and whether their abode there is temporary or permanent.

Arafat, or JEBEL-ER-RAHM ('Hill of Mercy'), a granite hill (about 250 ft. high) 15 m. S.E. of Mecca. An important duty of Mohammedan pilgrims is to stand on this hill on the ninth day of the pilgrimage month, or last month (Dhu'l Hijja) of the Mohammedan year, the day being spent in prayer and religious exercises. Mohammedans believe Arafat to be the place where Adam and Eve met after their expulsion from Paradise. Adam, they also maintain, built the chapel on the summit. See Burton's *Narrative of a Pilgrimage to El Medinah and Meccah* (1856).

Arafura or **Alfura Sea**, the division of the Pacific lying between the N. of Australia and the W. half of New Guinea.

Arago, DOMINIQUE FRANÇOIS (1786-1853), French astronomer and physicist; born near Perpignan; was appointed secretary to the Bureau des Longitudes at

the age of nineteen, and in 1806 assisted Biot in measuring an arc of the meridian. While engaged in taking observations in Majorca, Arago was mistaken for a spy. After a series of adventures, he returned to France in 1809, was elected a member of the Institute, and appointed professor of analytical geometry in the Ecole Polytechnique. Arago filled that chair for twenty years, and did much to popularize scientific discovery, especially in optics, astronomy, and magnetism. He confirmed the undulatory theory of light (1816), and for his discovery of rotatory magnetism received (1825) the Copley medal from the Royal Society of London. In 1830 he was appointed director of the observatory in Paris, and perpetual secretary to the Academy of Mathematical Science. After taking part in the revolution of that year, he opposed the presidency of Louis Napoleon, and refused to take the oath of allegiance (Dec. 1851); but his position and character had such weight that the new government refrained from prosecuting him. Among his best-known works are his *Autobiog.* (trans. Powell, 1858); *Lectures, etc.* (trans. Smyth and Grant, 1855); *Astronomie Populaire* (1834-5; Eng. ed. 1855-8). A complete edition of his works was published in 1854-62; 2nd ed. 1865, etc. See Audiganne's *François Arago* (2nd ed. 1869).

Aragon, an ancient kingdom and former province of Spain, with an area of 18,000 sq. m. and a pop. of 920,000; bounded on the N. by the Pyrenees. Cap. Zaragoza. It is now divided into the three provinces of Huesca in the N., Zaragoza in the middle, and Teruel in the S. The soil is sterile, though intersected by the Ebro, but is rich in minerals of almost every kind. The inhabitants are characterized by intense nationalistic conservatism, and

by vindictiveness and bigotry, but are patriotic, intrepid, and energetic. Aragon was a county from the 9th century, and a kingdom from the middle of the 11th century. By the marriage of its ruler's daughter in 1137 it acquired the county of Barcelona, and under Jaime the Conqueror (1238) annexed the Moorish kingdom of Valencia. It became the most powerful maritime state in Spain, and aspired to found a great Romance kingdom on the Mediterranean; but the growing power of France made this impossible. The marriage of King Ferdinand with Isabella of Castile united the two crowns. From 1282 to 1730 it also embraced Sicily, and from 1416 to 1713 Sardinia. The CANAL OF ARAGON was first projected by the Emperor Charles V. (1528), but was not seriously taken in hand until the accession of Charles III. (1760). Pignatelli, the Italian engineer, constructed it from Zaragoza to Tudela. See SPAIN.

Aragona, tn., prov. Girgenti, Sicily, 10 m. by rail N. of Girgenti. Has important sulphur mines. Near Aragona is the mud volcano of Maccaluba. Pop. 14,000.

Aragonite, a variety of calcium carbonate, first found in Aragon. It crystallizes in six-sided prisms, or in long, narrow, pointed forms, and has the same composition as calcite, though differing from it in specific gravity, crystalline form, and physical properties. (See DIMORPHISM.) Many fossil shells, which at first consisted of aragonite, have had their substance replaced by calcite, the more stable mineral. Satin spar is a fibrous variety of aragonite.

Araguaya, or RIO GRANDE, a riv. of Brazil, rises in the Serra Cayapo, and joins the Tocantins near São Francisco. It flows N.E., and has a length of 1,300 miles.

The lower course is obstructed by rapids.

Arahal, EL, tn., prov. Seville, Spain, 24 m. s.e. of Seville. Pop. 8,000.

Arakan, or ARRACAN. (1.) The N.W. division of Lower Burma, on E. shore of Bay of Bengal; ceded to Britain (1826); cap. Akyab. Area, 18,540 sq. m. Pop. 765,000. See Hay's *Arakan* (1892). (2.) ARAKAN, or MRO-HAUNG or MYO-HAUNG, anc. city of Arakan, Burma, 40 m. N. by E. of Akyab. Formerly much larger, the pop. has now dwindled to about 5,000.

Aral, SEA OF (*Aralskoye More*), the second largest sheet of inland water in Asia, fills the lowest part of the W. Turkestan depression, between 43° 40' and 46° 45' N. and 58° 20' and 61° 45' E. It lies 160 ft. above sea-level, and 245 ft. above the level of the Caspian; measures 280 m. from N. to S., and 140 m. to 190 m. in breadth, and has an area of 26,000 sq. m. On the N. and W. are plateaus of clay formation about 230 to 330 ft. high, including that of Ust-Urt, which separates the Sea of Aral from the Caspian; and on the E. is a sandy desert, broken only by the Syr Daria. Evaporation being in excess of precipitation, the sea is gradually drying up. As late as the middle of the 18th century it extended 50 m. farther to the N.E. than it now does; and the Aibughir Gulf, in the S., has disappeared since the middle of the 19th century. The average depth is less than 100 ft.; the deepest part, 220 ft., is towards the N.W. Its water is only slightly saline, and every winter it freezes for several miles all round its shores. Its fish, of which it yields a rich harvest, are fresh-water species. The two great desert streams of W. Turkestan, the Syr Daria (Jaxartes) and the Amu Daria (Oxus), both pour their waters into this sea. There exists very conclusive evidence

that at a comparatively recent geological period the Sea of Aral and the Caspian Sea both formed part of a much more extensive basin or inland sea. See *Proc. R.G.S.*, vols. xi. and xvi., and vol. i. (New Series); also Wood's *The Shores of Lake Aral* (1876).

Aralia, a genus of the ivy order, natives of the temperate and tropical regions. The greenhouse plant, commonly called *A. Sieboldii*, now known as *Fatsia japonica*, was introduced from Japan in 1858. Its large, round leaves are often mistaken for those of the castor-oil plant. The roots of another species, *A. edulis* (*cordata*), are eaten by the Japanese. A species in Formosa produces pith which the Chinese make into rice-paper. Ginseng is produced by yet another species of the order.

Aram, an old Semitic geographical term which included Syria and Mesopotamia, but excluded Palestine. It gave name to a division of the Semitic family of speech, Aramean or Aramaic, the dialects of which formed the group of North Semitic, as distinguished from Middle Semitic (*i.e.* Hebrew and Phœnician) and from South Semitic (*i.e.* Arabic and Ethiopic). Aramaic was divided into two main branches—Chaldee and Syriac. Large portions of the Books of Daniel and Ezra are written in the former, which was, for this and other reasons, taken to have been the language of ancient Babylonia. But this is an error; even the Semitic dialects employed in the Assyrian and Babylonian cuneiform inscriptions are not Aramaic. During the rule of the Persian dynasties Aramaic was a sort of official language and commercial *lingua franca* for the provinces of the empire which stretched W. and S.W. from the Euphrates to Egypt. In this way Aramaic is believed (the fact is not definitely known)

to have supplanted the Hebrew of the Old Testament as the everyday speech of the people of Palestine. At any rate, Aramaic was the vernacular of Palestine in the time of Christ, and it is Aramaic that is meant when the New Testament speaks of 'Hebrew.' Chaldee (Aramaic) is the language of the Targums and Talmuds of Jerusalem and Babylon. Syriac, a literary language, embraced the Peshito version of the Bible, and was extensively used from the 4th to the 13th century, though it is now superseded by Arabic. The ancient Samaritans, the Nabatæans (though Arab by blood), and the Mandeans all spoke Aramaic dialects. See Nöldeke's *Die Semitischen Sprachen* (1887).

Aram, EUGENE (1704-59), an English felon; born at Ramsgill, Yorkshire. Though wholly self-educated, he was the first to grasp clearly the affinity of the Celtic to the other Indo-European languages. He became a schoolmaster at Knaresborough, where he was intimate with a man named Daniel Clark, who soon after disappeared. A man named Houseman, who was apprehended on the charge of murdering Clark, gave evidence against Aram, who was tried, and after an able self-defence convicted. After an unsuccessful attempt at suicide, he was hanged at York. The interest attaching to Aram's crime is mainly due to Bulwer Lytton's novel and Hood's poem on the subject of the murder. See Scatcherd's *Memoirs of Eugene Aram* (1838); also the *Annual Register* (1759).

Aran, or ARRAN ISLES, a group of small islands at the entrance to Galway Bay, about 4 m. off the w. coast of Ireland, and 27 m. s.w. of Galway city. The chief islands are named Inishmore, Inishmaan, and Inisheer. The Congested Districts Board has made them the headquarters of the mackerel

fishing of that part of the coast. The isles are rich in archaeological remains, one of which, Dun Ængus, a cyclopean fort of unhewn stone, is described by Dr. Petrie as 'the most magnificent barbaric monument now extant in Europe.' They were anciently the seat of a monastic school, and their old shrines attract many visitors to 'Aran of the Saints.' See Burke's *South Isles of Aran* (1887), and Synge's *Aran Islands* (1907).

Aranda, PEDRO PABLO ABARCA Y BOLEA, COUNT OF (1718-99), Spanish statesman, born at Saragossa of a noble family, was sent in 1759 as ambassador to the Polish court, and in 1766 was made prime minister and military governor of Castile. His home policy was very liberal, and much influenced by the ideas of the French philosophers. He suppressed many abuses of the church, restrained the Inquisition, and procured the expulsion of the Jesuits from Spain (Apr. 1, 1767). He took many measures for the well-being of the people, organized the police and justice of the country, and encouraged arts and sciences. In his foreign policy he was a great adversary of England. The clergy worked for his downfall, and at their instigation he was sent as ambassador to Paris (1773). In that capacity he took an active part in the conclusion of the treaty of Paris (1783). Recalled in 1787, he was in 1792 for a short time prime minister, until supplanted by Godoy.

Aranjuez (anc. *Ara Jovis*), tn., prov. Madrid, Spain, on l. bk. of Tagus, 28 m. s. of Madrid. It is the spring residence of the Spanish court, and has a beautiful castle built by Philip II., containing many art treasures. Here took place the insurrection which forced King Charles IV. to abdicate in favour of Ferdinand (Apr. 18, 1808). Aranjuez provides Ma-

dried with asparagus, strawberries, and other fruits. Known to Germans from Schiller's *Don Carlos*. Pop. 13,000.

Arany, JANOS (1817-82), Hungarian poet, born in Nagy-Szalonta, Bihar, won in 1845 a prize of the Kisfaludy Society of Budapest with a humorous epic, *Az Elveszett Alkotmány* (The Lost Constitution). His epic poems, *Toldi* (1847) and *Murany Ostroma* (The Conquest of Murany) (1847), made him the favourite poet of the Hungarian nation. In the revolution of 1848 he held an appointment in the national government, and after the defeat of Kossuth returned to poverty in his native town until 1854, when he became professor at the college of Nagy-Körös, whence he passed (1860) to Budapest as director of the Kisfaludy Society. Elected member of the Hungarian Academy in 1859, he became its perpetual secretary in 1865. Among his other works are *Toldi Esteje* (Toldi's Evening) (1854), and *Toldi Szerelme* (Toldi's Love) (1879); *Buda Halála* (The Death of Buda) (1864), and the humorous epic, *Nagyidai Cziganyok* (The Gypsies of Eida) (1852). Arany is the most popular and important modern poet of Hungary.

Arapahoes, North American aborigines, a western branch of the Algonquin family; are supposed to be the *Gros Ventres* of early French writers, but in later times withdrew beyond the Mississippi to the state of Colorado. They are tall, well-shaped, of a coppery-red colour, with long, black hair of the horse-tail texture, large nose, and somewhat regular features. In 1820 they numbered about 10,000, but are now reduced to about 2,000.

Arapaima, a genus of tropical fresh-water fishes—the largest existing—with bony, compound scales. *A. gigas* of S. America attains 15 ft. in length. They are

highly coloured, and their flesh is greatly esteemed.

Ararat. 'Mount Ararat' is a misnomer, Ararat being a region or country (Armenia), as may be seen even from Gen. 8:4, 'The ark rested . . . upon the mountains of Ararat' (cf. 2 Kings 19:37; Isa. 37:38; Jer. 51:27). The Babylonian account of the flood makes the ark take ground upon the 'mountain of Nizir,' in E. Assyria; while Nicolaus Damascenus states that its resting-place was 'a great mountain in Armenia . . . called Baris' (Josephus, *Ant.*, i. iii. 6), or Lubar, between Armenia and Kurdistan. The tradition is modern which identifies 'Mount Ararat' with Mt. Massis, a double volcanic (eruption 1840) peak (16,950 and 13,220 ft.) in the N. of Armenia, which forms the point of contact of Russia with Turkey and Persia, to each of which it partly belongs. See Professor Bryce's *Transcaucasia and Ararat* (4th ed. 1897); also ARMENIA and DELUGE.

Ararat, tn., Victoria, Australia, near the river Hopkins, 115 m. W. by N. of Melbourne. Near it are famous vineyards and good timber. Pop. 3,600; of the district, 8,500.

Aras (*Araxes*), large riv. of Armenia; rises in Erzerum vilayet. For the greater part of its course of 600 m. it forms the boundary between Russia (Cis-Caucasia) and Persia. It formerly joined the Kura 60 m. W. of its mouth; but in 1897 it changed its lower course, and now flows direct into the Caspian Sea at Kizil Agach Bay.

Aratch, tn., Asia Minor, in vilayet of and 35 m. W. by S. of Kastamuni. Pop. about 12,000.

Aratus OF SICYON (271-213 B.C.), a Greek general and statesman. In 251 B.C. he expelled the tyrant Nicocles, and united (251) Sicyon to the Achæan league (see ACHÆI), and in 245 B.C. was chosen general of the league, which office he held for many

years. He also obtained the accession to the league of Megara, Argos, and other cities; but this aroused the jealousy of the Ætoli-ans and of Cleomenes, king of Sparta, and Aratus was obliged, for safety, to secure an alliance with the king of Macedonia. Ptolemy, king of Egypt, joined the Ætoli-ans and Cleomenes, and in a succession of battles Aratus and the Achæans were defeated. At this crisis Antigonus of Macedon arrived with his army to assist Aratus, and defeated the Spartans at the battle of Sellasia (222 B.C.). But finally the relations between Antigonus's successor, Philip, and Aratus became so strained that the king procured the death of the latter by poison in 213 B.C. Aratus left thirty books of memoirs (now lost), which were drawn upon by Polybius and Plutarch.

Aratus OF SOLI, Cilicia, a Greek poet and astronomer, flourished about 270 B.C., only two of whose works are extant, the *Phænomena* and the *Diosemeia*. The former treats of astronomy, and the latter of the weather. Cicero and Germanicus translated them, and Virgil made use of them in the *Georgics*. Editions: Bekker (1828); Köchly's *Poetæ Bucolici et Didactici* (1851, 2nd vol.); *Phænomena* (with Latin notes), by Maass (1893); *Diosemeia* (trans. and notes in English), by Poste (1880).

Araucanians, a historical S. American nation, whose territory comprised that part of Chile which lies between the Bio-Bio and Valdivia Rs., and bordered N. on the Peruvian empire. The national name was *Molu-che* (Men of War), a name fully justified by an indomitable courage, which enabled them to stem the southward advance of the Incas and hold out for centuries against the Spaniards. Their prowess was the theme of Ercilla's epic

poem *Araucana* (1597), and Alvarez de Toledo's *Curen Indomito* (1861); and in 1773 Spain recognized the independence of their four confederate states. The pure Araucanian population is now estimated at less than 50,000. Between 1861 and 1870 a French adventurer of the name of Tounens (1820-78) proclaimed himself king of the Araucanians, under the title of Orelio Antonio; but he was deposed by the Chilean government and sent back to France. Since then the rule of Chile has been recognized. The Araucanians are an undersized but vigorous race. Their chief industry is the breeding of cattle and vicunas. Araucan, a language of high polysynthetic type, has been reduced to written form, and in it are embodied a large number of myths and national legends. See Tounens's *L'Araucanie* (1878); Lenz's *Araukanische Märchen* (1896).

Araucaria, a genus of Coniferæ with evergreen leaves, of a singularly geometrical habit of growth, is considered the oldest of the conifers. A feature of the genus is the appearance of male and female flowers on separate trees. The only species that grows well in Britain is the *A. imbricata*, popularly called the monkey puzzle or Chile pine, which grows to a great height if protected from wind and frost, and is used for the masts of ships. In its native country, Chile, the tree produces a seed which is used for food, and also a fragrant resin. The *A. excelsa*, or Norfolk Island pine, attains a height of 200 ft.

Arauco (2,446 sq. m.), prov. on the Pacific slope, 40 m. s. of Concepcion, Chile; has coal mines. Pop. 62,000. Cap. Lebu.

Araujo e Azevedo, ANTONIO DE, COUNT DE BARCA (1754-1817), Portuguese statesman, ambassador at the Hague (1789), Paris (1797), and St. Petersburg, after

the peace of Amiens. In 1803 he became Minister of Foreign Affairs at Lisbon; but upon Napoleon's invasion he fled (1807) with the royal family to Brazil, where in 1814 he was made Minister of Marine and the Colonies.

Araujo Porto Alegre, MANOEL DE (1806-79), Brazilian poet and architect, born in Rio Pardo, state of São Pedro, Brazil; completed his artistic training in Paris (1831) and in Italy (1835). In 1837 he became professor at the Academy of Arts, Rio de Janeiro, and a little later at the military college. He was the founder of the national theatre, for which he wrote several plays with a patriotic tendency. His principal poetical works are *Colombo* and *Brasilianas* (1863).

Aravali Hills, India, extend from Gujarat, in Bombay Presidency, for 300 m. N.E. through Rajputana. Mount Abu (5,650 ft.) is the highest point.

Arawaks, S. American aborigines who formerly ranged over a great part of N. Brazil, the Guianas, and Venezuela, and appear to have formed the chief element in the W. Indies and Bahamas. They are still numerous on the mainland. In the Arawak family two distinct types have been noticed—one marked by short, thick-set frames, broad and rather flat features, retreating forehead, slightly oblique eyes, small nose, and yellowish skin; the other with tall, slim figures, straight eyes and nose, more regular oval features, reddish-brown complexion, and bright, animated expression. All alike are rude, uncultured tribes.

Araxas, tn., Minas Geraes State, Brazil, 330 m. N.W. of Rio de Janeiro. Pop. 12,000.

Arayet, tn., in the prov. of Pampanga, Luzon, Philippines, 12 m. N.E. of Bacolor. Pop. 15,000.

Arbaces, the Mede, who, according to the historian Ctesias,

overthrew the Assyrian empire in the seventh century B.C. by defeating Sardanapalus, and founded the Median. Another of the name was a general of Artaxerxes Memnon in his war with his brother Cyrus (401 B.C.).

Arbe (in Slavonic, *Rab*), an island of Austria, lying between the Quarnerolo and the coast of Croatia. It is hilly (1,340 ft.) but fertile, and produces wine, maize, millet, salt, and sheep. Area, 45 sq. m. Pop. 4,400. Chief town, Arbe, on the w. coast, was an important centre of commerce under the Venetians in the Middle Ages.

Arbela, city of Adiabene, Assyria, famous as a centre for the worship of Istar, and as the headquarters of Darius before his defeat by Alexander (331 B.C.). The battle of Arbela was really fought near Gaugamela, about 50 m. W.

Arber, EDWARD, English man of letters, emeritus professor of English language and literature at the University of Birmingham. His chief works are: *English Reprints* (14 vols. 1868-71), *British Anthologies* (10 vols. 1899-1900), *English Garner* (8 vols. 1877-96), *English Scholar's Library* (16 vols. 1878-84), *Tyndale's New Testament, 1525* (1871), *A Transcript of the Stationers' Registers, 1554-1640* (5 vols. 1875-94), *The Term Catalogues, 1668-1709* (2 vols. 1903-5, 3rd in preparation), and *A Christian Library* (1907).

Arbitrage, in stockbroking, the buying and selling at one and the same time, but in different markets, of stocks, bonds, bills, shares, etc., so as to derive a profit from the difference between the quotations in such markets. The term is also applied to the calculation on which such traffic is based.

Arbitration, a way of settling disputes without going to law. In England, the law on the subject is contained in the Arbitration Act, 1889; but the act does

not apply to a verbal submission to arbitration. Parties may agree to submit any present or future matters of difference affecting any of their civil interests to the decision of an arbitrator, or of two arbitrators, with an umpire in case they disagree. A written submission to arbitration is irrevocable except by leave of the court. Any proceedings with respect to any matter referred to arbitration may be stayed by the court. If the parties cannot agree on an arbitrator, or if the person nominated refuses or is unable to act, either party may serve the other with written notice to make an appointment; and if the appointment is not made within seven days, the court may appoint. In case of a submission to two arbitrators, if one refuses or is unable to act, the party who appointed him may appoint another; and if one party refuses to make an appointment, the arbitrator appointed by the other party may, after seven days' notice to the party refusing, be appointed sole arbitrator, subject to the discretionary powers of the court. An arbitrator may administer an oath, and witnesses before him may be summoned on *subpœna*, and are liable for perjury as in an ordinary action. An arbitrator may state a case for the opinion of the court on any question of law arising in the course of the arbitration, and he may, on the application of one of the parties, be ordered by the court to do so. He may be removed by the court for misconduct, and his award set aside; otherwise an award may be enforced as if it were a judgment of the court. Some criminal matters, when the offence is not of a public nature, and the injured party has a remedy by action as well as by indictment, may be referred to arbitration—as, for example, cases of assault. The Arbitration Act also provides for

the reference of difficult questions of fact, which cannot be conveniently dealt with by the court, to a special referee or arbitrator.

In all arbitrations, unless it is otherwise provided by the submission, the following rules apply:— (1) The reference is to one arbitrator; (2) two arbitrators may appoint an umpire; (3) the award must be made in writing within three months of the reference, but the arbitrators may extend the time; (4) if the arbitrators make no award, the umpire may make an award within one month; (5) the parties are examined on oath, and must produce all papers required; (6) if the arbitrators think fit, the witnesses are examined on oath; (7) the award is final; and (8) the costs are in the discretion of the arbitrator. The powers of an arbitrator are strictly limited by the terms of the reference to him.

Many statutes now provide that disputes arising under them shall be determined by arbitration—*e.g.* all questions of compensation under acts authorizing the compulsory taking of land.

In trade disputes arbitration is being more and more resorted to either directly or through conciliation boards.

In Scotland, the range of matters which can be referred to arbitration by the parties appears to be as wide as in England, and the substance of the law generally is the same; but the Arbitration Act, 1889, does not apply, and there are material differences in form and procedure. An arbitrator is called an 'arbiter,' an umpire an 'oversman,' and an award a 'decree-arbitral.' The submission and the decree-arbitral are formal deeds. The submission contains a clause by which the parties agree to the registration of the submission and the decree-arbitral; and the registration is necessary in order to enable the

parties to enforce it as a judgment. The Arbitration (Scotland) Act, 1894, s. 1, provides that 'an agreement to refer to arbitration shall not be invalid or ineffectual by reason of the reference being to a person not named, or to a person to be named by another person, or to a person merely described as the holder for the time being of any office or appointment.' See Russell's *On Arbitration* (1906); and G. I. Bell's *On Arbitration* (1877).

Arbitration, INTERNATIONAL, is an adaptation by independent nations to their own differences of the system of settling disputes between private individuals by reference to the judgment of a third party. But in a case of international arbitration there is no true legal 'sanction,' and effective compliance with the award must depend upon the national sense of honour of the beaten party.

The nearest approach to modern international arbitration which was to be found in ancient times was the inter-state arbitration occasionally resorted to by the several Greek communities. It was not, however, until the middle ages, when Europe had separated into different kingdoms with some equality of status, that opportunity was given for the application of international arbitration in something like its present form. The Pope, for instance, not infrequently acted as arbitrator or mediator in the disputes between ambitious monarchs, or between those monarchs and their more powerful and turbulent vassals. Sometimes one king adjudicated in the differences between two others. The awards given, however, were not always above suspicion; and the finding of the arbitrator was often repudiated, or became the starting-point of a fresh dispute. No sketch of the history of international arbitration would be complete without a reference to the 'Great Design'

of Henry IV. of France and his minister Sully. Those two statesmen dreamed of a mighty scheme of federation for all the states of Christian Europe, under a common government, and it was an essential feature of their plan that all disputes should be settled by arbitration.

The Abbé St. Pierre at the beginning of the 18th century, and Kant and Bentham at the end, dreamed these Utopian dreams; but it was not till the middle of the 19th century that the sympathies of statesmen and politicians became at all actively enlisted in the cause. Resolutions in favour of a general and permanent system of arbitration were, after repeated failures, carried both in the American Congress and in the British House of Commons; and though, indeed, no immediate practical result was secured, still men's minds were more generally set to work upon the subject. In the early 'seventies the study of the problems involved in international arbitration received a powerful stimulus from the establishment of the Institute of International Law and the International Law Association, bodies of jurists and public men of all countries, formed for the express purpose of discussing that large and somewhat indeterminate class of questions which arise under the so-called law of nations. Another body which deserves mention is the International Parliamentary Union, instituted in 1888 with the object of promoting arbitration and peace.

Concurrently with the theoretical discussion of schemes of international arbitration, a steadily growing practice arose in the 19th century among the great powers of the world of submitting certain kinds of disputes to this method of settlement. This practice—in which Great Britain has taken an

honourable share—has fallen far short indeed of complete adhesion to the principle of universal and permanent arbitration. But each resort to arbitration has formed a precedent; and the obvious convenience and the comparative cheapness of this method of settling differences have more and more recommended themselves to statesmen.

Perhaps the most famous, certainly one of the most controversial, cases in which Great Britain was concerned during the 19th century was the case of the *Alabama* claims. (See ALABAMA, THE.) Another famous arbitration between this country and the United States was that upon their respective rights of fishing in the Bering Sea. The question was referred to an arbitration tribunal which sat at Paris in 1893, and the result was in favour of Great Britain on almost all points.

A more sensational case was the dispute as to the boundary between British Guiana and Venezuela. The attitude adopted on the question by the president of the United States at the end of 1895 provoked great excitement in this country. But Lord Salisbury, on behalf of Great Britain, consented to arbitration with Venezuela, and a peaceful conclusion of the dispute was arrived at. The award of the arbitration tribunal was again in favour of Britain. The whole incident, however, suggested strongly to the statesmen both of America and of the United Kingdom the advantage of a permanent treaty of arbitration between the two powers. Great hopes, therefore, were excited when it became known that such a treaty had been successfully negotiated by Mr. Olney, the American secretary of state, and Sir Julian Pauncefote, our ambassador at Washington. Such hopes, unfortunately, were doomed to disappointment by the action

of the American Senate, whose ratification of the treaty was accompanied by amendments which wholly destroyed its value, and compelled the British government to withdraw. The action of the Senate was, according to the critics in the American press, largely dictated by the dislike of the free-silver men for Mr. Cleveland and Mr. Olney.

The settlement of the Alaska Boundary dispute between the United States and Canada deserves mention here, although it does not exactly come under the head of arbitration proper. In this case the Dominion and the Imperial government on the one hand, and the American government on the other, agreed to submit the points at issue, not to an outside arbitrator, but to a tribunal of eminent jurists and statesmen belonging to the two powers concerned, and presided over by Lord Alverstone, Lord Chief-Justice of England. Only a few days before the Alaska tribunal had finished its deliberations another triumph of the principle of arbitration was secured in the conclusion of the Anglo-French treaty, which provides for the peaceful settlement in the future of most classes of disputes between ourselves and our neighbours.

In the summer of 1910 the long dispute between Britain and the United States as to fishing rights off the coast of British N. America was referred to the Hague Tribunal. Of the seven questions put to the court, five were decided in favour of the United States but the two most important (as to the sovereignty of the waters and the right to regard all bays as *inside* the coast-line) were given in favour of Britain. The decision was well received in both countries.

Among other recent arbitration treaties are those signed between Chile and Argentina (Aug. 12, 1902); between France and Italy

(Dec. 25, 1903); between Great Britain and Germany (July 12, 1904); between Great Britain and Portugal (Nov. 16, 1904); between Great Britain and Austria-Hungary (Jan. 12, 1905); and that between the United States and Great Britain (dropped in Feb. 1905). See also DOGGER BANK and DELAGOA BAY.

The most notable advance in universal arbitration was taken in 1899. The famous rescript of the Czar, calling for a conference of the powers to arrive at a scheme of disarmament, resulted in the Hague Convention. The main project of that rescript, disarmament, was found impracticable; but the policy of the Czar was fully justified by the agreement of the powers to establish a permanent court of arbitration at the Hague. Opinion was obviously not ripe for a compulsory scheme of arbitration to meet all cases; but the formation of such a court gives the strongest encouragement to governments to submit as many disputes as possible to this process of settlement, and the success which so far has attended its operations affords much hope for the future peace of the world. The impulse thus communicated to the cause of international arbitration has resulted in the adoption by several European states of general treaties of arbitration with one or more of their neighbours, in which Great Britain has borne the leading part.

Arblay, MADAME D'. See BURNEY, FRANCES.

Arboga, tn., Sweden, prov. Vestmanland, situated on the Arboga R., affluent of Lake Mälär, 25 m. N.E. of Örebro, on the railway Köping-Örebro. It is one of the oldest places in Sweden, many Diets having been held here, especially those of 1561 and 1597. The town church has an altar-piece by Rembrandt. Pop. 5,300.

Arbogast (d. 394), a Frank by origin, who distinguished himself as a Roman general under the Emperors Gratian (367-383) and Valentinian II. (388-392). Being dismissed by Valentinian, he refused to give up his command, and a few days later the emperor was killed at Vienna (Gaul) by order of Arbogast. He did not himself ascend the throne, but made the rhetorician Eugenius emperor. But after two years (394) the Emperor of the East, Theodosius, invaded Italy, and defeated Arbogast near Aquileia. Eugenius was decapitated, and Arbogast committed suicide. See Morpurgo's *Arbogaste e l'Imperio Romano, 379-394* (1883).

Arbois, tn., Jura dep., France, 26 m. S.S.W. of Besançon; noted for its red and white wines. Pop. 3,500.

Arbois de Jubainville, MARIE HENRI D' (1827), distinguished French philologist and historian, born at Nancy; professor of Celtic language and literature at the Collège de France (1882); member of the Académie des Inscriptions et Belles-lettres (1884); hon. fellow of the Royal Society of Antiquaries of Ireland; has directed *La Revue Celtique* since 1886. He is the author of many important books, as *Histoire des Ducs et des Comtes de Champagne* (7 vols. 1859-69); *Les Premiers Habitants de l'Europe* (1877; 2nd ed. 1889-94); *Etudes Grammaticales sur les Langues Celtiques* (1881); *Le Cycle Mythologique Irlandais et la Mythologie Grecque* (1884), which forms part of the *Cours de Littérature Celtique* (12 vols. 1883-1903); *La Famille Celtique* (1905); *Les Druides et les Dieux Celtiques à forme d'Animaux* (1906); and *L'Enlèvement du Taureau divin et des Vaches de Cooley* (1907).

Arbor Day, a day set apart in the United States and in Canada for the planting of trees by chil-

dren, to encourage forestry in treeless districts. It was first adopted in Nebraska in 1872. Arbor Day in Ireland (March 17) was inaugurated in 1904, when most boards of guardians planted commemorative trees.

Arboriculture. See FORESTRY.

Arbor Vitæ, the *Thuja* genus in the cypress family of conifers; includes aromatic and evergreen shrubs and trees of great variety, many of which are grown in the open or under glass in Britain. See THUYA.

Arbroath, formerly Aberbrothwick and Aberbrothock ('mouth of the Brothock'), royal and parl. burgh, seapt., and manufacturing tn., Forfarshire, Scotland, 17 m. N.E. of Dundee. It manufactures linen, sail-cloth, and leather, and spins flax and jute. There are also engineering works and shipbuilding yards. The dock area is 2½ ac.; high-water depth at entrance, 15 ft.; patent slipway, 450 ft. long. Ruins of the abbey founded by William the Lion in 1178. Arbroath is the 'Fairport' of Scott's *Antiquary*. Pop. 23,000. See Hay's *History of Arbroath* (2nd ed. 1899); M'Bain's *Arbroath Past and Present* (1887).

Arbuës, PEDRO DE (1441-85), Spanish inquisitor, born at Epila, Aragon; became an Augustine monk at Saragossa, and was appointed (1484) by Torquemada first inquisitor there. His excessive zeal in the persecution of the heretics led to his assassination in 1485. He was canonized by Popes Alexander VII. (1661) and Pius IX. (1867). He is the subject of W. von Kaulbach's *Peter Arbuës of Epila condemning a Family of Heretics to Death*. See Zirngiebl's *Peter Arbuës* (3rd ed. 1872).

Arbuthnot, ALEXANDER (d. 1585), Scottish printer, who (with Bassandyne) published the first Scottish Bible. It was a reprint of the Geneva version, and was issued in 2 vols. folio at Edin-

burgh in 1579. It contained a dedication, written by Arbuthnot, to James VI.

Arbuthnot, JOHN (1667-1735), Scottish author and physician, was born at Arbuthnott, Kincardineshire, and graduated M.D. at St. Andrews. He was physician to Queen Anne, a close friend of Swift, and intimate with Pope and Gay. He was the author of the famous satire, *The History of John Bull* (1712). *The Memoirs of Martinus Scriblerus* (1741), though published among Pope's works, is now ascribed to Arbuthnot. See Swift's *Journal to Stella*, and Aitken's *Life and Works of Arbuthnot* (1892).

Arbutus, a genus of evergreen shrubs of the Ericaceæ or heath order. *A. unedo*, the beautiful 'strawberry' tree (20 ft.), is grown in warm districts of the United Kingdom. *A. Andrachne* (15 ft.) is hardy in S. Britain. The *A. Menziesii*, which grows to 100 ft. high, is the madroña of California.

Arc (Lat. 'bow'), a portion of any curved line. The straight line joining its ends is called the 'chord'; the bisector of the chord at right angles, passing to the arc, is the *sagitta* or 'arrow.' The length of a circular arc is given by the equation $s = r\theta$, where r is the radius, and θ the angle subtended at the centre of the circle measured in radians. (See ANGLE.) Huygen's approximation for the length of a circular arc is $(8 \times \text{chord of } \frac{1}{2} \text{ arc} - \text{chord of whole arc}) \div 3$. See CURVE and ASYMPTOTES.

Arc, JEANNE D'. See JOAN OF ARC.

Arc and Arc Lamps. See ELECTRIC LAMPS.

Arcachon, health resort, dep. Gironde, France, on the Bassin d'Arcachon, 35 m. S.W. of Bordeaux. The town proper is situated on the lagoon; the winter town (since 1854) is composed of numerous villas scattered among the pinewoods. The climate is

mild and bracing (59° F. mean of the whole year, 48° F. mean of winter). Oysters are extensively cultivated. The Bassin d'Arcachon is a triangular lagoon, 60 sq. m. in area, communicating with the sea at Cap Ferret. Pop. 9,300. See Lalesque's *Arcachon* (1886).

Arcade, a term in architecture very vaguely used—(1) a series of apertures or recesses with arched ceilings; (2) a single-arched aperture or enclosure, equivalent to a vault; (3) the space covered by a continued arch or vault supported on piers or columns. The first is the true arcade, behind which there is generally a walk or ambulatory. The Romans erected arcades one over the other. The piers of arcades may be decorated with various columns, pilasters, niches, and apertures. See Fergusson's *History of Architecture* (1865-76).

Arcadelt, Jacob (d. 1575), musical composer, born in the Netherlands at the end of the 15th or beginning of the 16th century. He went to Rome in 1536, and was employed as a singer at the Vatican until 1555, when he accompanied Cardinal Charles of Lorraine to Paris. He wrote many masses, over two hundred madrigals for four and five voices, and a collection of songs.

Arcadia, a mountainous and picturesque country in the centre of the Peloponnesus, Greece; bounded by Achaia on the N., by Argolis on the E., by Laconia and Messenia on the S., and by Elis on the W.; entirely surrounded by mountains. Its chief towns were Tegea, Mantinea, and, after 370 B.C., Megalopolis. The Arcadians claimed to be the most ancient people in Greece—'older than the moon,' according to the name they gave themselves. They were certainly a primitive people, chiefly occupied in pastoral pursuits and hunting. Their devotion to music is responsible for

the Arcadia of modern poetry and romance. They retained their independence against the Spartans, and in the 3rd century B.C. joined the Achæan League, and, with its other members, submitted to the Romans in 146 B.C. See Grote's and Bury's *History of Greece*. Arcadia now forms a nomarchy (prov.) of the modern Greek kingdom. Area 2,020 sq. m. Pop. 167,000.

Arcadius (377-408 A.D.), son of Theodosius, emperor of Rome; remarkable as (from 395) the first Emperor of the East, with his capital at Constantinople, his brother Honorius reigning at Rome as Emperor of the West. He was a ruler of no ability, led by his favourites or by his empress Eudoxia. He was succeeded by his son Theodosius II. See W. Stuart Jones's *Roman Empire* (Story of the Nations Series, 1908).

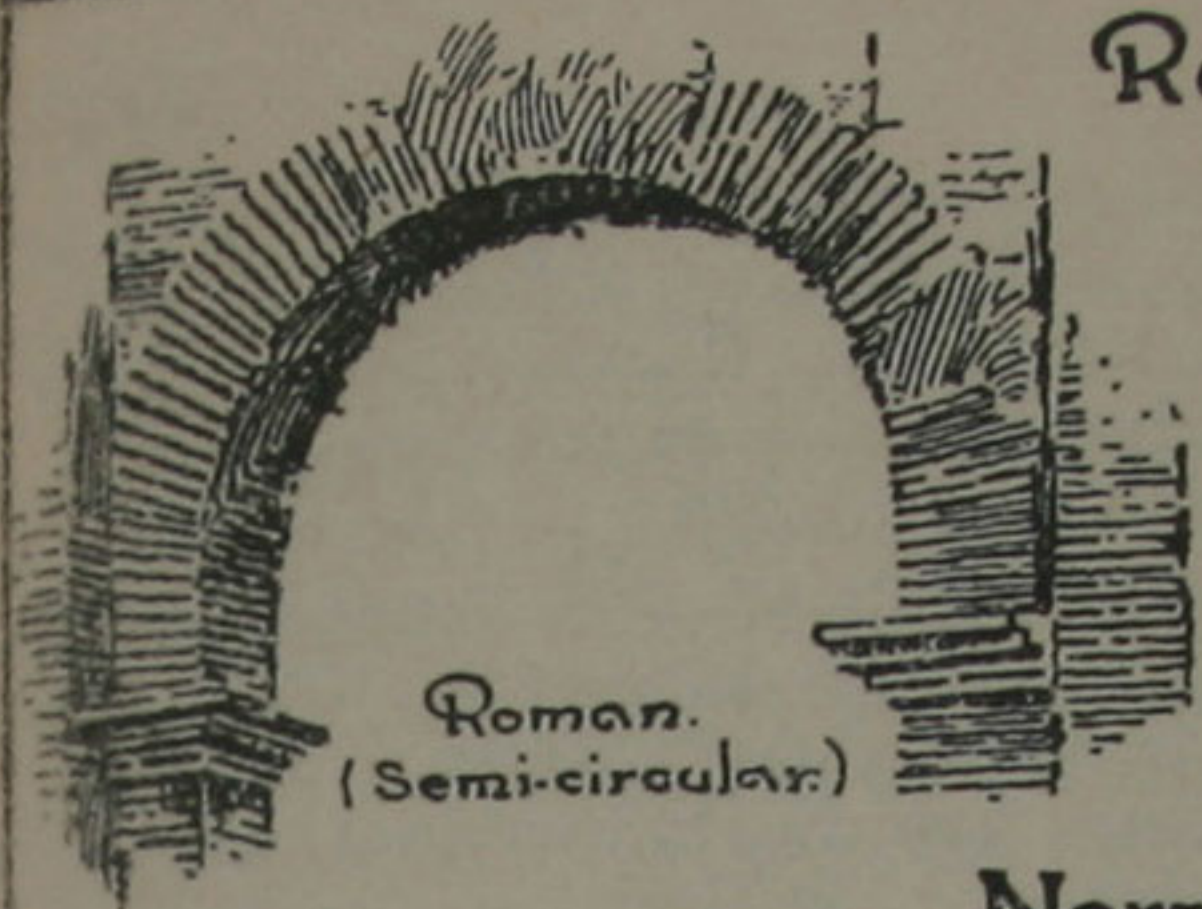
Arce, comm., prov., Caserta, Italy, 5 m. S. by E. of Arpino. Pop. comm. 7,500.

Arcesilaus (316-241 B.C.), Greek philosopher, founder of the Middle Academy, and opponent of Zeno, the founder of the Stoa. A true successor to Pyrrho in his antagonism to the dogmatic schools, he denied that there is any standard by which truth and error may be distinguished. Our convictions, he said, are opinion rather than knowledge; but in the practical or moral sphere we must be guided by probability. See Schwegler's *Geschichte der Griechischen Philosophie* (Eng. trans. 1888).

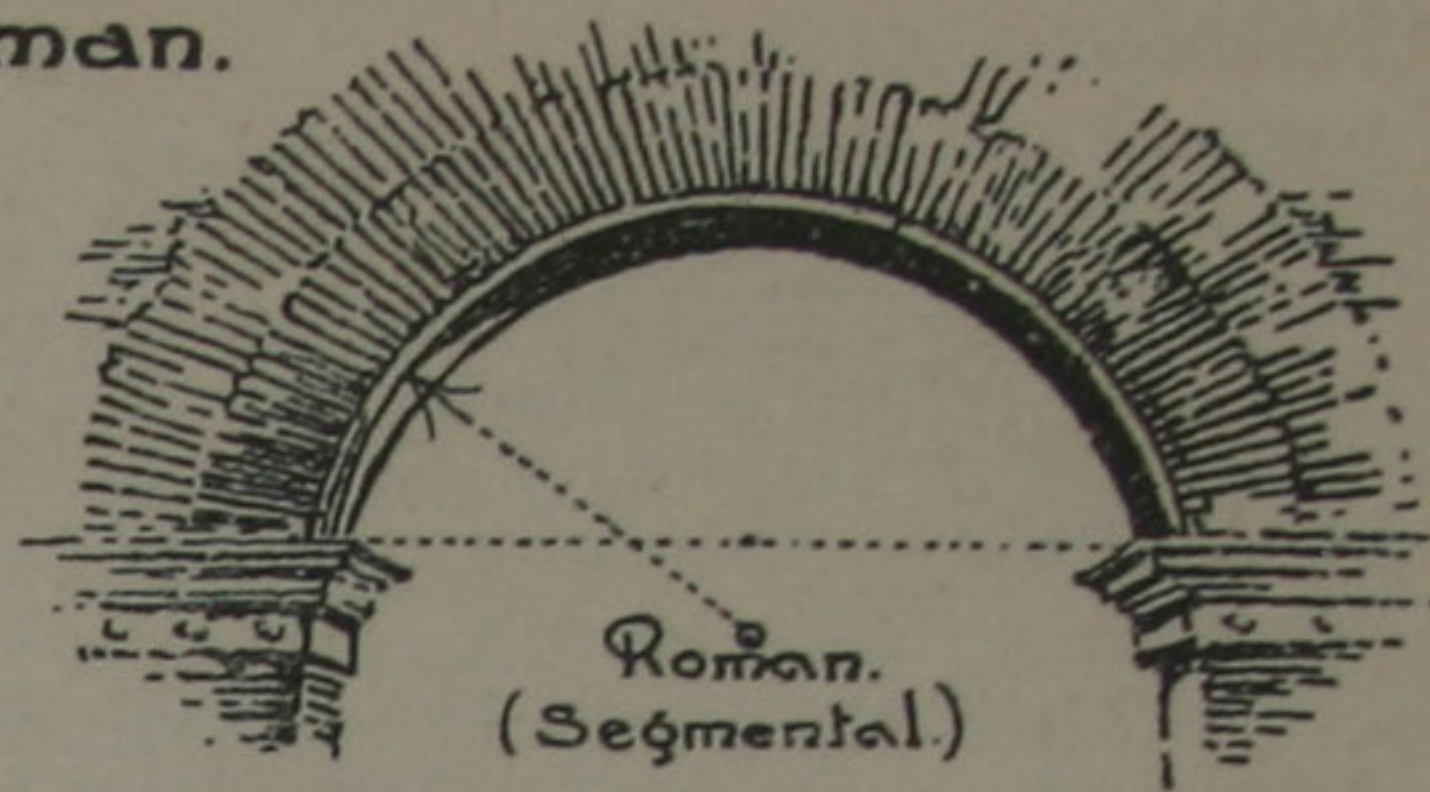
Arcevia, comm., Italy, prov. of and 32 m. W. by S. of Ancona. Pop. comm. 11,000.

Arch, a structure of brickwork or masonry, or of iron or steel ribs, whereby a load is supported over an open space, as in doorways, windows, roofs, bridges, and tunnels. The word is not applied to a straight horizontal support, such as a lintel or girder, which fulfils its purpose by its mere tensile

Roman.

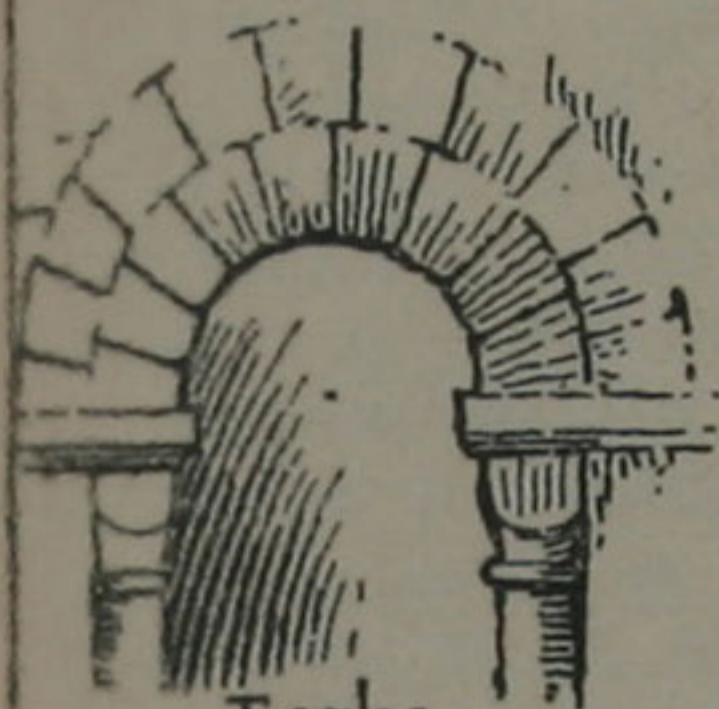


Roman.
(Semi-circular.)

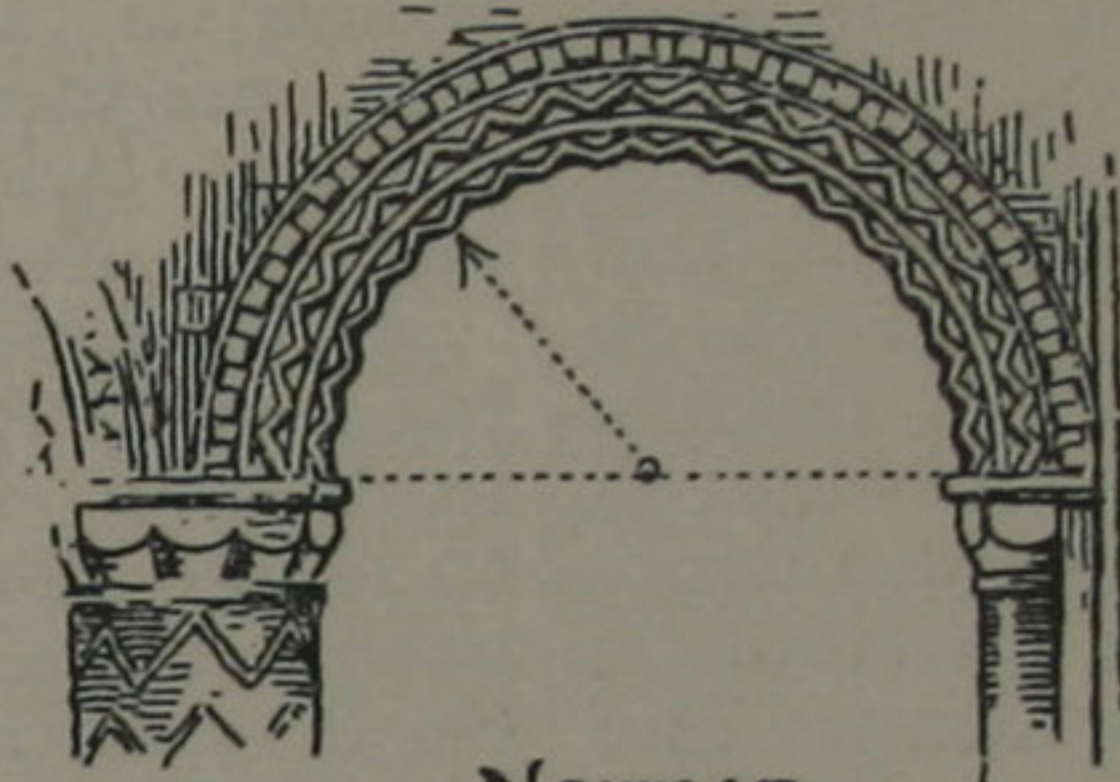


Roman.
(Segmental.)

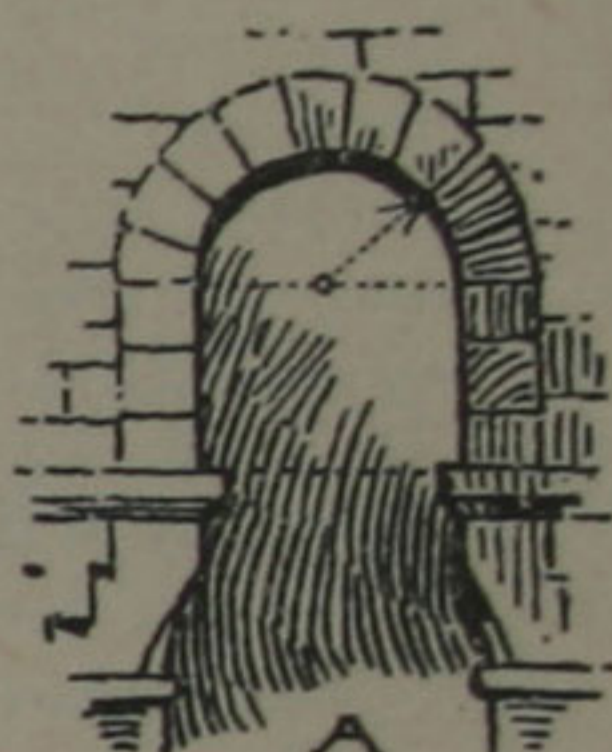
Norman. 1066-1189.



Early
Norman.
(Romanesque.)



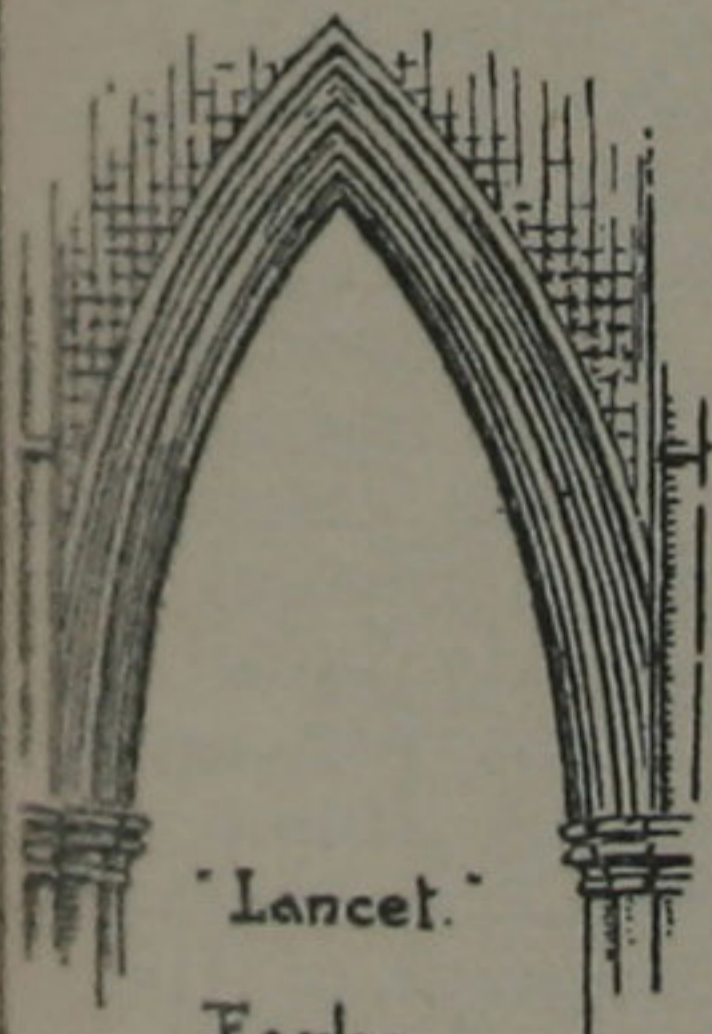
Norman,
or Romanesque.
(Semi-circular.)



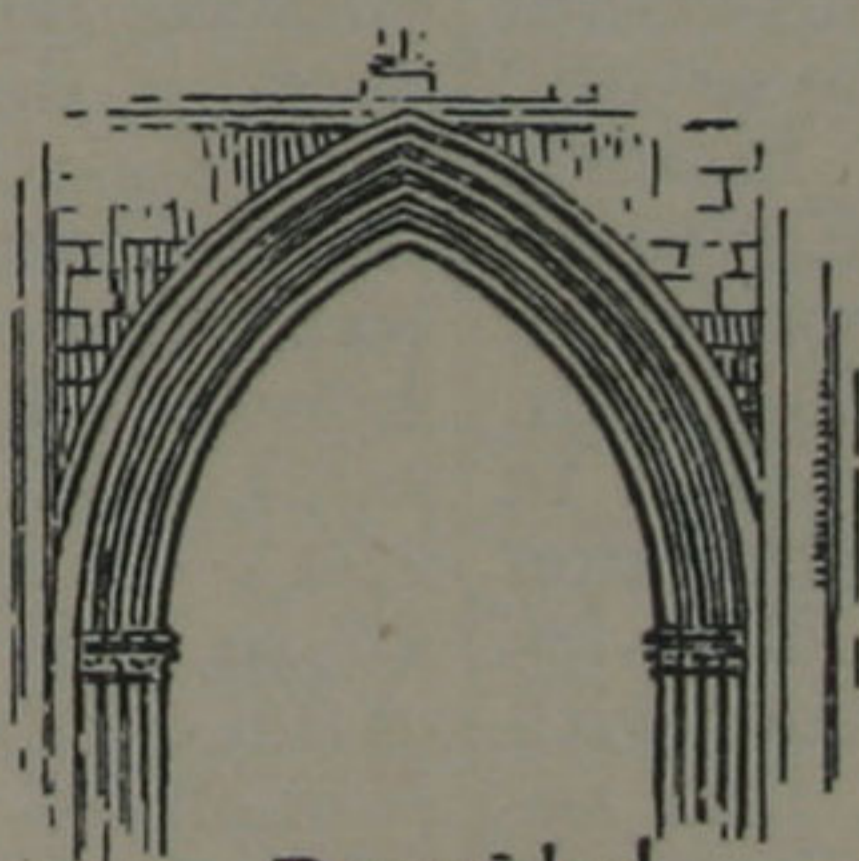
A
Stilted Arch
(Norman.)

Gothic—Pointed

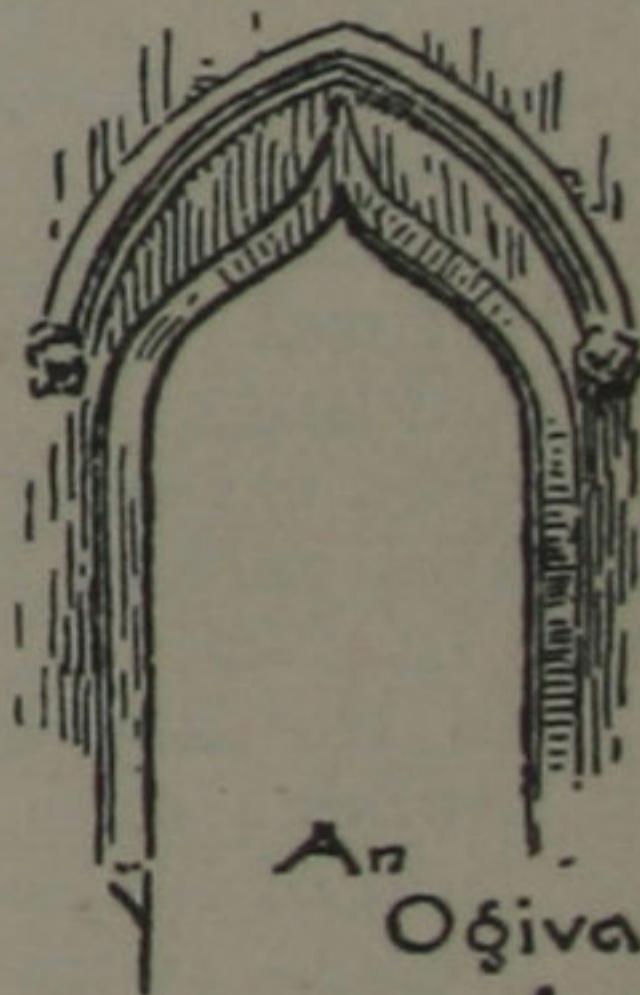
(1189-1546)



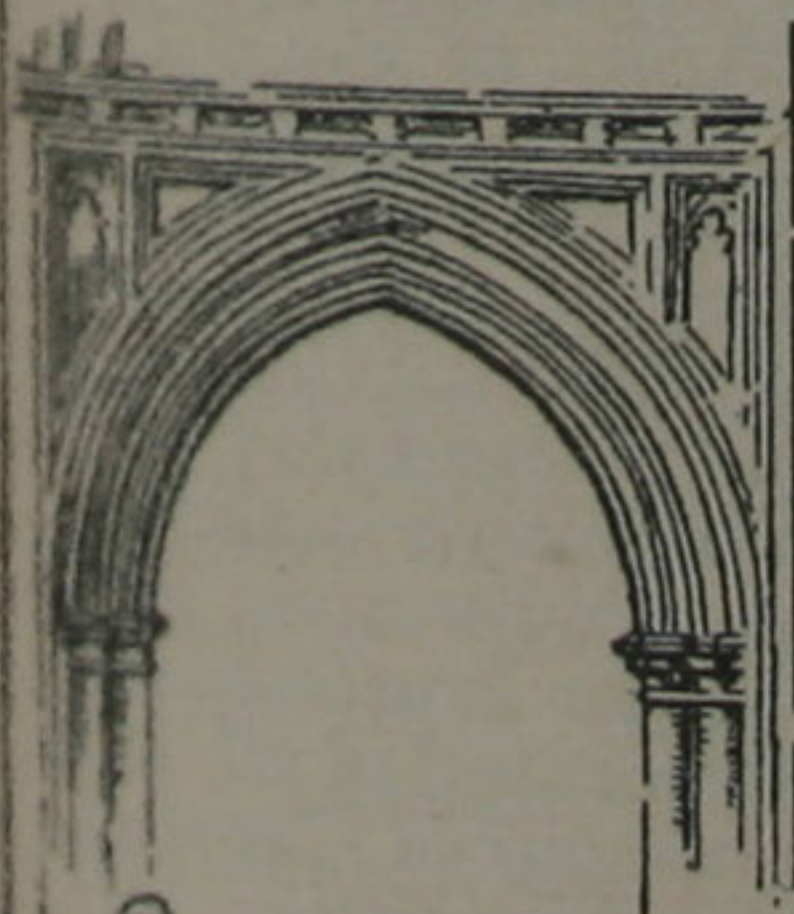
"Lancet."
Early
English.
(1189 - 1307)



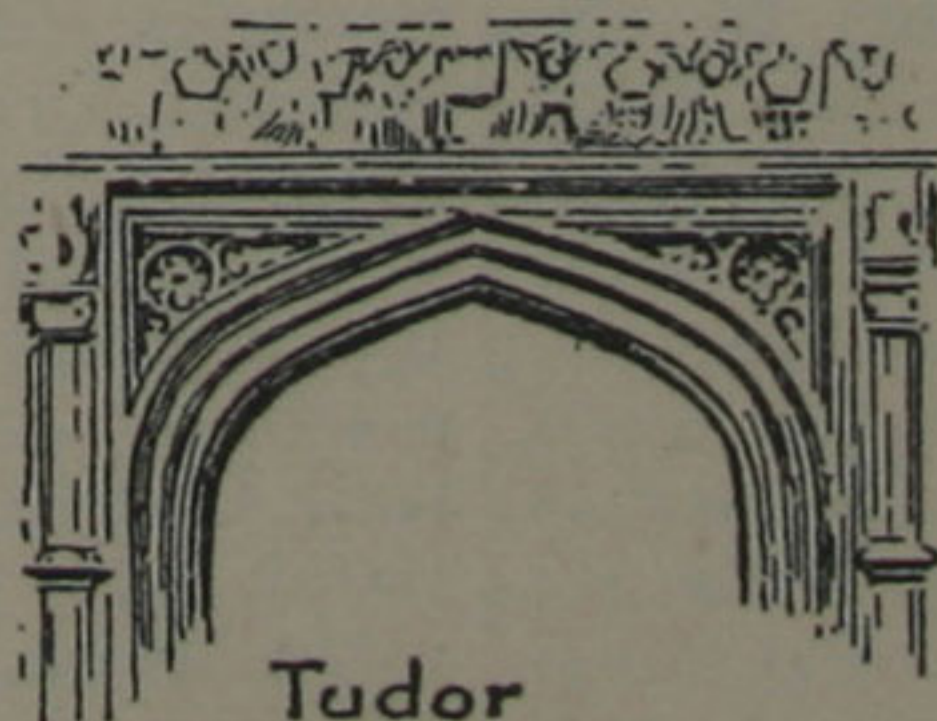
Decorated.
(1307-1379)



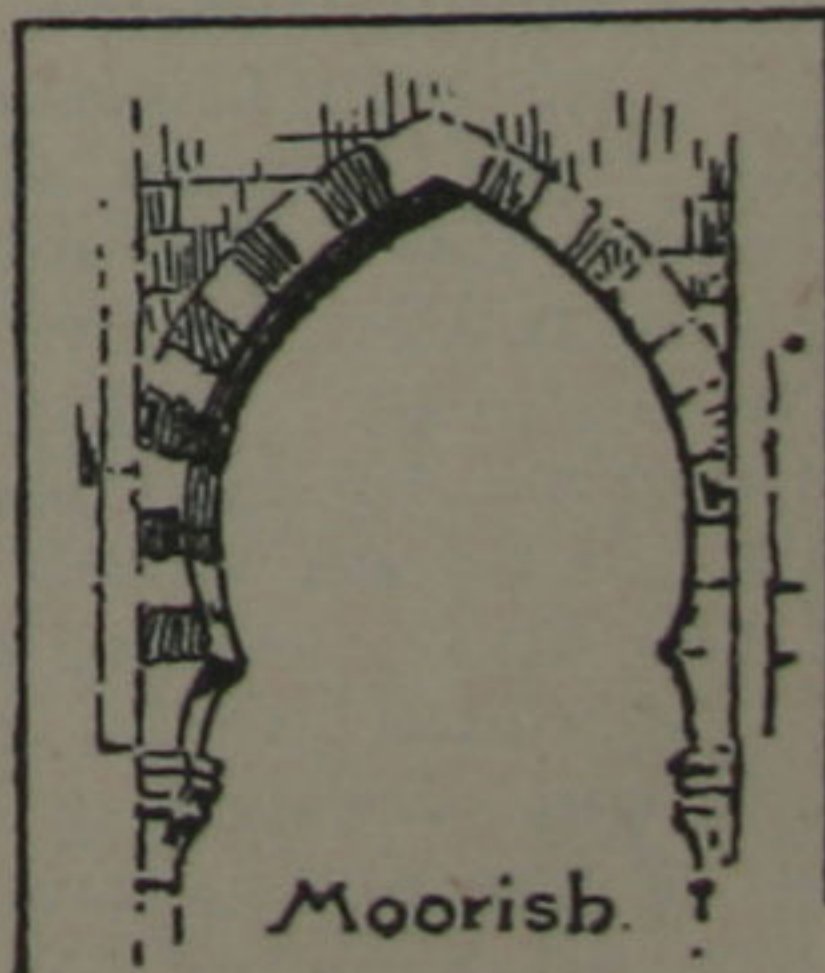
An
Ogival
Arch.
(Gothic.)



Perpendicular.
(1377-1546)



Tudor
(1485-1546)
Advanced
Perpendicular.



Moorish.

strength and rigidity. Arches are, as the name implies, curved (or polyhedral) structures designed to receive the load equally at all points, and to transmit the pressure through elements (stones, ribs, etc.) placed in the 'line of pressure' to the supports. The latter has a definite geometrical form for every amount and distribution of load, and it is the business of the architect or engineer to calculate where that curved line of pressure will lie, and to build his arch to coincide with it. If a flexible chain be held up at its two ends and loaded, it will assume a curve corresponding to the distribution of the load upon the chain; and if the curve thus obtained be inverted, it will represent the arch necessary to support a similarly distributed load laid upon it. Limited by this principle, architects have yet given to the arch a wonderful variety of forms, and it has been the most important factor in determining the several architectural styles of history. The buildings of the Egyptian and Greek civilizations employed the lintel rather than the arch, being, in fact, developments in stone of the art of construction with timber; and the recent introduction of house-building with steel girders (which, in this respect, have the same qualities as wooden beams) has, for many purposes, eliminated the arch, vault, and dome from modern structures. But, from Roman times to the present day, the masonry arch has been used for every constructive purpose. A typical arch is supported by two *piers*, the distance between which is the *span* of the arch. Above each pier is a horizontal block, the *impost*; then the *springer*, or lowest *vousoir* of the curve; then other *vousoirs*, all wedge-shaped; until at the apex is reached the *keystone*, which is the centre of the arch.

The concave side of the arch is the *intrados*, or *soffit*, the convex the *extrados*; the *rise* is the height of the intrados at its highest point, above the middle of the line joining the top of the imposts; the *thrust* is the pressure which the arch exerts outwards. Masonry arches are built upon a wooden structure, called a centering, which is afterwards removed. The engineering questions involved are discussed under BRIDGE. See also ARCHITECTURE.

Arch, TRIUMPHAL, a monumental arch erected by the Romans in honour of an individual, or to commemorate some historical event, usually a great victory. Such structures were originally temporary wooden erections festooned with garlands of flowers, stretching across the road or street along which the victorious general and his army entered the city. Afterwards the triumphal arch became a massive, highly ornamental, permanent piece of architecture, decorated with appropriate bas-reliefs and inscriptions. The oldest, although not now in existence, were those erected in honour of Scipio Africanus (190 B.C.) and Fabius Maximus (120 B.C.). Among surviving arches there are three at Rome—the Arch of Titus (80 A.D.), erected in honour of the conquest of Judea (it is richly sculptured, and shows reliefs of Titus in triumph, with the plunder of the temple at Jerusalem); the Arch of Septimius Severus (203 A.D.), erected in commemoration of his victories over the Parthians; and the Arch of Constantine (312 A.D.), which has a large central archway with a smaller arch on either side, and four Corinthian columns on each front. It was the greatest and most lavishly decorated of all, and was erected in honour of Constantine's victory over Maxentius. Triumphal arches existed also in all parts of the Roman empire—as at

Ancona; at Benevento (114 A.D.), in honour of the Emperor Trajan; and at Saint-Rémy and Carpentras, in honour of Marcus Aurelius. In modern times there are the arch erected at Naples in honour of Alphonso of Aragon (in the 15th century); the Arco de la Pace at Milan (in the 19th century); the two arches erected by the municipality of Paris in honour of Louis XIV., called afterwards Porte Saint-Denis and Porte Saint-Martin; the Arc du Carrousel (1806), and the Arc de Triomphe de l'Étoile (1836), both at Paris, and both dedicated to the Grande Armée. The Arc de Triomphe de l'Étoile is situated at the end of the Champs Elysées, in the middle of a circus from which twelve large avenues radiate. Its erection was begun by Napoleon I. after the battle of Austerlitz (1806), and completed in 1836. It stands 150 ft. high, is 135 ft. broad, and 69 ft. deep. It is splendidly decorated and adorned with allegorical statues, and contains the names of the principal victories of Napoleon, and of 386 generals who took part in the battles of the revolution and of the first empire. Carrousel, in the square of the same name in Paris, was erected by Napoleon in 1806, after the model of the Arch of Septimius Severus in Rome. Other notable arches are the Brandenburger Thor at Berlin, the Siegesthor at Munich; and in America the Washington Arch at New York, and the Memorial Arch at Brooklyn.

Arch, JOSEPH (1826), agitator (1867-1900) in favour of farm labourers, was born in Warwickshire; worked as a farm hand; became a Methodist preacher; founded the National Agricultural Labourers' Union (1872); was Liberal M.P. for N.W. Norfolk, 1885-6, 1892, and 1895-1900. See his *Autobiography*, ed. by the Countess of Warwick (1898).

Archæan System, a geological term including all those rocks which are believed to be older than the fossiliferous strata. The name, which means 'initial' (Gr. *archaios*), was suggested by the supposition that they were the remains of the first crust which formed on the cooling globe; but most geologists would hesitate to decide to what extent this primitive crust is exposed and can be recognized at the present day. They have also been called 'azoic' (without life, unfossiliferous); but this name is even more objectionable, as it takes for granted that fossils will never be obtained from them.

At the present time the name Precambrian is generally employed; it implies that they are older than the oldest Cambrian strata. Rocks of this system are spread over wide areas of both hemispheres, everywhere exhibiting great diversity of character, and structures often intricate and difficult to decipher. As a general rule gneisses and metamorphic schists are the prevalent rock types, but sedimentary rocks and igneous masses are found in practically every area. It has generally been possible to establish a twofold subdivision of this system, there being a lower series of more highly crystalline character, and an upper series of metamorphic schists or little-altered sedimentary masses. The lower series (which, from its importance in the Outer Hebrides, has been called Lewisian, and Laurentian by Canadian geologists from its large development in the St. Lawrence basin) consists usually of gneissose rocks, such as hornblende or biotite, gneiss, hornblende schist, actinolite schist, and eclogite, mostly foliated, and lying in bands or layers which are often of very irregular thickness. It is probable that this series is of igneous origin, and that its char-

acters are partly primary, partly the result of mechanical deformation. Mixed with these are rocks which present a normal igneous *facies*—*e.g.* granite, pegmatite, diorite, peridotite, which seem to have been injected as veins, sills, and rude sheets in fissures of the gneisses. Marbles and crystalline limestones, micaceous schists, granulites, and graphitic rocks, though usually present, play only a subordinate part in this subdivision of the system. The upper series is well developed in Scotland, forming what is known as the Dalradian series of the Geological Survey; and appears also in the Scandinavian peninsula, and, with somewhat different characters, as the Huronian of N. America. The coarsely crystalline and rudely foliated gneisses and igneous rocks of the lower group are here replaced by mica schists, graphitic schists, chlorite schists, quartzites, granulites of various types, slates, phyllites, and crystalline limestones. Much of this material was originally of sedimentary origin, and has reached its present condition as the result of extensive regional metamorphism. In N. America, the Huronian contains important volcanic rocks (diabases and tuffs). Conglomerates are also not infrequent, and indicate extensive unconformabilities. How far in every case these upper rocks are really Precambrian, or include greatly-altered members of the Cambrian or later formations, it is at the present moment impossible to decide. The search for fossils has already in some cases been rewarded, as in the mica schists of S. Norway, which are probably altered Silurian rocks. There is still another *facies* of Precambrian rocks, which in Scotland is represented by the Torridonian, in Norway by the Sparagmite beds, and in N. America by the Keeweenawan beds. These are de-

trital sedimentary masses, sandstones, grits, arkoses, conglomerates, etc., in most cases little altered. Sheets of lava and ash beds are mingled with them in many areas, and they are often penetrated by igneous injections. These are in Scotland known to be of Precambrian age; elsewhere their true position is often uncertain. The Longmyndian and Uriconian rocks of Shropshire, which consist respectively of quartzites and volcanic rocks, as well as the Hartshill and Lickey quartzites of the English Midlands, and the slates and volcanic rocks of Charnwood Forest, may with probability be assigned to this group. Not the least interesting feature of the Archæan and Precambrian rocks is their enormous thickness, which in N. America has been estimated at from 80,000 to 100,000 ft. Although, owing to their very complex and much-folded structure, such estimates in this case are apt to be fallacious, yet they indicate how large a portion of the history of the terrestrial globe must be represented by these masses of rock. We have other evidence which leads to the same conclusion: the earliest known fauna—that of the Cambrian—has never been regarded by zoologists as in any real sense primitive, but its members are so highly developed that they must have had a long series of ancestors of whom no record has been found. It was at one time believed that in Eozoön, supposed to be a species of Foraminifera, an undoubted fossil had been unearthed from the Precambrian rocks of Canada; but the evidence of its organic structure is incomplete. In addition to those districts already mentioned, Archæan rocks are found in Brittany, Finland, Bohemia, Spain, and Portugal; in India, N. China, and over large areas in Brazil, Australia, and