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Aram, Eugene to Arcueil

Articles in This Slice

ARAM, EUGENE (1704-1759), English scholar, but more famous as the murderer celebrated by Hood in his ballad, the *Dream of Eugene Aram*, and by Bulwer Lytton in his romance of *Eugene Aram*, was born of humble parents at Ramsgill, Yorkshire, in 1704. He received little education at school, but manifested an intense desire for learning. While still young, he married and settled as a schoolmaster at Netherdale, and during the years he spent there, he taught himself both Latin and Greek. In 1734 he removed to Knaresborough, where he remained as schoolmaster till 1745. In that year a man named Daniel Clark, an intimate friend of Aram, after obtaining a considerable quantity of goods from some of the tradesmen in the town, suddenly disappeared. Suspicions of being concerned in this swindling transaction fell upon Aram. His garden was searched, and some of the goods found there. As, however, there was not evidence sufficient to convict him of any crime, he was discharged, and soon after set out for London, leaving his wife behind. For several years he travelled through parts of England, acting as usher in a number of schools, and settled finally at Lynn, in Norfolk. During his travels he had amassed considerable materials for a work he had projected on etymology, to be entitled a *Comparative Lexicon of the English, Latin, Greek, Hebrew and Celtic Languages*. He was undoubtedly an original philologist, who realized, what was then not yet admitted by scholars, the affinity of the Celtic language to the other languages of Europe, and could dispute the then accepted belief that Latin was derived from Greek. Aram's writings show that he had grasped the right idea on the subject of the Indo-European character of the Celtic language, which was not established till J.C. Prichard published his book, *Eastern Origin of the Celtic Nations*, in 1831. But he was not destined to live in history as the pioneer of a new philology. In February 1758 a skeleton was dug up at Knaresborough, and some suspicion arose that it might be Clark's. Aram's wife had more than once hinted that her husband and a man named Houseman knew the secret of Clark's disappearance. Houseman was at once arrested and confronted with the bones that had been found. He affirmed his innocence, and, taking up one of the bones, said, "This is no more Dan Clark's bone than it is mine." His manner in saying this roused suspicion that he knew more of Clark's disappearance than he was willing to admit. He was again examined, and confessed that he had been present at the murder of Clark by Aram and another man, Terry, of whom nothing further is heard. He also gave information as to the place where the body had been buried in St Robert's Cave, a well-known spot near Knaresborough. A skeleton was dug up here, and Aram was immediately arrested, and sent to York for trial. Houseman was admitted as evidence against him. Aram conducted his own defence, and did not attempt to overthrow Houseman's evidence, although there were some discrepancies in that; but made a skilful attack on the fallibility of circumstantial evidence in general, and particularly of evidence drawn from the discovery of bones. He brought forward several instances where bones had been found in caves, and tried to show that the bones found in St Robert's Cave were probably those of some hermit who had taken up his abode there. He was found guilty, and condemned to be executed on the 6th of August 1759, three days after his trial. While in his cell he confessed his guilt, and threw some light on the motives for his crime, by asserting that he had discovered a criminal intimacy between Clark and his own wife. On the night before his execution he made an unsuccessful attempt at suicide by opening the veins in his arm.

ARAMAIC LANGUAGES, a class of languages so called from Aram, a geographical term, which in old Semitic usage designates nearly the same districts as the Greek word Syria. Aram, however, does not include Palestine, while it comprehends Mesopotamia (Heb. Aram of two rivers), a region which the Greeks frequently distinguish from Syria proper. Thus the Aramaic languages may be geographically defined as the Semitic dialects originally current in Mesopotamia and the regions extending south-west from the Euphrates to Palestine. (See SEMITIC LANGUAGES; SYRIAC; TARGUM.)

ARANDA, PEDRO PABLO ABARCA DE BOLEA, COUNT OF (1719-1798), Spanish minister and general, was born at the castle of Siétamo, a lordship of his family near Huesca in Aragon, on the 1st of August 1719. The house of Abarca was very

ancient, a fact of which Don Pedro, who never forgot that he was a "rico hombre" (noble) of Aragon, was deeply conscious. He was educated partly at Bologna and partly at the military school of Parma. In 1740 he entered the army as captain in the regiment "Castilla," of which his father was proprietary colonel. On the death of his father he became colonel, and served in the Italian campaigns of the War of the Austrian Succession. In 1749 he married Doña Ana, daughter of the 9th duke of Hijar, by whom he had one son, who died young, and a daughter. During the following years he travelled and visited the camp of Frederick the Great, whose system of drill he admired and afterwards introduced into the Spanish army. After a short period of diplomatic service in Portugal, where his exacting temper made it impossible for him to agree with the premier, Pombal, he returned to Madrid, was made a knight of the Golden Fleece, and director-general of artillery —a post which he threw up, together with his rank of lieutenant-general, because he was not allowed to punish certain fraudulent contractors. The king, Ferdinand VI., exiled him to his estates, but Charles III. on his accession took him into favour. He was again employed in diplomacy, and then appointed to command an army against Portugal in 1763. In 1764 he was made governor of Valencia. When in 1766 the king was driven from his capital in a riot, he summoned Aranda to Madrid and made him president of the council, and captain-general of New Castile. Until 1773 Aranda was the most important minister in Spain. He restored order and aided the king most materially in his work of administrative reform. But his great achievements, which gave him a high reputation throughout Europe with the philosophical and anti-clerical parties, were his expulsion of the Jesuits, whom the king considered responsible for the riot of 1766, and the active part he took in the suppression of the order. Aranda had come much under foreign influence by his education and his travels, and had acquired the reputation of being a confirmed sceptic. By Voltaire and the Encyclopaedists he was erected into a hero from whom great things were expected. His ability, his remarkable capacity for work, and his popularity made him indispensable to the king. But he was a trying servant, for his temper was captious and his tongue sarcastic, while his aristocratic arrogance led him to display an offensive contempt for the *golillas* (the stiff collars), as he called the lawyers and public servants whom the king preferred to choose as ministers, and he permitted himself an amazing freedom of language with his sovereign. At last Charles III. sent him as ambassador to Paris in a disguised disgrace. Aranda held this position till 1787, but in Paris he was chiefly known for his oddities of manner and for perpetual wrangling with the French on small points of etiquette. He resigned his post for private reasons. In the reign of Charles IV., with whom he had been on familiar terms during the life of the old king, he was for a very short time prime minister in 1792. In reality he was merely used as a screen by the queen Maria Louisa and her favourite Godoy. His open sympathy with the French Revolution brought him into collision with the violent reaction produced in Spain by the excesses of the Jacobins, while his temper, which had become perfectly uncontrollable with age, made him insufferable to the king. After his removal from office he was imprisoned for a short time at Granada, and was threatened with a trial by the Inquisition. The proceedings did not go beyond the preliminary stage, and Aranda died at Epila on the 9th of January 1798.

See Don Jacobo de la Pezuela in the *Revista de España*, vol. xxv. (1872); Don Antonio Mª. Fabié, in the *Diccionario general de politica y administration* of Don E. Suarez Inclan (Madrid, 1868), vol. i.; M. Morel Fatio, *Études sur l'Espagne* (2nd series, Paris, 1890).

(D. H.)

ARAN ISLANDS, or South Aran, three islands lying across Galway Bay, on the west coast of Ireland, in a south-easterly direction, forming a kind of natural breakwater. They belong to the county Galway, and their population in 1901 was 2863. They are called respectively—beginning with the northernmost—Inishmore (or Aranmore), the Great Island; Inishmaan, the Middle Island; and Inisheer, the Eastern Island. The first has an elevation of 354 ft., the second of 259, and the third of 202. Their formation is carboniferous limestone. These islands are remarkable for a number of architectural remains of a very early date. In Inishmore there stand, on a cliff 220 ft. high, large remains of a circular cyclopean tower, called Dun-Aengus, ascribed to the Fir-bolg or Belgae; or, individually, to the first of three brothers, Aengus, Conchobar and Nil, who reached Aran Islands from Scotland in the 1st century A.D. There are seven other similar structures in the group. Inishmore also bears the name of *Aran-na-naomh*, Aran-of-the-Saints, from the number of religious recluses who took up their abode in it, and gave a celebrity to the holy wells, altars and shrines, to which many are still attracted. No less, indeed, than twenty buildings of ecclesiastical or monastic character have been enumerated in the three islands. On Inishmore are remains of the abbey of Killenda. Christianity was introduced in the 5th century, and Aran soon became one of the most famous island-resorts of religious teachers and ascetics. The extraordinary fame of the foundations here has been inferred from the inscription "VII. Romani" on a stone in the church Teampull Brecain on Inishmore, attributed to disciples from Rome. The total area of the islands is 11,579 acres. The Congested Districts Board made many efforts to improve the condition of the inhabitants, especially by introducing better methods of fishing. A curing station is established at Killeany, the harbour of Inishmore.

ARANJUEZ (perhaps the ancient *Ara Jovis*), a town of central Spain, in the province of Madrid, 30 m. S. of Madrid, on the left bank of the river Tagus, at the junction of the main southern railways to Madrid, and at the western terminus of the Aranjuez-Cuenca railway. Pop. (1900) 12,670. Aranjuez occupies part of a wide valley, about 1500 ft. above the sea. Its formal, straight streets, crossing one another regularly at right angles, and its uniform, two-storeyed houses were built in imitation of the Dutch style, under the direction of Jerónimo, marquis de Grimaldi (1716-1788), ambassador of Charles III. at the Hague. A rapid in the Tagus, artificially converted into a weir, renders irrigation easy, and has thus created an oasis in the midst of the barren plateau of New Castile. On every side the town is surrounded by royal parks and woods of sycamores, plane-trees and elms, often of extraordinary size. The prevalence of the dark English elms, first introduced into the country and planted here by order of Philip II. (1527-1598), gives to the Aranjuez district a character wholly distinct from that of other Spanish landscapes; and at an early period, despite the unhealthy climate, and especially the oppressive summer heat, which often approaches 100° F., Aranjuez became a favourite residence of the Spanish court. In the 14th and 15th centuries, the master of the Order of Santiago had a country seat here, which passed, along with the mastership, into the possession of the crown of Spain in 1522. Its successive occupants, from the emperor Charles V. (1500-1558) down to Ferdinand VII. (1784-1833), modified it according to their respective tastes. The larger palace was built by Pedro Caro for Philip V. (1683-1746), in the French style of the period. It overlooks the Jardin de la Isla, a beautiful garden laid out for Philip II. on an island in the Tagus, which forms the scene of Schiller's famous drama *Don Carlos*. The Casa del Labrador, or Labourer's Cottage, as it is called, is a smaller palace built by Charles IV. in 1803, and full of elaborate ornamentation. The chief local industry is farming, and an annual fair is held in September for the sale of live stock. Great attention is given to the rearing of horses and mules, and the royal stud used to be remarkable for the beauty of its cream-coloured breed. The treaty of 1772 between France and Spain was concluded at Aranjuez, which afterwards suffered severely from the French during the Peninsular War. Here, also, in 1808, the insurrection broke out which ended in the abdication of Charles IV.

For a fuller description of Aranjuez see D.S. Viñas y Rey, *Aranjuez* (Madrid, 1890); F. Nard, *Guia de Aranjuez, su historia y descripcion* (Madrid, 1851), (illustrated); Alvarez de Quindos, *Descripcion historica del real basque y casa de Aranjuez* (Madrid, 1804).

ARANY, JÁNOS (1817-1882), the greatest poet of Hungary after Petöfi, was born at Nagy-Szalontá on the 2nd of March 1817, the son of György Arany and Sara Mégyeri; his people were small Calvinist yeomen of noble origin, whose property consisted of a rush-thatched cottage and a tiny plot of land. An only son, late born, seeing no companions of his own age, hearing nothing but the voices of his parents and the hymns and prayers in the little Calvinist chapel, Arany grew up a grave and gentle, but by no means an ignorant child. His precocity was remarkable. At six years of age he went to school at Szalontá, where he read everything he could lay his hands upon in Hungarian and Latin. From 1832 to 1836 Arany was a preceptor at Kis-Ujszállás and Debreczen, still a voracious reader with a wider field before him, for he had by this time taught himself French and German. Tiring of the monotony of a scholastic life, he joined a troupe of travelling actors. The hardships he suffered were as nothing compared with the pangs of conscience which plagued him when he thought of the despair of his father, who had meant to make a pastor of this prodigal son, to whom both church and college now seemed for ever closed. At last he borrowed sixpence from the stage-manager and returned home, carrying all his property tied up in a handkerchief. Shortly after his home-coming his mother died and his father became stone-blind. Arany at once resolved that it was his duty never to leave his father again, and a conrectorship which he obtained at this time enabled them to live in modest comfort. In 1840 he obtained a notaryship also, and the same year married Juliana Ercsey, the penniless orphan daughter of an advocate. The next few happy years were devoted to his profession and a good deal of miscellaneous reading, especially of Shakespeare (he learnt English in order to compare the original with his well-thumbed German version) and Homer. Meanwhile the reactionaries of Vienna were goading the Magyar Liberals into revolt, and Arany found a safety-valve for his growing indignation by composing a satirical poem in hexameters, entitled "The Lost Constitution." The Kisfaludy Society, the great literary association of Hungary, about this time happened to advertise a prize for the best satire on current events. Arany sent in his work, and shortly afterwards was awarded the 25-gulden prize (7th of February 1846) by the society, which then advertised another prize for the best Magyar epic poem. Arany won this also with his *Toldi* (the first part of the present trilogy), and immediately found himself famous. All eyes were instantly turned towards the poor country notary, and Petöfi was the first to greet him as a brother. In February of the following year Arany was elected a member of the Kisfaludy Society. In the memorable year 1848 the people of Szalontá elected him their deputy to the Hungarian parliament. But neither now nor subsequently (1861, 1869) would he accept a parliamentary mandate. He wrote many articles, however, in the gazette *Népbarátja*, an organ of the Magyar government, and served in the field as a national guard for eight or ten weeks. In 1849 he was in the civil service of the revolutionary government, and after the final catastrophe returned to his native place, living as best he could on his small savings till 1850, when Lajos Tisza, the father of Kálmán Tisza, the future prime minister, invited him to his castle at Geszt to teach his son Domokos the art of poetry. In the following year Arany was elected professor of Hungarian literature and language at the Nagy-Körös gymnasium. He also attempted to write another epic poem, but the time was not favourable for such an undertaking. The miserable condition of his country, and his own very precarious situation, weighed heavily upon his sensitive soul, and he suffered severely both in mind and body. On the other hand reflection on past events made clear to him not only the sufferings but the defects and follies of the national heroes, and from henceforth, for the first time, we notice a bitterly humorous vein in his writings. Thus *Bolond Istók*, the first canto of which he completed in 1850, is full of sub-acrid merriment. During his nine years' residence at Nagy-Körös, Arany first seriously turned his attention to the Magyar ballad, and not only composed some of the most beautiful ballads in the language, but wrote two priceless dissertations on the technique of the ballad in general: "Something concerning assonance" (1854), and "On Hungarian National Versification" (1856).

When the Hungarian Academy opened its doors again after a ten years' cessation, Arany was elected a member (15th of December 1858). On the 15th of July 1860 he was elected director of the revived Kisfaludy Society, and went to Pest. In November, the same year, he started *Szépirodalmi Figyelö*, a monthly review better known by its later name, *Koszeru*, which did much for Magyar criticism and literature. He also edited the principal publications of the society, including its notable translation of *Shakespeare's Dramatic Works*, to which he contributed the *Midsummer Night's Dream* (1864), *Hamlet* and *King John* (1867). The same year he won the Nádasdy prize of the Academy with his poem "Death of Buda." From 1865 to 1879 he was the secretary of the Hungarian Academy.

Domestic affliction, ill-health and his official duties made these years comparatively unproductive, but he issued an edition of his collected poems in 1867, and in 1880 won the Karácsonyi prize with his translation of the *Comedies of Aristophanes* (1880). In 1879 he completed his epic trilogy by publishing *The Love of Toldi* and *Toldi's Evening*, which were received with universal enthusiasm. He died suddenly on the 24th of October 1882. The first edition of his collected works, in 8 volumes, was published in 1884-1885.

Arany reformed Hungarian literature. Hitherto classical and romantic successively, like other European literatures, he first gave it a national direction. He compelled the poetry of art to draw nearer to life and nature, extended its boundaries and made it more generally intelligible and popular. He wrote not for one class or school but for the whole nation. He introduced the popular element into literature, but at the same time elevated and ennobled it. What Petöfi had done for lyrical he did for epic poetry. Yet there were great differences between them. Petöfi was more subjective, more individual; Arany was more objective and national. As a lyric poet Petöfi naturally gave expression to present moods and feelings; as an epic poet Arany plunged into the past. He took his standpoint on tradition. His art was essentially rooted in the character of the whole nation and its glorious history. His genius was unusually rich and versatile; his artistic conscience always alert and sober. His taste was extraordinarily developed and absolutely sure. To say nothing of his other great qualities, he is certainly the most artistic of all the Magyar poets.

See *Posthumous Writings and Correspondence of Arany*, edited by László Arany (Hung.), (Budapest, 1887-1889); article "Arany," in *A Pallas Nagy Lexikona*, Kot 2 (Budapest, 1893); Mór Gaal, *Life of János Arany* (Hung.), (Budapest, 1898); L. Gyöngyösi, *János Arany's Life and Works* (Hung.), (Budapest, 1901). Translations from Arany: *The Legend of the Wondrous Hunt* (canto 6 of *Buda's Death*), by D. Butler (London, 1881); *Toldi, poème en 12 chants* (Paris, 1895); *Dichtungen* (Leipzig, 1880); *Konig Buda's Tod* (Leipzig, 1879); *Balladen* (Vienna, 1886).

(R. N. B.)

ARAPAHO (possibly from the Pawnee for "trader"), a tribe of North American Indians of Algonquian stock. They formerly ranged over the central portion of the plains between the Platte and Arkansas. They were a brave, warlike, predatory tribe.

With the Sioux and Cheyennes they waged unremitting warfare upon the Utes. The southern divisions of the tribe were placed (1867) on a reservation in the west of Indian Territory (now Oklahoma), while the northern are in western Wyoming. The southern section sold their reservations in 1892 and became American citizens. The Arapahos number in all some 2000.

See INDIANS, NORTH AMERICAN; H.R. Schoolcraft, *History of the Indian Tribes of the United States* (1851-1837, 6 vols.); *Handbook of American Indians*, ed. F.W. Hodge (Washington, 1907).

ARARAT (Armen. *Massis*, Turk. *Egri Dagh*, *i.e.* "Painful Mountain," Pers. *Koh-i-Nuh*, *i.e.* "Mountain of Noah,"), the name given to the culminating point of the Armenian plateau which rises to a height of 17,000 ft. above the sea. The *massif* of Ararat rises on the north and east out of the alluvial plain of the Aras, here from 2500 ft. to 3000 ft. above the sea, and on the south-west sinks into the plateau of Bayezid, about 4500 ft. It is thus isolated on all sides but the north-west, where a *col* about 6900 ft. high connects it with a long ridge of volcanic mountains. Out of the *massif* rise two peaks, "their bases confluent at a height of 8800 ft., their summits about 7 m. apart." The higher, Great Ararat, is "a huge broad-shouldered mass, more of a dome than a cone"; the lower, Little Ararat, 12,840 ft. on which the territories of the tsar, the sultan, and the shah meet, is "an elegant cone or pyramid, rising with steep, smooth, regular sides into a comparatively sharp peak" (Bryce). On the north and west the slopes of Great Ararat are covered with glittering fields of unbroken *névé*. The only true glacier is on the north-east side, at the bottom of a large chasm which runs into the heart of the mountain. The great height of the snow-line, 14,000 ft., is due to the small rainfall and the upward rush of dry air from the plain of the Araxes. The middle zone of Ararat, 5000-11,500 ft., is covered with good pasture, the upper and lower zones are for the most part sterile. Whether the tradition which makes Ararat the resting-place of Noah's Ark is of any historical value or not, there is at least poetical fitness in the hypothesis, inasmuch as this mountain is about equally distant from the Black Sea and the Caspian, from the Mediterranean and the Persian Gulf. Another tradition—accepted by the Kurds, Syrians and Nestorians—fixes on Mount Judi, in the south of Armenia, on the left bank of the Tigris, near Jezire, as the Ark's resting-place. There so-called genuine relics of the ark were exhibited, and a monastery and mosque of commemoration were built; but the monastery was destroyed by lightning in 776 A.D., and the tradition has declined in credit. Round Mount Ararat, however, gather many traditions connected with the Deluge. The garden of Eden is placed in the valley of the Araxes; Marand is the burial-place of Noah's wife; at Arghuri, a village near the great chasm, was the spot where Noah planted the first vineyard, and here were shown Noah's vine and the monastery of St James, until village and monastery were overwhelmed by a fall of rock, ice and snow, shaken down by an earthquake in 1840. According to the Babylonian account, the resting-place of the Ark was "on the Mountain of Nizir," which some writers have identified with Mount Rowanduz, and others with Mount Elburz, near Teheran.

From the Armenian plateau, Ararat rises in a graceful isolated cone far into the region of perennial snow. It was long believed by the Armenian monks that no one was permitted to reach the "secret top" of Ararat with its sacred remains, but on the 27th of September 1829, Dr. Johann Jacob Parrot (1792-1840) of Dorpat, a German in the employment of Russia, set foot on the "dome of eternal ice." Ararat has since been ascended by S. Aftonomov (1834 and 1843); M. Wagner and W.H. Abich (1845); J. Chodzko, N.W. Chanykov, P.H. Moritz and a party of Cossacks in the service of the Russian government (1850); Stuart (1856); Monteith (1856); D.W. Freshfield (1868); James Bryce (1876); A.V. Markov (1888); P. Pashtukhov and H.B. Lynch (1893). Mr Freshfield thus described the mountain:—"It stands perfectly isolated from all the other ranges, with the still more perfect cone of Little Ararat (a typical volcano) at its side. Seen thus early in the season (May), with at least 9000 ft. of snow on its slopes, from a distance and height well calculated to permit the eye to take in its true proportions, we agreed that no single mountain we know presented such a magnificent and impressive appearance as the Armenian Giant." There are a number of glaciers in the upper portion, and the climate of the whole district is very severe. The greater part of the mountain is destitute of trees, but the lower Ararat is clothed with birches. The fauna and flora are both comparatively meagre.

Both Great and Little Ararat consist entirely of volcanic rocks, chiefly andesites and pyroxene andesites, with some obsidian. No crater now exists at the summit of either, but well-formed parasitic cones occur upon their flanks. There are no certain historic records of any eruption. The earthquake and fall of rock which destroyed the village of Arghuri in 1840 may have been caused by a volcanic explosion, but the evidence is unsatisfactory.

The name of Ararat also applies to the Assyrian *Urardhu*, the country in which the Ark rested after the Deluge (Gen. viii. 4), and to which the murderers of Sennacherib fled (2 Kings xix. 37; Isaiah xxxvii. 38). The name Urardhu, originally that of a principality which included Mount Ararat and the plain of the Araxes, is given in Assyrian inscriptions from the 9th century B.C. downwards to a kingdom that at one time included the greater part of the later Armenia. The native name of the kingdom was *Biainas*, and its capital was *Dhuspas*, now Van. The first king, Sarduris I. (*c.* 833 B.C.), subdued the country of the Upper Euphrates and Tigris. His inscriptions are written in cuneiform, in Assyrian, whilst those of his successors are in cuneiform, in their own language, which is neither Aryan nor Semitic. The kings of Biainas extended their kingdom eastward and westward, and defeated the Assyrians and Hittites. But Sarduris II. was overthrown by Tiglath Pileser III. (743 B.C.), and driven north of the Araxes, where he made Armavir, *Armauria*, his capital. Interesting specimens of Biainian art have been found on the site of the palace of Rusas II., near Van. Shortly after 645 B.C. the kingdom fell, possibly conquered by Cyaxares, and a way was thus opened for the immigration of the Aryan Armenians. The name Ararat is unknown to the Armenians of the present day. The limits of the Biblical Ararat are not known, but they must have included the lofty Armenian plateau which overlooks the plain of the Araxes on the north, and that of Mesopotamia on the south. It is only natural that the highest and most striking mountain in the district should have been regarded as that upon which the Ark rested, and that the old name of the country should have been transferred to it.

See also H.B. Lynch, *Armenia* (1901); Sayce, "Cuneiform Inscriptions of Lake Van," in *Journal of Royal Asiatic Society*, vols. xiv., xx. and xxvi.; Maspero, *Histoire ancienne des peuples de l'Orient classique*, tome iii., *Les Empires* (Paris, 1899); J. Bryce, *Transcaucasia and Ararat* (4th ed., 1896); D.W. Freshfield, *Travels in the Central Caucasus and Bashan* (1869); Parrot, *Reise zum Ararat* (1834); Wagner, *Reise nach dem Ararat* (1848); Abich, *Die Besteigung des Ararat* (1849); articles "Ararat," in Hastings' *Dictionary of the Bible*, and the *Encyclopaedia Biblica*.

(C. W. W.)

ARARAT, a municipal town of Ripon county, Victoria, Australia, 130 m. by rail W.N.W. of Melbourne. Pop. (1901) 3580. It lies at an elevation of 1028 ft. towards the western extremity of the Great Dividing range. It is the commercial centre of the north-western grain and wool-producing district and is also noted for its quartz and alluvial gold-mines. Excellent wine is made, and flour-milling, leather-working, brick and candle making and soap-boiling are the chief industries. The district

also yields the best timber in great quantity. Granite, bluestone, limestone and slate abound in the neighbourhood.

ARAROBA POWDER, a drug occurring in the form of a yellowish-brown powder, varying considerably in tint, which derives an alternative name—Goa powder—from the Portuguese colony of Goa, where it appears to have been introduced about the year 1852. The tree which yields it is the *Andira Araroba* of the natural order Leguminosae. It is met with in great abundance in certain forests in the province of Bahia, preferring as a rule low and humid spots. The tree is from 80 to 100 ft. high and has large imparipinnate leaves, the leaflets of which are oblong, about 1½ in. long and ¾ in. broad, and somewhat truncate at the apex. The flowers are papilionaceous, of a purple colour and arranged in panicles. The Goa powder or araroba is contained in the trunk, filling crevices in the heartwood. It is a morbid product in the tree, and yields to hot chloroform 50% of a substance known officially as chrysarobin, which has a definite therapeutic value and is contained in most modern pharmacopoeias. It occurs as a micro-crystalline, odourless, tasteless powder, very slightly soluble in either water or alcohol; it also occurs in rhubarb root. This complex mixture contains pure chrysarobin ($C_{15}H_{12}O_3$), di-chrysarobin methylether ($C_{30}H_{23}O_7 \cdot OCH_3$), di-chrysarobin ($C_{30}H_{24}O_7$). Chrysarobin is a methyl trioxyanthracene and exists as a glucoside in the plant, but is gradually oxidized to chrysophanic acid (a dioxy-methyl anthraquinone) and glucose. This strikes a blood-red colour in alkaline solutions, and may therefore cause much alarm if administered to a patient whose urine is alkaline. The British pharmacopoeia has an ointment containing one part of chrysarobin and 24 of benzoated lard.

Both internally and externally the drug is a powerful irritant. The general practice amongst modern dermatologists is to use only chrysophanic acid, which may be applied externally and given by the mouth in doses of about one grain in cases of psoriasis and chronic eczema. The drug is a feeble parasiticide, and has been used locally in the treatment of ringworm. It stains the skin—and linen—a deep yellow or brown, a coloration which may be removed by caustic alkali in weak solution.

ARAS, the anc. *Araxes*, and the *Phasis* of Xenophon (Turk. and Arab. *Ras*, Armen. *Yerash*, Georg. *Rashki*), a river which rises south of Erzerum, in the Bingeul-dagh, and flows east through the province of Erzerum, across the Pasin plateau, and then through Russian Armenia, passing between Mount Ararat and Erivan, and forming the Russo-Persian frontier. Its course is about 600 m. long; its principal tributary is the Zanga, which flows by Erivan and drains Lake Gokcha or Sevanga. It is a rapid and muddy stream, dangerous to cross when swollen by the melting of the snows in Armenia, but fordable in its ordinary state. It formerly joined the Kura; but in 1897 it changed its lower course, and now runs direct to the Kizil-agach Bay of the Caspian. On an island in its bed stood Artaxata, the capital of Armenia from 180 B.C. to A.D. 50.

ARASON, JON (1484-1551), Icelandic bishop and poet, became a priest about 1504, and having attracted the notice of Gottskalk, bishop of Holar, was sent by that prelate on two missions to Norway. In 1522 he succeeded Gottskalk in the see of Holar, but he was soon driven out by the other Icelandic bishop, Ogmund of Skalholt. His exile, however, was brief, and some years after his return he became involved in a dispute with his sovereign, Christian III., king of Denmark, because he refused to further the progress of Lutheranism in the island. Then in 1548, when a large number of the islanders had accepted the reformed doctrines, Arason and Ogmund joined their forces and attacked the Lutherans. Civil war broke out, and in 1551 the bishop of Holar and two of his sons were captured and executed. Arason, who was the last Roman Catholic bishop in Iceland, is celebrated as a poet, and as the man who introduced printing into the island.

ARATOR, of Liguria, a Christian poet, who lived during the 6th century. He was an orphan, and owed his early education to Laurentius, archbishop of Milan, and Ennodius, bishop of Pavia, who took great interest in him. After completing his studies, he practised with success as an advocate, and was appointed to an influential post at the court of Athalaric, king of the Ostrogoths. About 540, he quitted the service of the state, took orders and was elected sub-deacon of the Roman Church. He gained the favour of Pope Vigilius, to whom he dedicated his *De Actibus Aposlolorum* (written about 544), which was much admired in the middle ages. The poem, consisting of some 2500 hexameters, is of little merit, being full of mystical and allegorical interpretations and long-winded digressions; the versification, except for certain eccentricities in prosody, is generally correct.

Text by Hübner, 1850. See Leimbach, "Der Dichter Arator," in *Theologische Studien und Kritik* (1873); Manitius, *Geschichte der christlich-lateinischen Poesie* (1891).

ARATUS, Greek statesman, was born at Sicyon in 271 B.C., and educated at Argos after the death of his father, at the hands of Abantidas, tyrant of Sicyon. When twenty years old Aratus delivered Sicyon from its tyrant by a bold *coup de main*. By enrolling it in the Achaean League (*q.v.*) he secured it against Macedonia, and with funds received from Ptolemy Philadelphus he pacified the returned exiles. Ever anxious to extend the league, in which after 245 he was general almost every second year, Aratus took Corinth by surprise (243), and with mingled threats and persuasion won over other cities, notably Megalopolis (233) and Argos (229), whose tyrants abdicated voluntarily. He fought successfully against the Aetolians (241), and in 228 induced the Macedonian commander to evacuate Attica. But when Cleomenes III. (*q.v.*) opened hostilities, Aratus sustained several reverses, and was badly defeated near Dyme (226 or 225). Rather than admit Cleomenes as chief of the league, where he might have upset the existing timocracy, Aratus opposed all attempts at mediation. As plenipotentiary in 224 he called in Antigonus Doson of Macedonia, and helped to recover Corinth and Argos

and to crush Cleomenes at Sellasia, but at the same time sacrificed the independence of the league. In 220-219 the Aetolians defeated him in Arcadia and harried the Peloponnese unchecked. When Philip V. of Macedon came to expel these marauders, Aratus became the king's adviser, and averted a treacherous attack on Messene (215); before long, however, he lost favour and in 213 was poisoned. The Sicyonians accorded him hero-worship as a "son of Asclepius." To Aratus is due the credit of having made the Achaean League an effective instrument against tyrants and foreign enemies. But his military incapacity and his blind hatred of democratic reform went far to undo his work.

Polybius (ii.-viii.) follows the *Memoirs* which Aratus wrote to justify his statesmanship,—Plutarch (*Aratus* and *Cleomenes*) used this same source and the hostile account of Phylarchus; Paus. ii. 10; see Neumeyer, *Aralos von Sikyon* (Leipzig, 1886).

(M. O. B. C.)

ARATUS, of Soli in Cilicia, Greek didactic poet, a contemporary of Callimachus and Theocritus, was born about 315 B.C. He was invited (about 276) to the court of Antigonus Gonatas of Macedonia, where he wrote his most famous poem, Φαινόμενα (Appearances, or Phenomena). He then spent some time with Antiochus I. of Syria; but subsequently returned to Macedonia, where he died about 245. Aratus's only extant works are two short poems, or two fragments of his one poem, written in hexameters; an imitation of a prose work on astronomy by Eudoxus of Cnidus, and Διοσημεῖα (on weather signs), chiefly from Theophrastus. The work has all the characteristics of the Alexandrian school of poetry. Although Aratus was ignorant of astronomy, his poem attracted the favourable notice of distinguished specialists, such as Hipparchus, who wrote commentaries upon it. Amongst the Romans it enjoyed a high reputation (Ovid, *Amores*, i. 15, 16). Cicero, Caesar Germanicus and Avienus translated it; the two last versions and fragments of Cicero's are still extant. Quintilian (*Instit.* x. i, 55) is less enthusiastic. Virgil has imitated the *Prognostica* to some extent in the *Georgics*. One verse from the opening invocation to Zeus has become famous from being quoted by St Paul (Acts xvii. 28). Several accounts of his life are extant, by anonymous Greek writers.

Editio princeps, 1499; Buhle, 1793; Maass, 1893; *Aratea* (1892), *Commentariorum in Aratum Reliquiae* (1898), by the same. English translations: Lamb, 1848; Poste, 1880; R. Brown, 1885; Prince, 1895. On recently discovered fragments, see H.I. Bell, in *Classical Quarterly*, April 1907; also *Berliner Klassikertexte*, Heft v. 1, pp. 47-54.

ARAUCANIA, the name of a large territory of Chile, South America, S. of the Bio-bio river, belonging to the Araucanian Indians (see below) at the time of their independence of Spanish and Chilean authority. The loss of their political independence has been followed by that of the greater part of their territory, which has been divided up into the Chilean provinces of Arauco, Bio-bio, Malleco and Cautin, and the Indians, much reduced in number, now live in the wooded recesses of the three provinces last named.

ARAUCANIANS (or Auca), a tribal group of South American Indians in southern Chile (see above). Physically a fine race, their hardiness and bravery enabled them successfully to resist the Incas in the 15th century. Their government was by four *toquis* or princes, independent of one another, but confederates against foreign enemies. Each tetrarchy was divided into five provinces, ruled by five chiefs called *apo-ulmen*; and each province into nine districts, governed by as many *ulmen*, who were subject to the apo-ulmen, as the latter were to the toquis. These various chiefs (who all bore the title of ulmen) composed the aristocracy of the country. They held their dignities by hereditary descent in the male line, and in the order of primogeniture. The supreme power of each tetrarchy resided in a council of the ulmen, who assembled annually in a large plain. The resolutions of this council were subject to popular assent. The chiefs, indeed, were little more than leaders in war; for the right of private revenge limited their authority in judicial matters; and they received no taxes. Their laws were merely traditional customs. War was declared by the council, messengers bearing arrows dipped in blood being sent to all parts of the country to summon the men to arms. From the time of the first Spanish invasion (1535) the Araucanians made a vigorous resistance, and after worsting the best soldiers and the best generals of Spain for two centuries obtained an acknowledgment of their independence. Their success was due as much to their readiness in adopting their enemy's methods of warfare as to their bravery. Realizing the inefficiency of their old missiles when opposed to musket balls, they laid aside their bows, and armed themselves with spears, swords or other weapons fitted for close combat. Their practice was to advance rapidly within such a distance of the Spaniards as would not leave the latter time to reload after firing. Here they received without shrinking a volley, which was certain to destroy a number of them, and then rushing forward in close order, fought their enemies hand to hand.

The Araucanians believe in a supreme being, and in many subordinate spirits, good and bad. They believe also in omens and divination, but they have neither temples nor idols, nor religious rites. Very few have become Roman Catholics. They believe in a future state, and have a confused tradition respecting a deluge, from which some persons were saved on a high mountain. They divide the year into twelve months of thirty days, and add five days by intercalation. They esteem poetry and eloquence, but can scarcely be induced to learn reading or writing.

The tribal divisions have little or no organization. Some 50,000 in number, they spend a nomad existence wandering from pasture to pasture, living in low skin tents, their herds providing their food. They still preserve their warlike nature, though in 1870 they formally recognized Chilean rule. In 1861 Antoine de Tounens (1820-1878), a French adventurer in Chile, proclaimed himself king of Araucania under the title of Orélie Antoine I., and tried to obtain subscriptions from France to support his enterprise. But his pretensions were ludicrous; he was quickly captured by the Chileans and sent back to France (1862) as a madman; and though he made one more abortive effort in 1874 to recover his "kingdom," and occupied his pen in magnifying his achievements, nobody took him seriously except a few of the deluded Indians.

See Domeyko, *Araucania y sus habitantes* (Santiago, 1846); de Ginoux, "Le Chili et les Araucans," in *Bull, de la soc, de géogr.* (1852); E.R. Smith, *Araucamans* (New York, 1855); J.T. Medina, *Los aborjenes de Chile* (Santiago, 1882); A. Polakowsky, *Die heutigen Araukanen*, Globus No. 74 (Brunswick, 1898).

ARAUCARIA, a genus of coniferous trees included in the tribe *Araucarineae*. They are magnificent evergreen trees, with apparently whorled branches, and stiff, flattened, pointed leaves, found in Brazil and Chile, Polynesia and Australia. The name of the genus is derived from Arauco, the name of the district in southern Chile where the trees were first discovered. *Araucaria imbricata*, the Chile pine, or "monkey puzzle," was introduced into Britain in 1796. It is largely cultivated, and usually stands the winter of Britain; but in some years, when the temperature fell very low, the trees have suffered much. Care should be taken in planting to select a spot somewhat elevated and well drained. The tree grows to the height of 150 ft. in the Cordilleras of Chile. The cones are from 8 to 8½ in. broad, and 7 to 7½ in. long. The wood of the tree is hard and durable. This is the only species which can be cultivated in the open air in Britain. *Araucaria brasiliana*, the Brazil pine, is a native of the mountains of southern Brazil, and was introduced into Britain in 1819. It is not so hardy as *A. imbricata*, and requires protection during winter. It is grown in conservatories for half-hardy plants. *Araucaria excelsa*, the Norfolk Island pine, a native of Norfolk Island and New Caledonia, was discovered during Captain Cook's second voyage, and introduced into Britain by Sir Joseph Banks in 1793. It cannot be grown in the open air in Britain, as it requires protection from frost, and is more tender than the Brazilian pine. It is a majestic tree, sometimes attaining a height of more than 220 ft. The scales of its cones are winged, and have a hook at the apex. *Araucaria Cunninghami*, the Moreton Bay pine, is a tall tree abundant on the shores of Moreton Bay, Australia, and found through the littoral region of Queensland to Cape York Peninsula, also in New Guinea. It requires protection in England during the winter. *Araucaria Bidwilli*, the Bunya-Bunya pine, found on the mountains of southern Queensland, between the rivers Brisbane and Burnett, at 27° S. lat., is a noble tree, attaining a height of 100 to 150 ft., with a straight trunk and white wood. It bears cones as large as a man's head. Its seeds are very large, and are used as food by the natives. *Araucaria Rulei*, which is a tree of New Caledonia, attains a height of 50 or 60 ft. *Araucaria Cookii*, also a native of New Caledonia, attains a height of 150 ft. It is found also in the Isle of Pines, and in the New Hebrides. The tree has a remarkable appearance, due to shedding its primary branches for about five-sixths of its height and replacing them by a small bushy growth, the whole resembling a tall column crowned with foliage, suggesting to its discoverer, Captain Cook, a tall column of basalt.

ARAUCO, a coast province of southern Chile, bounded N., E. and S. by the provinces of Concepción, Bio-bio, Malleco and Cautin. Area, 2458 sq. m.; pop. (est. 1902) 70,635. The province originally covered the once independent Indian territory of Araucania (*q.v.*), but this was afterwards divided into four provinces. It is devoted largely to agricultural pursuits. The capital Lebú (pop. in 1902, 3178) is situated on the coast about 55 m. south of Conceptión, with which it is connected by rail.

ARAVALLI HILLS, a range of mountains in India, running for 300 m. in a north-easterly direction, through the Rajputana states and the British district of Ajmere-Merwara, situated between 24° and 27° 10′ N. lat., and between 72° and 75° E. long. They consist of a series of ridges and peaks, with a breadth varying from 6 to 60 m. and an elevation of 1000 to 3000 ft., the highest point being Mount Abu, rising to 5653 ft., near the south-western extremity of the range. Geologically they belong to the primitive formation—granite, compact dark blue slate, gneiss and syenite. The dazzling white effect of their peaks is produced, not by snow, as among the Himalayas, but by enormous masses of vitreous rose-coloured quartz. On the north their drainage forms the Luni and Sakhi rivers, which fall into the Gulf of Cutch. To the south, their drainage supplies two distinct river systems, one of which debouches in comparatively small streams on the Gulf of Cambay, while the other unites to form the Chambal river, a great southern tributary of the Jumna, flowing thence via the Ganges, into the Bay of Bengal on the other side of India. The Aravalli hills are for the most part bare of cultivation, and even of jungle. Many of them are mere heaps of sand and stone; others consist of huge masses of quartz. The valleys between the ridges are generally sandy deserts, with an occasional oasis of cultivation. At long intervals, however, a fertile tract marks some great natural line of drainage, and among such valleys Ajmere city, with its lake, stands conspicuous. The hills are inhabited by a very sparse population of Mhairs, an aboriginal race. For long these people formed a difficult problem to the British government. Previously to the British occupation of India they had been accustomed to live, almost destitute of clothing, by the produce of their herds, by the chase and by plunder. But Ajmere having been ceded to the East India Company in 1818, the Mhair country was soon afterwards brought under British influence, and the predatory instincts of the people were at the same time controlled and utilized by forming them into a Merwara battalion. As the peaceful results of British rule developed, and the old feuds between the Mhairs and their Rajput neighbours died out, the Mhair battalion was transformed into a police force. The Aravalli mountaineers strongly objected to this change, and pleaded a long period of loyal usefulness to the state. They were accordingly again erected into a military battalion and brought upon the roll of the British army. Under Lord Kitchener's scheme of 1903 they were entitled the 50th Merwara Infantry. The Aravalli hills send off rocky ridges in a north-easterly direction through the states of Alwar and Jaipur, which from time to time reappear in the form of isolated hills and broken rocky elevations to near Delhi.

ARAWAK ("meal-eaters," in reference to cassava, their staple food), a tribe of South American Indians of Dutch and British Guiana. The Arawaks have given their name to a linguistic stock of South America, the Arawakan, which includes many once powerful tribes. The Arawakans were once numerous, their tribes stretching from southern Brazil and Bolivia to Central America, occupying the whole of the West Indies and having settlements on the Florida seaboard. They were found by the Spaniards in Haiti and possibly in the Bahamas, but the Caribs had expelled them from most of the islands. The Arawaks proper were physically an undersized, weakly people, peaceable agriculturists, by far the most civilized of all Guiana peoples, being skilful weavers and workers in stone and gold. The chief tribes which may be called Arawakan are the Anti, Arawak, Barre, Goajiro, Guana, Manaos, Maneteneri, Maipuri, Maranho, Moxo, Passé, Piro and Taruma.

See Everard F. im Thurn, *Among the Indians of Guiana* (London, 1883).

ARBACES, according to Ctesias (Diodor. ii. 24 ff. 32), one of the generals of Sardanapalus, king of Assyria and founder of the Median empire about 830 B.C. But Ctesias's whole history of the Assyrian and Median empires is absolutely fabulous; his Arbaces and his successors are not historical personages. From the inscriptions of Sargon of Assyria we know one "Arbaku Dynast of Arnashia" as one of forty-five chiefs of Median districts who paid tribute to Sargon in 713 B.C. See MEDIA. (Ed. M.)

ARBE (Serbo-Croatian *Rab*), an island in the Adriatic Sea, forming the northernmost point of Dalmatia, Austria. Pop. (1900) 4441. Arbe is 13 m. long; its greatest breadth is 5 m. The capital, which bears the same name, is a walled town, remarkable, even among the Dalmatian cities, for its beauty. It occupies a steep ridge jutting out from the west coast. At the seaward end of this promontory is the 13th-century cathedral; behind which the belfries of four churches, at least as ancient, rise in a row along the crest of the ridge; while behind these, again, are the castle and a background of desolate hills. Many of the houses are roofless and untenanted; for, after five centuries of prosperity under Venetian or Hungarian rule, an outbreak of plague in 1456 swept away the majority of the townsfolk, and ruined the survivors. Some of the old palaces are, nevertheless, of considerable interest; one especially as the birthplace of the celebrated philosopher, Marc Antonio de Dominis. Fishing and agriculture constitute the chief resources of the islanders, whose ancient silk industry is still maintained. In 1018 the yearly tribute due to Venice was fixed at ten pounds of silk or five pounds of gold.

ARBELA (ARBA'IL, *i.e.* "Four-god-city"), an ancient town in Adiabene, the capital in Assyrian and pre-Assyrian times of the country between the greater and lesser Zab, and seat of an important cult of Ishtar. The battle in which Alexander overthrew Darius in 331 B.C., though named in the old books after Arbela, was probably fought at Gaugamela, some 60 m. away (Yorck von Wartenburg, *Kurze Übersicht der Feldzüge A. des Gr.*). The modern town of Erbil or Arbil, in the vilayet of Mosul, is about 40 m. from Mosul on the road to Bagdad. The greater part of the town, which seems at one time to have been very large, is situated on an artificial mound about 150 ft. high. It became the seat of the Ayyubite sultan Saladin in 1184; was bequeathed in 1233 to the caliphs of Bagdad; was plundered by the Mongols in 1236 and in 1393 by Timur, and was taken in 1732 by the Persians under Nadir Shah. In the 14th century the Christians were almost exterminated. The population, which varies from 2000 to 6000, is chiefly composed of Kurds.

The ruins of another ARBELA (Irbid, Beth-Arbel) in Palestine, situated near the west shore of the Sea of Galilee, a little north of its centre, are not in themselves of high interest, but the site is noteworthy through its connexion with the neighbouring caves in the lofty flank of the Wadi Hamam, above which Arbela stood. These caves (called by the Arabs Kulat ibn Ma'an) are apparently natural, but were enlarged and fortified. They were used by the inhabitants of Arbela as a place of refuge from the army of Bacchides, general of Demetrius III., king of Syria, and were the resort of bandits in the reign of Herod the Great. He laid siege to them, and his men could only gain access to the caves by being let down from above. The caves were also fortified against the Romans by Josephus.

ARBER, EDWARD (1836-   ), English man of letters, was born in London on the 4th of December 1836. From 1854 to 1878 he was a clerk in the admiralty; from 1878 to 1881 lecturer on English, under Prof. H. Morley, at University College; and from 1881 to 1894 professor of English at Mason College, Birmingham. From 1894 he lived in London as emeritus professor, being also a fellow of King's College. In 1905 he received the honorary degree of D. Litt. at Oxford. He married in 1869, and had two sons, one of them, E.A.N. Arber, becoming demonstrator in palaeobotany at Cambridge. As a scholarly editor Professor Arber's services to English literature are memorable. His name is associated particularly with the series of "English Reprints" (1868-1880), by which an accurate text of the works of many English authors, formerly only accessible in rare or expensive editions, was placed within reach of the general public. Among the thirty volumes of the series were Gosson's *School of Abuse*, Ascham's *Toxophilus*, *Tottel's Miscellany*, Naunton's *Fragmenta Regalia*, &c. It was followed by the "English Scholar's Library" (16 vols.) which included the *Works* (1884) of Captain John Smith, governor of Virginia, and the *Poems* (1882) of Richard Barnfield. In his *English Garner* (8 vols. 1877-1896) he made an admirable collection of rare old tracts and poems; in 1899-1901 he issued *British Anthologies* (10 vols.), and in 1907 began a series called *A Christian Library*. He also accomplished single-handed the editing of two vast, and invaluable, English bibliographies: *A Transcript of the Registers of the Stationers' Company, 1553-1640* (1875-1894), and *The Term Catalogues, 1668-1709; with a number for Easter Term 1711* (1904-1906), edited from the quarterly lists of the booksellers.

ARBITRAGE, the term applied to the system of equalizing prices in different commercial centres by buying in the cheaper market and selling in the dearer. These transactions, or their converse, are mainly confined to stocks and shares, foreign exchanges and bullion; and are for the most part carried on between London and other European capitals and largely with New York. When prices in London are affected by financial or political causes, all other markets are sooner or later influenced, as London is the banking and financial centre for the commerce of the world. It may, however, also occur that some local event of importance initiates a rise or fall in a particular market which must ultimately affect other countries. For instance, a crisis in France would immediately depress all French securities, and by exciting the fears of capitalists would stimulate transfers of funds and raise all the exchanges against France.

In ordinary times those engaged in arbitrage operate with a very small margin of profit. The great improvement in postal, telegraphic and telephonic communication enables operators to close transactions with amazing rapidity, while competition reduces the margin of profit to a minimum. Operations in American stocks and shares are carried on between London and New York on a vast scale, while transactions in African mining shares are undertaken to a considerable extent between London and Paris. The frequent fluctuations in the prices of the latter securities offer a large and fruitful field to bold operators possessed of large resources, while those who have small means often succumb in a commercial crisis. As regards foreign exchange and bullion, arbitrage operators stand on a fairly safe foundation, the fluctuations being slight

and involving little or no risk, although they yield a very small margin of profit. Arbitrage operations are for these reasons resorted to frequently by one country in supplying the requirements of another. The slightest advantage in any market is put to profit, and as the margin in ordinary exchange transactions is minute, the ability to operate in this cross fashion renders business possible, which would otherwise be impracticable. To give concrete instances of the working of arbitrage the following may be cited:—

On the 21st of May 1906 the exchange on London in Vienna was telegraphed from that city 24 kronen 4¾ cents; London, requiring to purchase remittances, found that Antwerp had some Vienna to sell, and arranged to buy there. The transactions worked out as follows:—The direct exchange in Antwerp on London being 25.25½, and Antwerp's selling price of Vienna being 105 francs for 100 kronen, on dividing 25.25½ by 105 an exchange of 24.05¼ was obtained or ½ cent cheaper than the direct exchange between Vienna and London.

Again a portion of the proceeds of the Russian loan of 1906 had to be remitted to Berlin from Paris. Having exhausted local balances in Berlin, Paris on one side, and Berlin on the other, sought to prevent gold shipments from Berlin, and thus cause stringency in that money market. On the 21st of May 1906 Berlin was therefore seeking to sell Paris in London at 81.35 marks for 100 francs, and draw on London for the proceeds at 20.50. This transaction produced a parity between the exchanges of 25.20, which left a small margin in London.

Two instances of arbitrage of stocks are the following:—On the 24th of March 1906, Japanese exchequer bonds, series 2 and 3, were bought in Tokio at 93¼ and were paid for by telegraphic transfer at 24⅜ pence per yen, and were sold in London the same day at 94 for payment on arrival of bonds. It took five weeks for the transmission of the bonds to London, where they were dealt in on the fixed basis of exchange, namely 24½ pence per yen. The London price works out thus:

$$\frac{93.25 \times 24.375}{24.50} = 92.77,$$

to which must be added the loss of interest, as the firm in London paid cash on the 24th of March for the telegraphic transfer, and did not recover payment until the arrival of the bonds from Tokio five weeks later. The following is a computation of the transaction:—

London price	92.77
Five weeks at 5%	.45
English stamp ½% on nominal amount	.50
Insurance ⅛%	.12
	———
	93.84

This sum represents the net cost to the arbitrage house in London, and the money paid on the 28th of April left a profit of about ³⁄₁₆%. The bonds being "to bearer" insurance was necessary for the safety in this, as in all similar transactions.

In the next example, however, this expense was unnecessary, the bonds being "inscribed." On the 21st of May 1906 American Steel common shares were sold for cash in New York at 41³⁄₁₆ dollars per share, and were bought in London at 42⁷⁄₃₂ for the account day, May 31st. These figures are explained by the fact that transactions in the United States stocks and shares are on the fixed basis of five dollars per pound sterling, while as regards payments in New York the exchange varies daily. Railway shares are generally 100 dollars each. In the London market, however, five shares of 100 dollars would be £100 nominal. These shares, therefore, cost in London, at the purchase price of 42⁷⁄₃₂, £42 : 4 : 5. The money realized in New York for five shares at 41³⁄₁₆ was 205·93 dollars. A cheque on London was bought at 4 dollars 85¼ cents, realizing £42 : 8 : 9. It should be noted that the shares in these cases are generally lent by the New York correspondent, thus saving loss of interest. The resulting profit in this particular instance was 4s. 4d. for each five shares, divided between the London and New York arbitrage firms. Arbitrage operations with distant countries such as India are large and mainly profitable. Arbitrage with India consists chiefly in buying bills of exchange in London, such as India Council rupee bills amounting to about 16 millions sterling annually, and commercial bills drawn against goods exported to India. The counter-operation consists in purchasing in India, for short or long delivery, sterling bills drawn against exports to Great Britain of Indian produce, such as cotton, tea, indigo, jute and wheat. These operations greatly facilitate trade and the moving of produce from the interior of India to the seaports. Without this assistance Great Britain's enormous trade could not be carried on, and she would have to revert to the primitive system of barter. The same advantages are afforded to her vast trade with China and Japan, with the material difference that the supply of government council bills is confined to the Indian trade. The balance of trade with all countries is generally settled by specie shipments; hence, with the Far East, silver and gold play an important part in arbitrage.

It will thus be seen that arbitrage fills a useful place in commerce; the profits are small because the competition is great; nevertheless huge transactions employing thousands of clerks result from this system.

The literature of the subject is extremely meagre. Lord Goschen's *Theory of Foreign Exchanges* (London, 1866) is general and theoretical, but throws great light upon particular aspects of the philosophy of arbitrage, without touching specially on the details of the subject itself. The principal other works are: Kelly's *Cambist* (1811, 1835); Otto Swoboda, *Die kaufmannische Arbitrage* (Berlin, 1873), and *Borse und Actien* (Cologne, 1869); Coquelin et Guillaumin, *Dictionnaire de l'économie politique* (Paris, 1851-1853); Ottomar Haupt, *London Arbitrageur* (London, 1870); Charles le Touzé, *Traité théorique et pratique du change* (Paris, 1868); Tate, *Modern Cambist* (London, 1868); Simon Spitzer, *Ueber Munz- und Arbiragenrechnung* (Vienna, 1872); J.W. Gilbart, *Principles and Practice of Banking* (London, 1871); G. Clare, *The A B C of Foreign Exchanges* (2nd ed., 1895); *Money Market Primer and Key to the Exchanges* (2nd ed., 1900); J. Pallain, *Les Changes étrangers et les prix* (Paris, 1905). (Sw.)

ARBITRATION (Lat. *arbitrari*, to examine or judge), a term derived from the nomenclature of Roman law, and applied to an arrangement for taking, and abiding by, the judgment of a selected person in some disputed matter, instead of carrying it to the established courts of justice. In disputes between states, arbitration has long played an important part (see ARBITRATION, INTERNATIONAL). The present article is restricted to arbitration under municipal law; but a separate article is also devoted to the use of arbitration in labour disputes (see ARBITRATION AND CONCILIATION).

Roman Law.—Arrangements for avoiding the delay and expense of litigation, and referring a dispute to friends or neutral persons, are a natural practice, of which traces may be found in any state of society; but it is from Roman Law that we derive arbitration as a system which has found its way into the practice of European nations in general, and has even evaded the dislike of the English common lawyers to the civil law. The praetor, who had the arrangement of all trials or private suits and the formal appointment of judges for them, referred the great majority of such cases for decision to a judge who was styled usually *judex* but sometimes *arbiter*. The phrase *judex arbiterve* frequently occurs. The *judex* and the *arbiter* had the same functions, and apparently the only express basis for the distinction between the two words is that

there might be several *arbitri* but never more than one *judex* in a cause. The term *arbiter* seems, however, to have been sometimes used when the referee had a certain degree of latitude, and was entitled to give weight to equitable considerations (Roby, *Inst. Rom. Law*, i. 318; Hunter, *Roman Law* (1897), p. 48; and see Cicero *pro Rosc. Com.* 4, ss. 10-13; Gaius, *Inst.* iv. s. 163). Apart from this system of compulsory reference by the praetor, Roman law recognized a voluntary reference (*compromissum*) to an *arbiter* or arbitrator by the parties themselves. The arbitrator *ex compromisso sumptus* had no coercive jurisdiction, and in order to make his award effective, the agreement of reference was confirmed by a stipulation and usually provided a penalty (*poena, pecunia compromissa*) in case of disobedience. The sum agreed on by way of penalty might be either specific or unliquidated, *e.g.* "whatever the matter may be worth" (*Dig.* iv., tit. 8, s. 28). The arbitrator *ex compromisso sumptus*, like the judicial *arbiter*, was expected to take account of equitable considerations in coming to a decision. If three arbitrators were appointed, a majority could decide; in case of two being appointed and not agreeing, the praetor would compel them to choose a third (Roby, *ubi sup.*, i. 320, 321; *Dig.* iv., tit. 8, s. 17). As in English law, it was necessary that the award should cover all the points submitted (*Dig.* iv., tit. 8, s. 21).

Law of England.—The law of England as to arbitration is now practically summed up in the Arbitration Act of 1889. This statute is an express code as to proceedings in all arbitration, but "criminal proceedings by the crown" cannot be referred under it (ss. 13, 14). The statute subdivides its subject-matter into two headings. I. References by consent out of court; II. References under order of court.

(1) Here the first matter to be dealt with is the submission. A submission is defined as a written agreement (it need not be signed by both parties) to submit present or future differences to arbitration, whether a particular arbitrator is named in it or not. The capacity of a person to agree to arbitration, or to act as arbitrator, depends on the general law of contract. A submission by an infant is not void, but is voidable at his option (see INFANT). A counsel has a general authority to deal with the conduct of an action, which includes authority to refer it to arbitration, but he has no authority to refer an action against the wishes of his client, or on terms different from those which his client has sanctioned; and if he does so, the reference may be set aside, although the limit put by the client on his counsel's authority is not made known to the other side when the reference is agreed upon (*Neale v. Gordon Lennox*, 1902, A.C. 465). The committee of a lunatic, with the sanction of the judge in lunacy, may refer disputes to arbitration. As an arbitrator is chosen by the parties themselves the question of his eligibility is of comparatively minor importance; and where an arbitrator has been chosen by both parties, the courts are reluctant to set the appointment aside. This question has arisen chiefly in contracts, for works, which frequently contain a provision that the engineer shall be the arbitrator, in any dispute between the contractor and his own employer. The practical result is to make the engineer judge in his own cause. But the courts will not in such cases prevent the engineer from acting, where the contractor was aware of the facts when he signed the contract, and there is no reason to believe that the engineer will be unfair (*Ives and Barker v. Willans*, 1894, 2 Ch. 478). Even the fact that he has expressed an opinion on matters in dispute will not of itself disqualify him (*Halliday* v. *Hamilton's Trustees*, 1903, 5 Fraser, 800). So, too, where a barrister was appointed arbitrator, the court refused to stop the arbitration on the mere ground that he was the client of a firm of solicitors, the conduct of one of whom was in question (*Bright* v. *River Plate Construction Co.*, 1900, 2 Ch. 835).

References by consent of the court.

Under the law prior to the act of 1889 (*a*) an agreement to refer disputes generally, without naming the arbitrators, was always irrevocable, and an action lay for the breach of it, although the court could not compel either of the parties to proceed under it; (*b*) an agreement to refer to a particular arbitrator was revocable, and if one of the parties revoked that particular arbitrator's authority he could not be compelled to submit to it; (*c*) when, however, the parties had got their tribunal fixed, and were proceeding to carry out the agreement to refer, the act 9 and 10 Will. III. c. 15 provided that the submission might be made a rule of court, a provision which gave the court power to assist the parties in the trial of the case, and to enforce the award of the arbitrators; (*d*) the statute 3 and 4 Will. IV. c. 42 (s. 39) put an end to the power to revoke the authority of a particular arbitrator after the reference to him had been made a rule of court; and—a liability which existed also under the act of 9 and 10 Will. III. c. 15—any person revoking the appointment of an arbitrator after the submission had been made a rule of court might be attached. The Arbitration Act 1889 provides that a submission, unless a contrary intention is expressed in it, is irrevocable except by leave of the court or a judge, and is to have the same effect in all respects as if it had been made an order of court. The object of this enactment was to save the expense of making a submission a rule of court by treating it as having been so made, and it leaves the law in this position, that while the authority of an arbitrator, once appointed, is irrevocable, there is no power—any more than there was under the old law—to compel an unwilling party to proceed to a reference, except in cases specially provided for by sections 5 and 6 of the act of 1889. The former of these sections deals with the power of the court, the latter with the power of the parties to a reference, to appoint an arbitrator in certain circumstances. Section 5 provides that where a reference is to be to a single arbitrator, and all the parties do not concur in appointing one, or an appointed arbitrator refuses to act or becomes incapable of acting, or where the parties or two arbitrators fail, when necessary, to appoint an umpire or third arbitrator, or such umpire or arbitrator when appointed refuses to act, or becomes incapable of acting, and the default is not rectified after seven clear days' notice, the court may supply the vacancy. Under section 6, where a reference is to two arbitrators, one to be appointed by each party, and either the appointed arbitrator refuses to act, or becomes incapable of acting, and the party appointing him fails, after seven clear days' notice, to supply the vacancy, or such party fails, after similar notice, to make an original appointment, a binding appointment (subject to the power of the court to set it aside) may be made by the other party to the reference. The court may compel parties to carry out an arbitration, not only in the above cases by directly appointing an arbitrator, &c., or by allowing one appointed by a party to proceed alone with the reference, but also indirectly by staying any proceedings before the legal tribunals to determine matters which come within the scope of the arbitration. Where the agreement to refer stipulates that the submission of a dispute to arbitration shall be a condition precedent to the right to bring an action in regard to it, an action does not lie until the arbitration has been held and an award made, and it is usual in such cases not to apply for a stay of proceedings, but to plead the agreement as a bar to the action (*Viney* v. *Bignold*, 1887, 20 Q.B.D. 172). The court will refuse to stay proceedings where the subject-matter of the litigation falls outside the scope of the reference, or there is some serious objection to the fitness of the arbitrator, or some other good reason of the kind exists.

An arbitrator is not liable to be sued for want of skill or for negligence in conducting the arbitration (*Pappa* v. *Rose*, 1872, L.R. 7 C.P. 525). When a building contract provides that a certificate of the architect, showing the final balance due to the contractor, shall be conclusive evidence of the works having been duly completed, the architect occupies the position of an arbitrator, and enjoys the same immunity from liability for negligence in the discharge of his functions (*Chambers* v. *Goldthorpe*, 1901, 1 Q.B. 624). An arbitrator cannot be compelled to act unless he is a party to the submission.

An arbitrator (and the following observations apply *mutatis mutandis* to an umpire after he has entered on his duties) has power to administer oaths to, or take the affirmations of, the parties and their witnesses; and any person who wilfully and corruptly gives false evidence before him may be prosecuted and punished for perjury (Arbitration Act 1889, sched. i. and s. 22). At any stage in the reference he may, and shall if he be required by the court, state in the form of a special case for the opinion of the court any question of law arising in the arbitration. The arbitrator may also state his award in whole or in part as a special case (*ib.* s. 19), and may correct in an award any clerical mistake or error arising from an accidental slip or omission. The costs of the reference and the award—which, under sched. i. of the act, must be in writing, unless the submission otherwise provides—are in the arbitrator's discretion, and he has a lien on the award and the submission for his fees, for which—if there is an express or implied promise to pay them—he can also sue (*Crampton* v. *Ridley*, 1887, 20 Q.B.D. 48). An arbitrator or umpire ought not, however, to state his award in such a way as to deprive the parties of their

right to challenge the amount charged by him for his services; and accordingly where an umpire fixed for his award a lump sum as costs, including therein his own and the arbitrators' fees, the award was remitted back to him to state how much he allotted to himself and how much to the arbitrators (in *Re Gilbert* v. *Wright*, 1904, 20 *Times* L.R. 164). But in the absence of evidence to show that the fees charged by arbitrators or umpire are extortionate, or unfair and unreasonable, the courts will not interfere with them (*Llandrindod Wells Water Co.* v. *Hawksley*, 1904, 20 *Times* L.R. 241).

If there is no express provision on the point in the submission, an award under the Arbitration Act 1889 must be made within three months after the arbitrator has entered on the reference, or been called upon to act by notice in writing from any party to the submission. The time may, however, be extended by the arbitrator or by the court. An umpire is required to make his award within one month after the original or extended time appointed for making the award of the arbitrators has expired, or any later day to which he may enlarge it. The court may by order remit an award to the arbitrators or umpire for reconsideration, in which case the reconsidered award must be made within three months after the date of the order.

An award must be *intra vires*: it must dispose of all the points referred; and it must be final, except as regards certain matters of valuation, &c. (see in *Re Stringer and Riley Brothers*, 1901, 1 K.B. 105). An award may, however, be set aside where the arbitrator has misconducted himself (an arbitrator may also be removed by the court on the ground of misconduct), or where it is *ultra vires*, or lacks any of the other requisites—above mentioned—of a valid award, or where the arbitrator has been wilfully deceived by one of the parties, or some such state of things exists. An award may, by leave of the court, be enforced in the same manner as a judgment or decree to the same effect. Under the Revenue Act 1906, s. 9, a uniform duty of ten shillings is payable on awards in England or Ireland, and on decreets arbitral in Scotland.

Provisions for the arbitration of special classes of disputes are contained in many acts of parliament, *e.g.* the Local Government Acts 1888, 1894, the Agricultural Holdings (England) Acts 1883 to 1906, the Small Holdings and Allotments Act 1907, the Light Railways Act 1896, the Housing of the Working Classes Act 1890, the Workmen's Compensation Act 1906, &c.

The Conciliation Act 1896 provides machinery for the prevention and settlement of trade disputes, and in 1892 a chamber of arbitration for business disputes was established by the joint action of the corporation of the city of London and the London chamber of commerce. At the time when the London chamber of arbitration was established, there was considerable dissatisfaction among the mercantile community with the delays that occurred in the disposal of commercial cases before the ordinary tribunals. But the special provision made by the judges in 1895 for the prompt trial of commercial causes to a large extent destroyed the *raison d'être* of the chamber of arbitration, and it did not attain any great measure of success.

(2) The court or a judge may refer any question arising in any cause or matter to an official or special referee, whose report may be enforced like a judgment or order to the same effect. This power may be exercised whether the parties desire it or not. The official referees are salaried officers of court. The remuneration of special referees is determined by the court or judge. An entire action may be referred, if all parties consent, or if it involves any prolonged examination of documents, or scientific or local examination, or consists wholly or partly of matters of account.

References under order of court.

Scots Law.—The Arbitration (Scotland) Act 1894, unlike the English Arbitration Act 1889, did not codify the previously existing law, and it becomes necessary, therefore, to deal with that law in some detail. It differs in important particulars from the law of England. Although (as in England apart from the Arbitration Act 1889) there is nothing to prevent a verbal reference, submissions are generally not merely written but are effected by deed. The deed of submission first defines the terms of the reference, the name or names of the arbiters or arbitrators, and the "oversman" or umpire, whose decision in the event of the arbiters differing in opinion is to be final. Formerly, where no oversman was named in the submission, and no power given to the arbiters to name one, the proceedings were abortive if the arbiters disagreed, unless the parties consented to a nomination. But under the Arbitration (Scotland) Act 1894, s. 4, here arbiters differ in opinion, they, or, if they fail to agree on the point, the court, on the application of either party, may nominate an oversman whose decision is to be final. The deed of submission next gives to the arbiters the necessary powers for disposing of the matters referred (*e.g.* powers to summon witnesses, to administer oaths and to award expenses), and specifies the time within which the "decreet arbitral" is to be pronounced. If this date is left blank, practice has limited the arbiter's power of deciding to a year and a day, unless, having express or clearly implied power in the submission, he exercises this power, or the parties expressly or tacitly agree to its prorogation. The deed of submission then goes on to provide that the parties bind themselves, under a stipulated penalty to abide by the decreet arbitral, that, in the event of the death of either of them, the submission shall continue in force against their heirs and representatives, and that they consent to the registration, for preservation and execution, both of the deed itself and of the decreet arbitral. The power to enforce the award depends on this last provision. Under the common law of Scotland, a submission of future disputes or differences to an arbiter, or arbiters, unnamed, was ineffectual except where the agreement to refer did not contemplate the decision of proper disputes between the parties but the adjustment of some condition, or the liquidation of some obligation, contained in the contract of which the agreement to submit formed a part. And by the Arbitration (Scotland) Act 1894, s. 1, an agreement to refer to arbitration is not invalid by reason of the reference being to a person not named, or to be named by another, or to a person merely described as the holder for the time being of any office or appointment. An arbiter who has accepted office may be compelled by an action in court of session to proceed with his duty unless he has sufficient cause, such as ill-health or supervening interest, for renouncing. The court may name a sole arbiter, where provision is made for one only and the parties cannot agree (Arbitration [Scotland] Act 1894, s. 2); and may name an arbiter where a party having the right or duty to nominate one of two arbiters will not exercise it (*ib.* s. 3). Scots law as to the requisites of a valid award is practically identical with the law of England. The grounds of reduction of a decreet arbitral are "corruption," "bribery," "false hold" (Scots Act of Regulations 1695, s. 25). An attempt was made to include, under the expression "constructive corruption," among these statutory grounds of reduction, irregular conduct on the part of an arbitrator, with no suggestion of any corrupt motive. But it was definitely overruled by the House of Lords (*Adams* v. *Great North of Scotland Railway Co.*, 1891, A.C. 31). The statutory definition of the grounds of reduction was intended, however, merely to put an end to the practice which had previously obtained of reviewing awards on their merits, and it does not prevent the courts from setting aside an award where the arbitrator has exceeded his jurisdiction, or disregarded any one of the expressed conditions of the submission, or been guilty of misconduct. A private arbiter cannot demand remuneration except in virtue of contract, or by implication from the nature of the work done, or if the reference is in pursuance of some statutory enactment (*e.g.* the Lands Clauses [Scotland] Act 1845, s. 32).

Judicial References have been long known to the law of Scotland. When an action is in court the parties may at any stage withdraw it from judicial determination, and refer it to arbitration. This is done by minute of reference to which the court interpones its authority. When the award is issued it becomes the judgment of the court. The court has no power to compel parties to enter into a reference of this kind, and it is doubtful whether counsel can bind their clients in such a matter. A judicial reference falls like the other by the elapse of a year; and the court cannot review the award on the ground of miscarriage. By the Court of Session Act 1850, s. 50, a provision is introduced whereby parties to an action in the supreme court may refer judicially any issue for trial to one, three, five or seven persons, who shall sit as a jury, and decide by a majority.

Law of Ireland.—The Common Law Procedure Act (Ireland) 1856, which is incorporated by s. 60 of the Supreme Court of Judicature Act (Ireland) 1877, and thereby made applicable to all divisions of the High Court of Justice, provides, on the lines of the English Common Law Procedure Act 1854, for the conduct of arbitrations and the enforcement of awards. Irish statute law, like that of England and Scotland, contains numerous provisions for arbitration under special enactments.

Indian and Colonial Law.—The provisions of the English Arbitration Act 1889 have in substance been adopted by the Indian Legislature (see Act ix. of 1899), and by many of the colonies (see, *e.g.*, Act No. 13 of 1895, Western Australia; No. 24 of 1898, Natal; c. 20 of 1899, Bahamas; No. 10 of 1895, Gibraltar; No. 29 of 1898, Cape of Good Hope: s. 7 of this last statute excludes from submission to arbitration criminal cases, so far as prosecution and punishment are concerned, and, without the special leave of the court, matters relating to status, matrimonial causes, and matters affecting minors or other perons under legal disability; Trinidad and Tobago, No. 35 of 1898).

United States.—The common law and statute law of the United States as to arbitration bear a general resemblance to the law of England.

Voluntary submissions. All controversies of a civil nature, and any question of personal injury on which a suit for damages will lie, although it may also be indictable, may be referred to arbitration; but crimes, and perhaps actions on penal statutes by common informers may not. The submission may be effected sometimes by parol, sometimes by written instrument, sometimes by deed or deed poll. Capacity to refer depends on the general law of contractual capacity. The law of England as to the capacity to act as an arbitrator and as to objections to an arbitrator on the ground of interest has been closely followed by the American courts. The same observation applies as to the requisites of an award, the mode of its enforcement and the grounds on which it will be set aside. The arbitrator has a lien on the award for his fees; and—a point of difference from the English law—he may sue for them without an express promise to pay (cf. *Goodall* v. *Cooley*, 1854, 29 New Hamp. 48). At common law, a submission is generally revocable at any time before award; and it is also, in the absence of stipulation to the contrary, revoked by the death of one of the parties. Provision has been made in Pennsylvania for compulsory arbitration by an act of the 16th of June 1836 (see Pepper and Lewis, *Pennsylvania Digest, tit.* "arbitration").

References by rule of court. The rules of court also of many of the states of the United States provide for reference through the intervention of the court at any stage in the progress of a litigation. Such submissions are usually declared irrevocable by the rules providing for them.

Statutory arbitrations. In addition to voluntary submissions and references by rules of court there are in America, as in the United Kingdom, various statutes which provide for arbitration in particular cases. Most of these statutes are founded on the 9 and 10 Will. III., c. 15, and 3 and 4 Will. IV. c. 42, s. 49, "by which it is allowed to refer a matter in dispute (not then in court) to arbitrators, and agree that the submission be made a rule of court. This agreement, being proved on the oath of one of the witnesses thereto, is enforced as if it had been made at first a rule of court" (Bouvier, *Law Dict. s.v.* "Arbitration").

Ample provision is made in America for the arbitration of labour disputes.

Law of France.—Voluntary arbitration has always been recognized in France. In cases of mercantile partnerships, arbitration was formerly compulsory; but in 1856 (law of the 17th of July 1856) jurisdiction in disputes between parties was conferred on the Tribunals of Commerce (as to which see *Code de Commerce*, arts. 615 et seq.), and arbitration at the present time is purely voluntary. The subject is very fully dealt with in the *Code de Procédure Civile* (arts. 1003-1028). The submission to arbitration (*compromis*) must, on pain of nullity, be acted upon within three months from its date (art. 1007). The submission terminates (i.) by the death, refusal, resignation or inability to act of one of the arbitrators; (ii.) by the expiration of the period agreed upon, or of three months if no time had been fixed; (iii.) by the disagreement of two arbitrators, unless power be reserved to them to appoint an umpire (art. 1012). An arbitrator cannot resign if he has once commenced to act, and can only be relieved on some ground arising subsequently to the submission (art. 1014). Each party to the arbitration is required to produce his evidence at least fifteen days before the expiration of the period fixed by the submission (art. 1016). If the arbitrators, differing in opinion, cannot agree upon an umpire (*tiers arbitre*), the president of the Tribunal of Commerce will appoint one, on the application of either party (art. 1017). The umpire is required to give his decision within one month of his acceptance of the appointment; before making his award, he must confer with the previous arbitrators who disagreed (art. 1018). Arbitrators and umpire must proceed according to the ordinary rules of law, unless they are specially empowered by the submission to proceed as *amiables compositeurs* (art. 1019). The award is rendered executory by an order of the president of the Civil Tribunal of First Instance (art. 1020). Awards cannot be set up against third parties (art. 1022), or attacked by way of opposition. An appeal against an award lies to the Civil Tribunal of First Instance, or to the court of appeal, according as the subject-matter, in the absence of arbitration, would have been within the jurisdiction of the justice of the peace, or of the Civil Tribunal of First Instance (art. 1023). In the manufacturing towns of France, there are also boards of umpires (*Conseils de Prud'hommes*) to deal with trade disputes between masters and workmen belonging to certain specified trades.

Other Foreign Laws.—The provisions of French law as to arbitration are in force in Belgium (*Code de Proc. Civ.*, arts. 1003 et seq.); and a convention (8th of July 1899) between France and Belgium regulates, *inter alia*, the mutual enforcement of awards. The law of France has also been reproduced in substance in the Netherlands (Code of Civil Procedure, arts. 620 et seq.). The German Imperial Code of Procedure did not create any system of arbitration in civil cases. But this omission was supplied in Prussia by a law of the 29th of March 1879, which provided for the appointment, in each commune, of an arbitrator (*Schiedsmann*) before whom conciliation proceedings in contentious matters might be conducted. The procedure was gratuitous and voluntary; and the functions of the arbitrator were not judicial; he merely recorded the arrangement arrived at, or the refusal of conciliation. This law was followed in Brunswick by a law of the 2nd of July 1896, and in Baden by a law of the 16th of April 1886. In Luxemburg, compulsory arbitration in matters affecting commercial partnerships was abolished in 1879 (law of the 16th of April 1879). A system of conciliation, similar to the Prussian, exists in Italy (laws of the 16th of June 1892, and the 26th of December 1892) and in some of the Swiss cantons (law of the 29th of April 1883). Spain (Code of Civil Proc., arts. 1003-1028; Civil Code, arts. 1820-1821) and Sweden and Norway (law of the 28th of October 1887) have followed the French law. In Portugal, provision has been made for the creation in important industrial centres, on the application of the administrative corporations, of boards of conciliation (decrees of the 14th of August 1889, and the 18th of May 1893).

AUTHORITIES.—Russell, *Arbitration* (London, 1906); *Annual Practice* (London, yearly); Redman, *Arbitration* (London, 1897); Crewe, *Arbitration Act of 1889* (London, 1898); Pollock, *On Arbitrators* (London, 1906). As to Scots law: Bell, *On Arbitration* (2nd ed., Edinburgh, 1877); Erskine, *Principles* (20th ed., Edinburgh, 1903). As to American law: Morse, *Law of Arbitration* (Boston, 1872). As to foreign law generally: the texts of the laws cited, and the *Annuaire de législation étrangère*.

(A. W. R.)

ARBITRATION, INTERNATIONAL. International arbitration is a proceeding in which two nations refer their differences to one or more selected persons, who, after affording to each party an opportunity of being heard, pronounce judgment on the matters at issue. It is understood, unless otherwise expressed, that the judgment shall be in accordance with the law by which civilized nations have agreed to be bound, whenever such law is applicable. Some authorities, notably the eminent Swiss jurist, J.K. Bluntschli, consider that unless this tacit condition is complied with, the award may be set aside. This would, however, be highly inconvenient since international law has never been codified. A fresh arbitration might have to be entered on to decide (1) what the law was, (2) whether it applied to the matter in hand.

Arbitration differs from Mediation (*q.v.*) in so far as it is a judicial act, whereas Mediation involves no decision, but merely advice and suggestions to those who invoke its aid.

Arbitral Tribunals.—An international arbitrator may be the chief of a friendly power, or he may be a private individual. When he is an emperor, a king, or a president of a republic, it is not expected that he will act personally; he may appoint a delegate or delegates to act on his behalf, and avail himself of their labours and views, the ultimate decision being his only in name. In this respect international arbitration differs from civil arbitration, since a private arbitrator cannot delegate his office without express authority. The analogy between the two fails to hold good in another respect also. In civil arbitration, the decision or award may be made a rule of court, after which it becomes enforceable by writ of execution against person or property. An international award cannot be enforced directly; in other words it has no legal sanction behind it. Its obligation rests on the good faith of the parties to the reference, and on the fact that, with the help of a world-wide press, public opinion can always be brought to bear on any state that seeks to evade its moral duty. The obligation of an ordinary treaty rests on precisely the same foundations. Where there are two or any other even number of arbitrators, provision is usually made for an umpire (French *sur-arbitre*). The umpire may be chosen by the arbitrators themselves or nominated by a neutral power. In the "Alabama" arbitration five arbitrators were nominated by the president of the United States, the queen of England, the king of Italy, the president of the Swiss Confederation, and the emperor of Brazil respectively. In the Bering Sea arbitration there were seven arbitrators, two nominated by Great Britain, two by the United States, and the remaining three by the president of the French Republic, the king of Italy, and the king of Sweden and Norway respectively. In neither of these cases was there an umpire; nor was any necessary, since the decision, if not unanimous, lay with the majority. (See separate articles on Bering Sea Arbitration and "Alabama" Arbitration.)

Arbitral tribunals may have to deal with questions either of law or fact, or of both combined. When they have to deal with law only, that is to say, to lay down a principle or decide a question of liability, their functions are judicial or quasi-judicial, and the result is arbitration proper. Where they have to deal with facts only, *e.g.* the evaluation of pecuniary claims, their functions are administrative rather than judicial, and the term commission is applied to them. "Mixed commissions," so called because they are composed of representatives of the parties in difference, have been frequently resorted to for delimitation of frontiers, and for settling the indemnities to be paid to the subjects of neutral powers in respect of losses sustained by non-combatants in times of war or civil insurrection. The two earliest of these were nominated in 1794 under the treaty negotiated by Lord Grenville with Mr John Jay, commonly called the "Jay Treaty," their tasks being (1) to define the boundary between Canada and the United States which had been agreed to by the treaty signed at Paris in 1783; (2) to estimate the amount to be paid by Great Britain and the United States to each other in respect of illegal captures or condemnation of vessels during the war of the American Revolution.

Although arbitrations proper may be thus distinguished from "mixed commissions," it must not be supposed that any hard or fast theoretical line can be drawn between them. Arbitrators strictly so called may (as in the "Alabama" case) proceed to award damages after they have decided the question of liability; whilst "mixed commissions," before awarding damages, usually have to decide whether the pecuniary claims made are or are not well founded.

Awards.—International awards, as already pointed out, differ from civil awards in having no legal sanction by which they can be enforced. On the other hand, they resemble civil awards in that they may be set aside, *i.e.* ignored, for sufficient reason, as, for example, if the tribunal has not acted in good faith, or has not given to each party an opportunity of being heard, or has exceeded its jurisdiction. An instance under the last head occurred in 1831, when it was referred to the king of the Netherlands as sole arbitrator to fix the north-eastern boundary of the state of Maine. The king's representatives were unable to draw the frontier line by reason of the imperfection of the maps then in existence, and he therefore directed a further survey. This direction was beyond the terms of the reference, and the award, when made, was repudiated by the United States as void for excess. The point in dispute was only finally disposed of by the Webster-Ashburton treaty of 1842.

Subject-matter.—The history of international arbitration is dealt with in the article Peace, where treaties of general arbitration are discussed, both those which embrace all future differences thereafter to arise between the contracting parties, and also those more limited conventions which aim at the settlement of all future differences in regard to particular subjects, *e.g.* commerce or navigation. The rapid growth of international arbitration in recent times may be gathered from the following figures. Between 1820 and 1840, there were eight such instances; between 1840 and 1860, there were thirty; between 1860 and 1880, forty-four; between 1880 and 1900, ninety. Of the governments which were parties in these several cases Great Britain heads the list in point of numbers, the United States of America being a good second. France, Portugal, Spain and the Netherlands are the European states next in order. The present article is concerned exclusively with arbitration in regard to such existing differences as are capable of precise statement and of prompt adjustment. These differences may be arranged in two main groups:—

(*a*) Those which have arisen between state and state in their sovereign capacities;

(*b*) Those in which one state has made a demand upon another state, ostensibly in its sovereign capacity, but really on behalf of some individual, or set of individuals, whose interests it was bound to protect.

To group (*a*) belong territorial differences in regard to ownership of land and rights of fishing at sea; to group (*b*) belong pecuniary claims in respect of acts wrongfully done to one or more subjects of one state by, or with the authority of, another state. To enumerate even a tenth part of the successful arbitrations in recent times would occupy too much space. Some prominent examples (dealt with elsewhere under their appropriate titles) are the dispute between the United States and Great Britain respecting the "Alabama" and other vessels employed by the Confederate government during the American Civil War (award in 1872); that between the same powers respecting the fur-seal fishery in Bering Sea (award in 1893); that between Great Britain and Venezuela respecting the boundary of British Guiana (award in 1899); that between Great Britain, the United States and Portugal respecting the Delagoa railway (award in 1900); that between Great Britain and the United States respecting the boundary of Alaska (award in 1903). The long-standing Newfoundland fishery dispute with France (finally settled in 1904) is dealt with under Newfoundland. Other examples are shortly noticed in the tables on p. 329, which although by no means exhaustive, sufficiently indicate the scope and trend of arbitration during the years covered. The cases decided by the permanent tribunal at the Hague established in 1900 are not included in these tables. They are separately discussed later.

The Hague Tribunal.—The establishment of a permanent tribunal at the Hague, pursuant to the Peace convention of 1899, marks a momentous epoch in the history of international arbitration. This tribunal realized an idea put forward by Jeremy Bentham towards the close of the 18th century, advocated by James Mill in the middle of the 19th century, and worked out later by Mr Dudley Field in America, by Dr Goldschmidt in Germany, and by Sir Edmund Hornby and Mr Leone Levi in England. The credit of the realization is due, in the first place, to the tsar of Russia, who initiated the Hague Conference of 1899, and, in the second place to Lord Pauncefote (then Sir Julian Pauncefote, British ambassador at Washington), who urged before a committee of the conference the importance of organizing a permanent international court, the service of which should be called into requisition at will, and who also submitted an outline of the mode in which such a court might be formed. The result was embodied in the following articles of the Convention, signed on behalf of sixteen of the assembled powers on the 29th of July 1899.

(Art. 23). Each of the signatory powers is to designate within three months from the ratification of the convention four persons at the most, of recognized competence in international law, enjoying the highest moral consideration, and willing to accept the duties of arbitrators. Two or more powers may agree to nominate one or more members in common, or the same

person may be nominated by different powers. Members of the court are to be appointed for six years and may be re-nominated. (Art. 25). The signatory powers desiring to apply to the tribunal for the settlement of a difference between them are to notify the same to the arbitrators. The arbitrators who are to determine this difference are, unless otherwise specially agreed, to be chosen from the general list of members in the following manner:—each party is to name two arbitrators, and these are to choose a chief arbitrator or umpire (*sur-arbitre*). If the votes are equally divided the selection of the chief arbitrator is to be entrusted to a third power to be named by the parties. (Art. 26). The tribunal is to sit at the Hague when practicable, unless the parties otherwise agree. (Art. 27). "The signatory powers consider it a duty in the event of an acute conflict threatening to break out between two or more of them to remind these latter that the permanent court is open to them. This action is only to be considered as an exercise of good offices." Several of the powers nominated members of the permanent court pursuant to Art. 25, quoted above, those nominated on behalf of Great Britain being Lord Pauncefote, Sir Edward Malet, Sir Edward Fry and Professor Westlake. On the death of Lord Pauncefote, Major-General Sir John C. Ardagh was appointed in his place.

Hague Cases.—(1) The first case decided by the Hague court was concerned with the "Pious Fund of the Californias." A fund bearing this name was formed in the 18th century for the purpose of converting to the Catholic faith the native Indians

The pious fund of the Californias.

of Upper and Lower California, both of which then belonged to Mexico, and of maintaining a Catholic priesthood there. By a decree of 1842 this fund was transferred to the public treasury of Mexico, the Mexican government undertaking to pay interest thereon in perpetuity in furtherance of the design of the original donors. After the sale of Upper California to the United States, effected by the treaty of Guadalupe Hidalgo (1848), the Mexican government refused to pay the proportion of the interest to which Upper California was entitled. The question of liability was then referred to commissioners appointed by each state, and, on their failing to agree, to Sir Edward Thornton, British minister at Washington, who by his award, in 1875, found there was due from Mexico to Upper California, or rather to the bishops there as administrators of the fund, an arrear of interest amounting to nearly $100,000, which was directed to be paid in gold. This award was carried out, but payment of the current interest was again withheld as from the 24th of October 1868. Claim was thereupon made on Mexico by the United States on behalf of the bishops, but without success. Ultimately, in May 1902, an agreement was come to between the two governments which provided for the settlement of the dispute by the Hague tribunal. The points to be determined were (1) whether the matter was *res judicata* by reason of Sir E. Thornton's award; (2) whether, if not, the claim for the interest was just. The arbitrators selected by the United States were Sir E. Fry and Professor F. de Martens, and by Mexico, Professor Asser and Professor de Savornin Lohman, both of Amsterdam. These four (none of whom, it will be observed, was of the nationality of either party in difference) chose for their umpire Professor Matzen, of Copenhagen, president of the Landsthing there. In October 1902, the court decided both questions in the affirmative, awarding the payment by Mexico of the annual sum claimed, not in gold, but *en monnaie ayant cours légal au Mexique*. The direction to pay in gold made by Sir E. Thornton was held to be referable only to the mode of the execution of the award, and therefore not to be *chose jugée*.

(2) The second arbitration before the Hague court was more important than the first, not only because so many of the great powers were concerned in it, but also because it brought about the discontinuance of acts of war. The facts may be stated shortly thus. By three several protocols signed at Washington in February 1903, it was agreed that

Great Britain, Germany and Italy versus Venezuela.

certain claims by Great Britain, Germany and Italy, on behalf of their respective subjects against the Venezuelan government should be referred to three mixed commissions, and that for the purpose of securing the payment of these claims 30 percent of the customs revenues at the ports of La Guayra and Puerto Caballo should be remitted in monthly instalments to the representative of the Bank of England at Caracas. Prior to the date of these protocols, an attempt had been made by Great Britain, Germany and Italy to enforce their claims by blockade, and a further question arose as between these three powers on the one hand, and the United States of America, France, Spain, Belgium, the Netherlands, Sweden and Norway, and Mexico (all of whom had claims against Venezuela, but had abstained from hostile action) on the other hand, as to whether the blockading powers were entitled to preferential treatment. By three several protocols signed in May 1903 this question was agreed to be submitted to the Hague court, three members of which were to be named as arbitrators by the tsar of Russia, but no arbitrator was to be a subject or citizen of any of the signatory or creditor powers. The arbitrators named by the tsar were M. Muraviev, minister of justice and attorney-general of the Russian empire; Professor Lammasch, member of the Upper House of the Austrian parliament; and M. de Martens, then member of the council of the ministry of foreign affairs at St Petersburg. The arbitrators by their award in February 1904 decided unanimously in favour of the blockading powers and ordered payment of their claims out of the 30% of the receipts at the two Venezuelan ports which had been set apart to meet them.

Dates of agreements to refer.	Parties.	Arbitrating Authority.	Subject-Matter.	Date of award.
		TABLE I. *Territorial Disputes* (*Ownership*)		
1857	Holland and Venezuela	Queen of Spain	Island of Aves in Venezuela	1865
1869	Great Britain and Portugal	President of United States	Island of Bulama on West Coast of Africa	1870
1872	Great Britain and Portugal	President of French Republic	Delagoa Bay (part of), Inyack and Elephant Is., S.E. Africa	1875
1876	Argentine Republic and Paraguay	President of United States	Territory between the Verde and Pilcomayo river of Paraguay	1878
1885	Great Britain and Germany	Mixed Commission	Islets and guano deposits on S.W. Coast of Africa	1886
1886	Bulgaria and Servia	Mixed Commission	Territory near the village of Bergovo	1887
1902	Austria and Hungary	Mixed Commission (with President of Swiss Federal tribunal as umpire)	Territory in the district of Upper Tatra	1902
		TABLE II. *Delimitation of Frontiers.*		
1869	Great Britain and the Transvaal	Lieutenant Governor of Natal	The southern boundary of the S. African Republic	1870
1871	Great Britain and the United States	The German Emperor	The San Juan water boundary	1872
1873	Italy and Switzerland	Mixed Commission (with U.S. Minister at Rome as umpire)	The Canton of Ticino	1874
1885	Great Britain and Russia	Mixed Commission	North-western Afganistan	1887
1890				1891

	France and Holland	Tsar of Russia	French Guiana and Dutch Guiana	
1895	Great Britain and Portugal	President of the Italian Court of Appeal	Manicaland	1897
1897	France and Brazil	President of the Swiss Confederation	River Yapoe named in the Treaty of Utrecht 1813	1900
1901	Great Britain and Brazil	King of Italy	British Guiana	1904
1903	Great Britain and Portugal	King of Italy	Barotseland	1905

TABLE III.
Pecuniary Claims in respect of Seizures and Arrests.

1851	United States and Portugal	President of French Republic	Seizure of the American privateer "General Armstrong"	1852
1863	Great Britain and Brazil	King of the Belgians	Arrest of three British officers of the ship "La Forte"	1863
1863	Great Britain and Peru	Sentate of Hamburg	Arrest at Callao of Capt. Melville White, a British subject	1864
1870	United States and Spain	Mixed Commission	The American S.S. "Col. Lloyd Aspinwall"	1870
1873	Japan and Peru	Tsar of Russia	The Peruvian barque "Maria Luz"	1875
1874	United States and Colombia	Mixed Commission	The American S.S. "Montijo"	1875
1879	France and Nicaragua	French Court of Cassation	The French ship "La Phare"	1880
1885	United States an Spain	Italian Minister at Madrid	The American S.S. "The Masonic"	1885
1888	The United States and Denmark	British Minister at Athens	The S.S. "Benjamin Franklin" and the barque "Catherine Augusta"	1890
1895	Great Britain and Netherlands	Tsar of Russia, who delegated his duties to Professor F. de Martens	Arrest of the master of the "Costa Rica" packet (a British subject)	1897

(3) The third case before the Hague court was heard in 1904-1905. A controversy not amenable to ordinary diplomatic methods arose between Great Britain, France and Germany on the one hand and Japan on the other hand as to the legality

Great Britain, France and Germany versus Japan.

of a house-tax imposed by Japan on certain subjects of those powers who held leases in perpetuity. The question upon the true construction of certain treaties between the European powers and Japan which had been made a few years previously. By three protocols signed at Tokyo in August 1902 this question was agreed to be submitted to arbitrators, members of the court at the Hague, one to be chosen by each party with power to name an umpire. The arbitrators chosen were M. Renault, professor of the law faculty in Paris, and M. Montono, the Japanese envoy to the French capital. They named as their umpire and president M. Gram, ex-minister of the state of Norway. In May 1905, an award was pronounced by the majority (M. Gram and M. Renault) in favour of the European contention, M. Montono dissenting both from the conclusion of his colleagues and from the reasons on which it was based.

(4) Barely two months had elapsed since the date of the last award when the Hague court was again called into requisition. The scene of dispute this time was on the S.E. coast of Arabia. Muscat, the capital of the kingdom of Oman on

Great Britain and the French flag at Muscat.

that coast, is ruled by a sultan, whose independence both Great Britain and France had, in March 1862, "reciprocally engaged to respect." Notwithstanding this, the French republic had issued to certain native dhows, owned by subjects of the sultan, papers authorizing them to fly the French flag, not only on the Oman littoral but in the Red Sea. A question thereupon arose as to the manner in which the privileges thereby purported to be conferred affected the jurisdiction of the sultan over such dhows, the masters of which, as was alleged, used their immunity from search for the purpose of carrying on contraband trade in slaves, arms and ammunition. In October 1904 the two governments agreed to refer this question to the Hague court. Chief Justice Melville W. Fuller, of the Supreme Court of the United States, was named as arbitrator on the part of Great Britain, M. de Savornin Lohrnan, who had acted in the case of the Californias (No. 1), as arbitrator on the part of France. The choice of an umpire was entrusted to the king of Italy. He named Professor Lammasch, who, as we have seen, had acted in the arbitration with Venezuela in 1903.

A unanimous award was made in August 1905. It was held that although generally speaking every sovereign may decide to whom he will accord the right to fly his flag, yet in this case such right was limited by the general act of the Brussels conference of July 1890 relative to the African slave trade, an act which was ratified by France on the 2nd of June 1892; that accordingly the owners and master of dhows who had been authorized by France to fly the French flag before the last-named date retained this authorization so long as France chose to renew it, but that after that date such authorization was improper unless the guarantees could establish that they had been treated by France as her protégés within the meaning of that term as explained in a treaty of 1863 between France and Morocco. A further point decided was that the owners or master of dhows duly authorized to fly the French flag within the ruling of the first point, did not enjoy, in consequence of that fact, any such right of extra-territoriality as would exempt them from the sovereignty and jurisdiction of the sultan. Such exemption would be contrary to the engagement to respect the independence of the sultan solemnly made in 1862.

Arbitral Procedure.—Not the least of the benefits of the Hague convention of 1899 (strengthened by that of 1907) is that it contains rules of procedure which furnish a guide for all arbitrations whether conducted before the Hague court or not. These may be summarized as follows:—The initial step is the making by the parties of a special agreement clearly defining the subject of the dispute. The next is the choice of the arbitrators and of an umpire if the number of arbitrators is even. Each party then by its agents prepares and presents its case in a narrative or argumentative form, annexing thereto all relevant documents. The cases so presented are interchanged by transmission to the opposite party. The hearing consists in the discussion of the matters contained in the several cases, and is conducted under the direction of the president who is either the umpire, or, if there is no umpire, one of the arbitrators. The members of the tribunal have the right of putting questions to the counsel and agents of the parties and to demand from them explanation of doubtful points. The arbitral judgment is read out at a public sitting of the tribunal, the counsel and agents having been duly summoned to hear it. Any application for a revision of the award must be based on the discovery of new evidence of such a nature as to exercise a decisive influence on the judgment and unknown up to the time when the hearing was closed, both to the tribunal itself and to the party asking for the revision. These general rules are universally applicable, but each case may require that special rules should be added to them. These each tribunal must make for itself.

One special and necessary rule is in regard to the language to be employed. This rule must vary according to convenience and is therefore made *ad hoc*. In case No. 1 noted above, the court allowed English or French to be spoken according to the nationality of the counsel engaged. The judgment was delivered in French only. In case No. 2 it was agreed that the written

and printed memoranda should be in English but might be accompanied by a translation into the language of the power on whose behalf they were put in. The oral discussion was either in English or French as happened to be convenient. The judgment was drawn up in both languages. In case No. 3 French was the official language throughout, but the parties were allowed to make any communication to the tribunal, in French, English, German or Japanese. In case No. 4 French was again the official language, but the counsel and agents of both parties were allowed to address the tribunal in English. The protocols and the judgment were drawn up in French accompanied by an official English translation.

Limits of International Arbitration.—Of the numerous treaties for general arbitration which have been made during the 20th century that between Great Britain and France (1903) is a type. This treaty contains reservations of all questions involving the vital interests, the independence or the honour of the contracting parties. The language of the reservation is open to more interpretations than one. What, for instance, is meant by the phrase "national independence" in this connexion? If it be taken in its strict acceptation of autonomous state sovereignty, the exception is somewhat of a truism. No self-respecting power would, of course, consent to submit to arbitration a question of life or death. This would be as if two men were to agree to draw lots as to which should commit suicide in order to avoid fighting a duel. On the other hand, if the exception be taken to exclude all questions which, when decided adversely to a state, impose a restraint on its freedom of action, then the exception would seem to exclude such a question as the true interpretation of an ambiguous treaty, a subject with which experience shows international arbitration is well fitted to deal. Again, we may ask, what is meant by the phrase "national honour"? It was thought at one time that the honour of a nation could only be vindicated by war, though all that had happened was the slighting of its flag, or of its accredited representative, during some sudden ebullition of local feeling. France once nearly broke off peaceful relations with Spain because her ambassador at London was assigned a place below the Spanish ambassador, and on another occasion she despatched troops into Italy because her ambassador at Rome had been insulted by the friends and partisans of the pope. The truth is that the extent to which national honour is involved depends on factors which have nothing to do with the immediate subject of complaint. So long as general good feeling subsists between two nations, neither will easily take offence at any discourteous act of the other. But when a deep-seated antagonism is concealed beneath an unruffled surface, the most trivial incident will bring it to the light of day. "Outraged national honour" is a highly elastic phrase. It may serve as a pretext for a serious quarrel whether the alleged "outrage" be great or small.

The prospects of the expansion of international arbitration will be more clearly perceived if we classify afresh all state differences under two heads:—(1) those which have a legal character, (2) those which have a political character. Under "legal differences" may be ranged such as are capable of being decided, when once the facts are ascertained, by settled, recognized rules, or by rules not settled nor recognized, but (as in the "Alabama" case) taken so to be for the purpose in hand. Boundary cases and cases of indemnity for losses sustained by non-combatants in time of war, of which several instances have already been mentioned, belong to this class. To the same class belong those cases in which the arbitrators have to adapt the provisions of an old treaty to new and altered circumstances, somewhat in the way in which English courts of justice apply the doctrine of "cy-près." "Political differences" on the other hand, are such as affect states in their external relations, or in relation to their subjects or dependants who may be in revolt against them. Some of these differences may be slight, while others may be vital, or (which amounts to the same thing) may seem to the parties to be so. All differences falling under the first of these two general heads appear to be suitable for international arbitration. Differences falling under the second general head are, for the most part, unsuitable, and may only be adjusted (if at all) through the mediation of a friendly power.

The interesting problem of the future is—are we to regard this classification as fixed or as merely transitory? The answer depends on several considerations which can only be glanced at here. It may be that, just as the usages of civilized nations have slowly crystallized into international law, so there may come a time when the political principles that govern states in relation to each other will be so clearly defined and so generally accepted as to acquire something of a legal or quasi-legal character. If they do, they will pass the line which at present separates arbitrable from non-arbitrable matter. This is the juridical aspect of the problem. But there is also an economic side to it by reason of the conditions of modern warfare. Already the nations are groaning under the burdens of militarism, and are for ever diverting energies that might be employed in the furtherance of useful productive work to purposes of an opposite character. The interruption of maritime intercourse, the stagnation of industry and trade, the rise in the price of the necessaries of life, the impossibility of adequately providing for the families of those—call them reservists, "landwehr," or what you will—who are torn away from their daily toil to serve in the tented field,—these are considerations that may well make us pause before we abandon a peaceful solution and appeal to brute force. Lastly, there is the moral aspect of the problem. In order that international arbitration may do its perfect work, it is not enough to set up a standing tribunal, whether at the Hague or elsewhere, and to equip it with elaborate rules of procedure. Tribunals and rules are, after all, only machinery. If this machinery is to act smoothly we must improve our motive power, the source of which is human passion and sentiment. Although religious animosities between Christian nations have died out, although dynasties may now rise and fall without raising half Europe to arms, the springs of warlike enterprise are still to be found in commercial jealousies, in imperialistic ambitions and in the doctrine of the survival of the fittest which lends scientific support to both. These must one and all be cleared away before we can enter on that era of universal peace towards the attainment of which the tsar of Russia declared, in his famous circular of 1898, the efforts of all governments should be directed. Meanwhile it is legitimate to share the hope expressed by President Roosevelt in his message to Congress of December 1905 that some future Hague conference may succeed in making arbitration the customary method of settling international disputes in all save the few classes of cases indicated above, and that—to quote Mr Roosevelt's words—"these classes may themselves be as sharply defined and rigidly limited as the governmental and social development of the world will for the time being permit."

AUTHORITIES.—Among special treatises are: Kamarowsky, *Le Tribunal international* (traduit par Serge de Westman) (Paris, 1887); Rouard de Card, *Les Destinées de l'arbitrage international, depuis la sentence rendue par le tribunal de Genève* (Paris, 1892); Michel Revon, *L'Arbitrage international* (Paris, 1892); Ferdinand Dreyfus, *L'Arbitrage international* (Paris, 1894) (where the earlier authorities are collected); A. Merignhac, *Traité de l'arbitrage international* (Paris, 1895); Le Chevalier Descamps, *Essai sur l'organisation de l'arbitrage international* (Bruxelles, 1896); Feraud-Giraud, *Des Traités d'arbitrage international général et permanent, Revue de droit international* (Bruxelles. 1897); *Pasicrisie International*, by Senator H. Lafontaine (Berne, 1902); *Recueils d'actes et protocols de la cour permanente d'Arbitrage*, Langenhuysen Frères, the Hague.

Of works in English there is a singular dearth. The most important is by an American, J.B. Moore, *History of the International Arbitrations to which the United States has been a Party* (Washington, 1898). The appendices to this work (which is in six volumes) contain, with much other matter of great value, full historical notes of arbitrations between other powers. Arbitration and mediation will be found briefly noticed in Phillimore's *International Law*; in Sir Henry Maine's *Lectures*, delivered in Cambridge in 1887; in W.E. Hall's *International Law*, and more at length in an interesting paper contributed by John Westlake to the *International Journal of Ethics*, October 1896, which its author has reprinted privately. A London journal, *The Herald of Peace and International Arbitration*, issued some years ago a list of instances in which arbitration or mediation had been successfully resorted to during the 19th century. David Dudley Field, of New York, subsequently enlarged this list, which has been continued under the title *International Tribunals*, by Dr W. Evans Darby, and is published, along with the texts of several projects for general arbitration, at the offices of the Peace Society, 47 New Broad Street, London.

(M. H. C.)

ARBITRATION AND CONCILIATION. The terms "arbitration and conciliation" as employed in this article, are used to describe a group of methods of settling disputes between employers and work-people or among two or more sets of work-people, of which the common feature is the intervention of some outside party not directly affected by the dispute. If the parties agree beforehand to abide by the award of the third party, the mode of settlement is described as "arbitration." If there be no such agreement, but the offices of the mediator are used to promote an amicable arrangement between the parties themselves, the process is described as "conciliation." The third party may be one or more disinterested individuals, or a joint-board representative of the parties or of other bodies or persons.

The process here termed "arbitration" is rarely an arbitration in the strict legal sense of the term (at least in the United Kingdom), because of the defective legal personality of the associations or groups of individuals who are usually parties to labour disputes, and the consequent absence in the great majority of cases of a valid legal "submission" of the difference to arbitration. Whether or not trade unions of employers or workmen in the United Kingdom are capable of entering through their agents into contracts which are legally binding on their members it is fairly certain that the great majority of the agreements actually made by the representatives of employers and workmen to submit a dispute to the decision of a third party are of no legal force except as regards the actual signatories. Broadly speaking, therefore, the provisions of the Arbitration Act 1889, which consolidated the law relating to arbitration in general, would as a rule have no application to the settlement of collective disputes between employers and workmen, even if the act had not been expressly excluded by section 3 of the Conciliation Act of 1896 in the case of disputes to which that act applies. Besides the absence of a legal "submission," labour arbitrations differ from ordinary arbitrations in the fact that the questions referred often (though by no means always) relate to the terms on which future contracts shall be made, whereas the vast majority of ordinary arbitrations relate to questions arising out of existing contracts. The defective "personality" of the parties to labour disputes also prevents the enforcement of an award by legal penalties. Since, however, difficulties of enforcement affect not only settlements arrived at by arbitration, but all agreements between bodies of employers and work-people with regard to the terms of employment, they are most appropriately considered at a later stage of this article.

The term "conciliation" is ordinarily used to cover a large number of methods of settlement, shading off in the one direction into "arbitration" and in the other into ordinary direct negotiation between the parties. In some cases conciliation only differs from arbitration in the absence of a previous agreement to accept the award. The German "*Gewerbegerichten*," when dealing with labour disputes, communicate a decision to both parties, who must notify their acceptance or otherwise (see below). Some of the state boards in America take similar action. The conciliation boards established under the New Zealand Arbitration Act of 1894 (see below) make recommendations, though either side may decline to accept them and may appeal to the court of arbitration, which in that colony has compulsory powers. Most frequently, however, in Great Britain, the mediating party abstains from pronouncing a definite judgment of his own, but confines himself to friendly suggestions with a view of removing obstacles to an agreement between the parties. On the other hand, it is not easy to define how far the "outside party" must be independent of the parties to the dispute, in order that the method of settlement may be properly described as "conciliation." There is a sense in which a friendly conversation between an employer or his manager and a deputation of aggrieved workmen is rightly described as "conciliation," but such an interview would certainly not be covered by the term as ordinarily used at the present day. Again, when the parties are represented by agents (*e.g.* the officials of an employers' association and of a trade union) the actual negotiators or some of them may not personally be affected by the particular dispute, and may often exercise some of the functions of the mediator or conciliator in a manner not clearly to be distinguished from the action of an outside party. It seems best, however, to exclude such negotiations from our purview so long as those between whom they are carried on merely act as the authorized agents for the parties affected. In the same way, a meeting arranged *ad hoc* between delegates of an employers' association and a trade union, for the purpose of arranging differences as to the terms on which the members of the association shall employ members of the union is not usually classed as "conciliation," unless the meeting is held in the presence of an independent chairman or conciliator, or in pursuance of a permanent agreement between the associations laying down the procedure for the settlement of disputes. If, however, the dispute is considered and arranged not by a casual meeting between two committees and deputations appointed *ad hoc*, but by a permanently organized "joint committee" or board with a constitution, rules of procedure and officers of its own, the process of settlement is by ordinary usage described as "conciliation," even though the board be entirely representative of the persons engaged in the industry. Such joint boards, as will be seen, play a most important part in conciliation at the present day, and they almost always have attached to them some machinery for the ultimate decision by arbitration of questions on which they fail to agree. Another form of conciliation is that in which the mediating board represents a wider group of industries than those affected by the dispute (*e.g.* the London and other "district" boards referred to below). Moreover, in some of the most important cases of settlement of disputes by conciliation, the mediating party has not been a permanent board but a disinterested individual, *e.g.* the mayor, county court judge, government official or member of parliament. As will be seen below, the Conciliation Act now provides for the appointment of "conciliators" by the Board of Trade.

Voluntary trade boards, however (*i.e.* permanent joint boards representing employers and work-people in particular trades), are at once the most firmly established and the most important agencies in Great Britain for the prevention and settlement of labour disputes. Among the earliest of such bodies was the board of arbitration in the Macclesfield silk trade, formed in 1849, in imitation of the French "*Conseils de Prud'hommes*," but which only lasted four years. The first board, however, which attained any degree of permanent success was that established for the hosiery and glove trade in Nottingham in 1860, through the efforts of A.J. Mundella. In 1864 a board was established in the Wolverhampton building trades, with Rupert Kettle as chairman, and in 1868 boards were formed for the pottery trade, the Leicester hosiery trade and the Nottingham lace trade. In 1869 there was formed one of the most important of the still existing boards, viz. the board of arbitration and conciliation in the manufactured iron and steel trades of the north of England, with which the names of Rupert Kettle, David Dale and others are associated. In 1872 and 1873 joint committees were formed in the Durham and Northumberland coal trades to deal with local questions. The Leicester boot and shoe trade board, the first of an elaborate system of local boards in this trade, was founded in 1875. From about 1870 onwards there was a great movement for the establishment of "sliding scales" in the coal and iron and steel trades, which by regulating wages automatically rendered unnecessary the settlement of general wages by conciliation or arbitration. These sliding scales, however, usually had attached to them joint committees for dealing with disputed questions. A sliding scale arranged by David Dale was attached to the manufactured iron trade board in 1871. A sliding scale for the Cleveland blast furnacemen came into force in 1879. Sliding scales were also adopted in the coal trade in many districts, *e.g.* South Wales (1875), Durham (1877) and Northumberland (1879). The movement was, however, followed by a reaction, and several of the sliding scales in the coal trade were terminated between 1887 and 1889. In 1902 the last surviving sliding scale in the coal trade, viz. in South Wales, ceased to exist and was replaced by a conciliation board.

The formation on a large scale of conciliation boards in the coal trade to fix the rate of wages dates from the great miners' dispute of 1893, one of the terms of settlement agreed to at the conference held at the foreign office under Lord Rosebery being the formation of a conciliation board covering the districts affected. Northumberland followed in 1894, Durham in 1895, Scotland in 1900 and South Wales in 1903.

In 1907 an important scheme for the formation of conciliation boards for railway companies and their employees was adopted as the result of the action taken by the president of the Board of Trade to prevent a general strike of railway servants in that year. Under this scheme separate boards (sectional and general) were to be formed for the employees of each railway company which adhered to the scheme, with provision for reference in case of a deadlock to an umpire.

The first general district board to be formed was that established in London in 1890, through the London chamber of commerce, as a sequel to the Mansion House committee which mediated in the great London dock strike of 1889. The example was followed by several large towns, but the action taken by the boards in most of these provincial districts has been very limited.

In addition there are two boards composed of representatives of co-operators and trade-unionists for the settlement of disputes arising between co-operative societies and their employees.

Constitution and functions of voluntary conciliation boards. The most typical form of machinery for the settlement of disputes by voluntary conciliation is a joint board consisting of equal numbers of representatives of employers and employed. The members of the board are usually elected by the associations of employers and workmen, though in some cases (*e.g.* in the manufactured iron trade board) the workmen's representatives are elected not by their trade union but by meetings of workmen employed at the various works. The chairman may be an independent person, or, more usually, a representative of the employers, the vice-chairman being a representative of the workmen. In the arbitration and conciliation boards in the boot and shoe trade, provision is made by which the chair may be occupied by representatives of the employers and workmen in alternate years. An independent chairman usually has a casting vote, which practically makes him an umpire in case of equal voting, but where there is no outside chairman there is often provision for reference of cases on which the board cannot agree to an umpire, who may either be a permanent officer of the board elected for a period of time (as in the case of several of the boards in the boot and shoe trade), or selected *ad hoc* by the board or appointed by some outside person or body. Thus the choice of the permanent chairman or umpire of the miners' conciliation board, formed in pursuance of the settlement of the coal dispute of 1893 by Lord Rosebery, was left to the speaker of the House of Commons. The nomination of umpires under the Railway Agreement of 1907 was left to the speaker and the master of the rolls. Since the passing of the Conciliation Act, several conciliation boards have provided in their rules for the appointment of umpires by the Board of Trade.

Conciliation boards constituted as described above usually have rules providing that there shall always be equality of voting as between employer and workmen, in spite of the casual absence of individuals on one side or the other. In order to expedite business it is sometimes provided that all questions shall be first considered by a sub-committee, with power to settle them by agreement before coming before the full board. Boards of conciliation and arbitration conforming more or less to the above type exist in the coal, iron and steel, boot and shoe and other industries in the United Kingdom. A somewhat different form of organization has prevailed in the cotton-spinning trade (since the dispute of 1892-1893) and in the engineering trade (since the engineering dispute of 1897-1898). In these important industries there are no permanent boards for the settlement of general questions, but elaborate agreements are in force between the employers' and workmen's organizations which among other things prescribe the mode in which questions at issue shall be dealt with and if possible settled. In the first place, if the question cannot be settled between the employer and his workmen, it is dealt with by the local associations or committees or their officials, and failing a settlement in this manner, is referred to a joint meeting of the executive committees of the two associations. In neither agreement is there any provision for the ultimate decision of unsettled questions by arbitration. The agreement in the cotton trade is known as the "Brooklands Agreement," and a large number of questions have been amicably settled under its provisions. In the building trade, it is very customary for the local "working rules," agreed to mutually by employers and employed in particular districts, to contain "conciliation rules" providing for the reference of disputed questions to a joint committee with or without an ultimate reference to arbitration. Yet another form of voluntary board is the "district board," consisting in most cases of representatives elected in equal numbers by the local chamber of commerce and trades council respectively. In the case, however, of the London Conciliation Board the workmen's representatives are elected, twelve by specially summoned meetings of trade union delegates and two by co-optation. The functions of district boards are to deal with disputes in any trade which may occur within their districts, and of course they can only take action with the consent of both parties to the dispute, in this respect differing from the majority of "trade" boards, which, as a rule, are empowered by the agreement under which they are constituted to deal with questions on the application of either party. Another interesting type of board is that representing two or more groups of workmen and sometimes their employers, with the object of settling "demarcation" disputes between the groups of workmen (*i.e.* questions as to the limits of the work which each group may claim to perform). Examples of such boards are those representing shipwrights and joiners on the Clyde, Tyne and elsewhere. While the arrangements for voluntary conciliation and arbitration differ in this way in various industries, there is an equally wide variation in the character and range of questions which the boards are empowered to determine. For example, some boards in the coal trade (*e.g.* the conciliation boards in Northumberland and the so-called "Federated Districts") deal solely with the general rate of wages. Others, *e.g.* the "joint committee" in Northumberland and Durham, confine their attention solely to local questions not affecting the counties as a whole. The Durham conciliation board deals with any general or county questions. This distinction between "general" and "local" questions corresponds nearly, though not entirely, to the distinction often drawn between questions of the terms of future employment and of the interpretation of existing agreements. Some conciliation boards are unlimited as regards the scope of the questions which they may consider. This was formerly the case with the boards in the boot and shoe trade, but under the "terms of settlement" of the dispute in 1895 drawn up at the Board of Trade, certain classes of questions (*e.g.* the employment of particular individuals, the adoption of piece-work or time-work, &c.) were wholly or partially withdrawn from their consideration, and any decision of a board contravening the "terms of settlement" is null and void. A special feature in the procedure for conciliation and arbitration in the boot and shoe trade, is the deposit by each party of £1000 with trustees, as a financial guarantee for the performance of agreements and awards. A certain class of conciliation boards, mostly in the Midland metal trades, were attached to "alliances" of employers and employed, having for their object the regulation of production and of prices (*e.g.* the Bedstead Trade Wages Board). None of these alliances, however, have survived.

Legislation in the United Kingdom. At all events up to the year 1896, the development of arbitration and conciliation as methods of settling labour disputes in the United Kingdom was entirely independent of any legislation. Previously to the Conciliation Act of 1896 several attempts had been made by parliament to promote arbitration and conciliation, but with little or no practical result, and the act of 1896 repealed all previous legislation on the subject, at the same time excluding the operation of the Arbitration Act of 1889 from the settlement of "any difference or dispute to which this act applies." The laws repealed by the Conciliation Act need only a few words of mention. During the 18th century the fixing of wages by magistrates under the Elizabethan legislation gradually decayed, and acts of 1745 and 1757 gave summary jurisdiction to justices of the peace to determine disputes between masters and servants in certain circumstances, although no rate of wages had been fixed that year by the justices of the peace of the shire. These and other laws, relating specially to disputes in the cotton-weaving trade, were consolidated and amended by the Arbitration Act of 1824. This act seems chiefly to have been aimed at disputes relating to piece-work in the textile trades, though applicable to other disputes arising out of a wages contract. It expressly excluded, however, the fixing of a rate of wages or price of labour or workmanship at which the workmen should in future be paid unless with the mutual consent of both master and workmen. The act gave compulsory powers of settling the disputes to which it relates on application of either party to a court of arbitrators representing employers and workmen nominated by a magistrate. The award could be enforced by distress or imprisonment. The act was subsequently amended in detail, and by the "Councils of Conciliation" Act of 1867 power was given to the home secretary to license "equitable councils of conciliation and arbitration" equally representative of masters and workmen, who should thereupon have the powers conferred by the act of 1824. The act contains provisions for the appointment of conciliation committees, and other details which are of little interest seeing that the act was never put into operation. Another amendment of the act of 1824 was made by the Arbitration (Masters and

Workmen) Act of 1872, which contemplated the conclusion of agreements between employers and employed, designating some board of arbitration by which disputes included within the scope of the former acts should be determined. A master or workman should be deemed to be bound by an agreement under the act, if he accepted a printed copy of the agreement and did not repudiate it within forty-eight hours. Like the previous legislation, however, the act of 1872 was inoperative. The evidence given before the Royal Commission on Labour (1891-1894) disclosed the existence of a considerable body of opinion in favour of some further action by the state for the prevention or settlement of labour disputes, and some impetus was given to the movement by the settlement through official mediation of several important disputes, *e.g.* the great coal-miners' dispute of 1893 by a conference presided over by Lord Rosebery, the cab-drivers' dispute of 1894 by the mediation of the home secretary (H.H. Asquith), and the boot and shoe trade dispute of 1895 by a Board of Trade conference under the chairmanship of Sir Courtenay Boyle. In these, and a few other less important cases, the intervention of the Board of Trade or other department took place without any special statutory sanction. The Conciliation Act passed in 1896 was framed with a view to giving express authorization to such action in the future.

This act is of a purely voluntary character. Its most important provisions are those of section 2, empowering the Board of Trade in cases "where a difference exists or is apprehended between any employer, or any class of employers, and workmen, or between different classes of workmen," to take certain steps to promote a settlement of the difference. They may of their own initiative hold an inquiry or endeavour to arrange a meeting between the parties under a chairman mutually agreed on or appointed from the outside, and on the application of either party they may appoint a conciliator or a board of conciliation who shall communicate with the parties and endeavour to bring about a settlement and report their proceedings to the Board of Trade. On the application of both parties the Board of Trade may appoint an arbitrator. In all cases the Board of Trade has discretion as to the action to be taken, and there is no provision either for compelling the parties to accept their mediation or to abide by any agreement effected through their intervention. There are other provisions in the act providing for the registration of voluntary conciliation boards, and for the promotion by the Board of Trade of the formation of such boards in districts and trades in which they are deficient. During the first eleven years after the passage of the act the number of cases arising under section 2 (providing for action by the Board of Trade for the settlement of actual or apprehended disputes) averaged twenty-one per annum, and the number of settlements effected fifteen. In the remaining cases the Board of Trade either refused to entertain the application or failed to effect a settlement, or the disputes were settled between the parties during the negotiations. About three-quarters of the settlements were effected by arbitration and one-quarter by conciliation. A number of voluntary conciliation boards formed or reorganized since the passing of the act provide in their rules for an appeal to the Board of Trade to appoint an umpire in case of a deadlock. At least thirty-six trade boards are known to have already adopted this course. The figures given above show that the Conciliation Act of 1896 has not, like previous legislation, been a dead letter, though the number of actual disputes settled is small compared with the total number annually recorded.

Arbitration and conciliation in labour disputes as practised in the United Kingdom are entirely voluntary, both as regards the initiation and conduct of the negotiations and the carrying out of the agreement resulting therefrom, In all these respects arbitration, though terminating in what is called a binding award, is on precisely the same legal footing as conciliation, which results in a mutual agreement. Various proposals have been made (and in some cases carried into effect in certain countries) for introducing an element of compulsion into this class of proceeding. There are three stages at which compulsion may conceivably be introduced, (1) The parties may be compelled by law to submit their dispute to some tribunal or board of conciliation; (2) the board of conciliation or arbitration may have power to compel the attendance of witnesses and the production of documents; (3) the parties may be compelled to observe the award of the board of arbitration. The most far-reaching schemes of compulsory arbitration in force in any country are those in force in New Zealand and certain states in Australia. Bills have been introduced into the British House of Commons for clothing voluntary boards of conciliation and arbitration, under certain conditions, with powers to require attendance of witnesses and production of documents, without, however, compelling the parties to submit their disputes to these boards or to abide by their decisions. In the United Kingdom, however, more attention has recently been given to the question of strengthening the sanction for the carrying out of awards and agreements than of compelling the parties to enter into such arrangements. An interesting step towards the solution of the difficulty of enforcement in certain cases is perhaps afforded by the provisions of the terms of settlement of the dispute in the boot and shoe trade drawn up at the Board of Trade in 1895. Under this agreement £1000 was deposited by each party with trustees, who were directed by the trust-deed to pay over to either party, out of the money deposited by the other, any sum which might be awarded as damages by the umpire named in the deed, for the breach of the agreement or of any award made by an arbitration board in consonance with it. Very few claims for damages have been sustained under this agreement. Nevertheless it cannot be doubted that the pecuniary liability of the parties has given stability to the work of the local arbitration boards, and the satisfaction of both sides with the arrangement is shown by the fact that the trust-deed which lapsed in 1900 has been several times renewed by common agreement for successive periods of two years, and is now in force for an indefinite period subject to six months' notice from either side. Theoretically a trust-deed of this kind can only offer a guarantee up to the point at which the original deposit on one side or the other is exhausted, as it is impossible to compel either party to renew the deposit. A proposal was made by the duke of Devonshire and certain of his colleagues on the Royal Commission on Labour for empowering associations of employers and employed to acquire, if they desired it, sufficient legal personality and corporate character to enable them to sue each other or their own members for breach of agreement. This would give the association aggrieved by a breach of award the power of suing the defaulting organization to recover damages out of their corporate funds, while each association could exact penalties from its members for such a breach. For this reason the suggestion has met with a good deal of support by many interested in arbitration and conciliation, but has been steadily opposed by representatives of the trade unions.

Proposals for compulsion.

The question is not free from difficulties. The object of the change would be to convert what are at present only morally binding understandings into legally enforceable contracts. But apart from the possibility that some of such contracts would be held by the courts to be void as being "in restraint of trade," the tendency might be to give a strict legal interpretation to working agreements which might deprive them of some of their effectiveness for the settlement of the conditions of future contracts between employers and workmen, while possibly deterring associations from entering into such agreements for fear of litigation. Individuals, moreover, could avoid liability by leaving their associations. In practice the cases of repudiation or breach of an award or agreement are not common. In countries like New Zealand, where the parties are compelled to submit their differences to arbitration, some of the above objections do not apply.

The following statistics are based on the reports of the Labour department of the Board of Trade. The number of boards of conciliation and arbitration known to be in existence in the United Kingdom is nearly 200, but a good many of these do little or no active work. Only about one-third of these boards deal with actual cases in any one year, the active boards being mainly connected with mining, iron and steel, engineering and shipbuilding, boot and shoe and building trades. During the ten years 1897-1906 the total number of cases considered by these boards averaged about 1500 annually, of which they have settled about half, the remainder having been withdrawn, referred back or otherwise settled. About three-quarters of the cases settled were determined by the boards themselves and only one-quarter by umpires. The great majority of the cases settled were purely local questions. Thus more than half the total were dealt with by the "joint committees" in the Northumberland and Durham coal trades, which confine their action to local questions, such as fixing the "hewing prices" for new seams. The great majority of the cases settled did not actually involve stoppage of work, the most useful work of these permanent boards being the prevention rather than the settlement of strikes and lockouts. A certain number of disputes are settled every year by the

Statistics of existing agencies.

mediation or arbitration of disinterested individuals, *e.g.* the local mayor or county court judge.

The extent to which the methods of arbitration and conciliation can be expected to afford a substitute for strikes and lockouts is one on which opinions differ very widely. The difficulties arising from the impossibility of enforcing agreements

Future scope and limits.

or awards by legal process have already been discussed. Apart from these, however, it is evident that both methods imply that the parties, especially the work-people, are organized at least to the extent of being capable of negotiating through agents. In some industries (*e.g.* agriculture or domestic service) this preliminary condition is not satisfied; in others the men's leaders possess little more than consultative powers, and employers may hesitate to deal either directly or through a third party with individuals or committees who have so little authority over those whom they claim to represent. And even where the trade organizations are strong, some employers refuse in any way to recognize the representative character of the men's officials. The question of the "recognition" of trade unions by employers is a frequent cause of disputes (see Strikes and Lock-outs.) It may be observed, however, that it often occurs that in cases in which both employers and employed are organized into associations which are accustomed to deal with each other, one or both parties entertain a strong objection to the intervention of any outside mediator, or to the submission of differences to an arbitrator. Thus the engineering employers in 1897 were opposed to any outside intervention, though ready to negotiate with the delegates chosen by the men. On the other hand, the cotton operatives have more than once opposed the proposal of the employers to refer the rate of wages to arbitration, and throughout the great miners' dispute of 1893 the opposition to arbitration came from the men. Naturally, the party whose organization is the stronger is usually the less inclined to admit outside intervention. But there have also been cases in which employers, who refused to deal directly with trade union officials, have been willing to negotiate with a mediator who was well known to be in communication with these officials, *e.g.* in the case of the Railway Settlement of 1907.

Apart, however, from the disinclination of one or both parties to allow of any outside intervention, we have to consider how far the nature of the questions in dispute may in any particular case put limits to the applicability of conciliation or arbitration as a method of settlement. Since conciliation is only a general term for the action of a third party in overcoming the obstacles to the conclusion of an agreement by the parties themselves, there is no class of questions which admit of settlement by direct negotiation which may not equally be settled by this method, provided of course that there is an adequate supply of sufficiently skilful mediators. As regards arbitration the case is somewhat different, seeing that in this case the parties agree to be bound by the award of a third party. For the success of arbitration, therefore, it is important that the general principles which should govern the settlement of the particular question at issue should be admitted by both sides. Thus in the manufactured iron trade in the north of England, it has throughout been understood that wages should depend on the prices realized, and the only question which an arbitrator has usually had to decide has been how far the state of prices at the time warranted a particular change of wage. On the other hand, there are many questions on which disputes arise (*e.g.* the employment of non-union labour, the restriction of piece-work, &c.) on which there is frequently no common agreement as to principles, and an arbitrator may be at a loss to know what considerations he is to take into account in determining his award. Generally speaking, employers are averse from submitting to a third party questions involving discipline and the management of their business, while in some trades workmen have shown themselves opposed to allowing an arbitrator to reduce wages beyond a certain point which they wish to regard as a guaranteed "minimum."

Another objection on the part of some employers and workmen to unrestricted arbitration is its alleged tendency to multiply disputes by providing an easy way of solving them without recourse to strikes or lock-outs, and so diminishing the sense of responsibility in the party advancing the claims. It is also sometimes contended that arbitrators, not being governed in their decisions by a definite code of principles, may tend to "split the difference," so as to satisfy both sides even when the demands on one side or the other are wholly unwarranted. This, it is said, encourages the formulation of demands purposely put high in order to admit of being cut down by an arbitrator. One of the chief practical difficulties in the way of the successful working of permanent boards of conciliation, consisting of equal numbers of employers and employed, with an umpire in case of deadlock, is the difficulty of inducing business men whose time is fully occupied to devote the necessary time to the work of the boards, especially when either side has it in its power to compel recourse to the umpire, and so render the work of the conciliation board fruitless. In spite of all these difficulties the practice of arranging differences by conciliation and arbitration is undoubtedly spreading, and it is to be remembered that even in cases in which theoretically a basis for arbitration can scarcely be said to exist, recourse to that method may often serve a useful purpose in putting an end to a deadlock of which both parties are tired, though neither cares to own itself beaten.

New Zealand.—The New Zealand Industrial Conciliation and Arbitration Act 1894 is important as the first practical attempt of any importance to enforce compulsory arbitration in trade disputes. The original act was amended by several subsequent measures, and the law has been more than once consolidated. The law provides for the incorporation of associations of employers or workmen under the title of industrial unions, and for the creation in each district of a joint conciliation board, elected by these industrial unions, with an impartial chairman elected by the board, to which a dispute may be referred by any party, a strike or lock-out being thenceforth illegal. If the recommendation of the conciliation board is not accepted by either party, the matter goes to a court of arbitration consisting of two persons representing employers and workmen respectively, and a judge of the supreme court. Up to 1901 disputes were ordinarily required to go first to a board of conciliation except by agreement of the parties, but now either party may carry a dispute direct to the arbitration court. The amendment was adopted because it was found in practice that the great majority of cases went ultimately to the arbitration court, and conciliation board proceedings were often mere waste of time. The award of the court is enforceable by legal process, financial penalties up to £500 being recoverable from defaulting associations or individuals. If the property of an association is insufficient to pay the penalty, its members are individually liable up to £10 each. It is the duty of factory inspectors to see that awards are obeyed. The law provides for the extension of awards to related trades, to employers entering the industry hereafter, and in some cases to a whole industry.

The above is only an outline of the principal provisions of this law, under which questions of wages, hours and the relations of employers and workmen generally in New Zealand (*q.v.*) industries became practically the subject of state regulation. The act must more properly be judged as a measure for the state regulation of industry, but as a method of putting an end to labour disputes its success has only been partial.

Australia.—The laws which are practically operative in Australia with respect to arbitration and conciliation are all based with modifications on the New Zealand system. The first compulsory arbitration act passed in Australia was the New South Wales Act of 1901. The principal points of difference between this and the New Zealand act are that the conciliation procedure is entirely omitted, the New South Wales measure being purely an arbitration act. The arbitration court has greater power over unorganized trades than in New Zealand, and the scope of its awards is greatly enlarged by its power to declare any condition of labour to be common rule of an industry, and thus binding on all existing and future employers and work-people in that industry. In Western Australia laws were passed in 1900 and 1902 which practically adopted the New Zealand legislation with certain modifications in detail.

In 1904 the commonwealth of Australia passed a compulsory arbitration law based mainly on those in force in New Zealand and New South Wales, and applicable to disputes affecting more than one Australian state. The arbitration court is empowered to require any dispute within its cognizance to be referred to it by the state authority proposing to deal with it. There are other Australian laws which, though unrepealed (*e.g.* the South Australian Act of 1894), are a dead-letter.

Generally speaking, the Australasian laws on arbitration and conciliation are more stringent and far-reaching than any others in the world.

Canada.—In 1900 a conciliation act was passed by the Dominion parliament resembling the United Kingdom act in most of its features, and in 1903 the Canadian Railway Labour Disputes Act made special provision for the reference of railway disputes to a conciliation board and (failing settlement) to a court of arbitration.

This act was consolidated with the Conciliation Act 1900 during 1906 in an act respecting conciliation and labour, and in March 1907 the Industrial Disputes Investigation Act became law by which machinery is set up for the constitution of a board, on the application of either side to a dispute in mines and industries connected with public utilities, whenever a strike involving more than ten employees is threatened. The provisions of the act may be extended to other industries and railway companies, and their employees may take action under either the Conciliation and Labour Act or the Industrial Disputes Investigation Act. Under the Investigation Act it is unlawful for any employer to cause a lock-out, or for an employee to go on strike on account of any dispute prior to or during a reference of such dispute to a board constituted under the act, or prior to or during a reference under the provisions concerning railway disputes under the Conciliation and Labour Act. There is nothing, however, in the act to prevent a strike or lock-out taking place after the dispute has been investigated.

France.—The French Conciliation and Arbitration Law of December 1892 provides that either party to a labour dispute may apply to the *juge de paix* of the canton, who informs the other party of the application. If they concur within three days, a joint committee of conciliation is formed of not more than five representatives of each party, which meets in the presence of the *juge de paix*, who, however, has no vote. If no agreement results the parties are invited to appoint arbitrators. If such arbitrators are appointed and cannot agree on an umpire, the president of the civil tribunal appoints an umpire. In the case of an actual strike, in the absence of an application from either party it is the duty of the *juge de paix* to invite the parties to proceed to conciliation or arbitration. The results of the action of the *juge de paix* and of the conciliation committee are placarded by the mayors of the communes affected. The law leaves the parties entirely free to accept or reject the services of the *juge de paix*.

During the ten years 1897-1906 the act was put in force in 1809 cases—viz. 916 on application of workmen; 49 of employers; 40 of both sides; and 804 without application. Altogether 616 disputes were settled—549 by conciliation and 67 by arbitration.

Germany.—In several continental European countries, courts or boards are established by law to settle cases arising out of existing labour contracts; *e.g.* the French "*Conseils de Prud'hommes*," the Italian "*Probi-Viri*," and the German "*Gewerbegerichten*,"—and some of the questions which come before these bodies are such as might be dealt with in England by voluntary boards or joint committees. The majority, however, are disputes between individuals as to wages due, &c., which would be determined in the United Kingdom by a court of summary jurisdiction. It is noteworthy, however, that the German industrial courts (*Gewerbegerichten*) are empowered under certain conditions to offer their services to mediate between the parties to an ordinary labour dispute. The main law is that of 1890 which was amended in 1901. In the case of a strike or lock-out the court must intervene on application of both parties, and may do so of its own initiative or on the invitation of one side. The conciliation board for this purpose consists under the amending law of 1901 of the president of the court and four or more representatives named by the parties in equal numbers but not concerned in the dispute. Failing appointment by the parties the president appoints them. Failing a settlement at a conference between the parties in the presence of the president and assessors of the court, the court arrives at a decision on the merits of the dispute which is communicated to the parties, who are allowed a certain time within which to notify their acceptance or rejection. The court has no power to compel the observance of its decision, but in certain cases it may fine a witness for non-attendance. In the first five years after the passage of the amending law of 1901 (viz. 1902-1906) there were 1139 applications for the intervention of the industrial courts: 492 agreements were brought about and 107 decisions were pronounced by the courts, of which 64 were accepted by both parties.

Switzerland.—The canton of Geneva enacted a law in 1900 providing for the settlement by negotiation, conciliation or arbitration of the general terms of employment in a trade, subject, however, to special arrangements between employers and workmen in particular cases. The negotiations take place between delegates chosen by the associations of employers and employed, or failing them, by meetings summoned by the council of state on sufficient applications. Failing settlement, the council of state, on application from either party, is to appoint one or more conciliators from its members, and if this fail the central committee of the *Prud'hommes*, together with the delegates of employers and workmen, is to form a board of arbitration, whose decision is binding. Any collective suspension of work is illegal during the period covered by the award or agreement. Up to the end of 1904 only seven cases occurred of application of the law to industrial differences. In Basel (town) a law providing for voluntary conciliation by means of boards of employers and workmen with an independent chairman appointed *ad hoc* by the council of state of the canton, has been in force since 1897, but it remained practically unused until 1902. In the period from January 1902 to May 1905, 18 disputes were dealt with and 10 settled under this law. A similar law was adopted in St Gall in 1902. In the three years 1902-1904, 10 disputes were dealt with and 3 settled.

Sweden.—By a law which came into force on the 1st of January 1907, Sweden was divided into seven districts and in each district a conciliator was appointed by the crown. The conciliator must reside within his district and his principal duty is to promote the settlement of disputes between employers and work-people or between members of either class among themselves. He is also on request to advise and otherwise assist employers and work-people in framing agreements affecting the conditions of labour if and so far as agreements are designed to promote good relations between the two classes and to obviate stoppages of work.

United States.—In the United States several states have legislated on the subject of conciliation and arbitration, among the first of such acts being the "Wallace" Act of 1883, in Pennsylvania, which, however, was almost inoperative. Altogether, 24 states have made constitutional or statutory provision for mediation in trade disputes, of which 17 contemplate the formation of permanent state boards. The only state laws which require notice are those of Massachusetts and New York providing for the formation of state boards of arbitration. The Massachusetts board, founded in 1886, consists of one employer, one employed and one independent person chosen by both. The New York board (1886) consists of two representatives of different political parties, and one member of a *bona fide* trade organization within the state. In both states it is the duty of the board, with or without application from the parties, to proceed to the spot where a labour dispute has occurred, and to endeavour to promote a settlement. The parties may decline its services, but the board is empowered to issue a report, and on application from either side to hold an inquiry and publish its decision, which (in Massachusetts) is binding for six months, unless sixty days' notice to the contrary is given by one side to the other. Several states, including Massachusetts and New York, provide not only for state boards, but also for local boards.

In Massachusetts, during 1906, the state board dealt with 158 disputes. Of these the board was appealed to as arbitrator in 95 cases. Awards were rendered in 80 cases, 12 cases were withdrawn and 3 cases were still pending at the end of the year. In New York the number of cases dealt with is much smaller.

Federal legislation can only touch the question of arbitration and conciliation so far as regards disputes affecting commerce between different states. Thus an act of June 1898 provides that in a dispute involving serious interruption of business on railways engaged in inter-state commerce, the chairman of the Inter-State Commerce Commission and the commissioner of labour shall, on application of either party, endeavour to effect a settlement, or to induce the parties to

submit the dispute to arbitration. While an arbitration under the act is pending a strike or lock-out is unlawful.

AUTHORITIES.—For the recent development of arbitration and conciliation in the United Kingdom, see the *Annual Reports of the Labour Department of the Board of Trade on Strikes and Lock-outs* from 1888 onwards. Since 1890 these reports have contained special appendices on the work of arbitration boards. See also the *Labour Gazette* (the monthly journal of the Labour Department) from 1893 onward, and the *Report on Rules of Voluntary Conciliation and Arbitration Boards and Joint Committees*. The *Reports of the Royal Commission on Labour* (1891-1894) contain much valuable information on the subject. For the working of the Conciliation Act see the *Reports* of the Board of Trade on their proceedings under the Conciliation Act 1896. For the earlier history in the United Kingdom: Crompton, *Industrial Conciliation* (1876); Price, *Industrial Peace* (1887). For foreign and colonial developments: the third *Abstract of Foreign Labour Statistics* (1906), issued by the Board of Trade; *Report on Government Industrial Arbitration*, by L.W. Hatch (Bulletin of Bureau of Labour of United States Department of Commerce and Labour, September 1905); the report of the French *Office du Travail*, *De la conciliation et de l'arbitrage dans les conflits collectifs entre patrons et ouvriers en France et à l'étranger* (1893); the Annual Reports of the same Department on *Strikes, Lockouts and Arbitration*; the *Reports of the Massachusetts and New York State Arbitration Boards*, and of the *New Zealand Department of Labour*; and the *Labour Gazette*. See also the following general works: N.P. Gilman, *Methods of Industrial Peace* (Boston, 1904); A.C. Pigou, *Principles and Methods of Industrial Peace* (1905).

<div align="right">(X.)</div>

ARBOGAST (d. 394), a barbarian officer in the Roman army, at the end of the 4th century. His nationality is uncertain, but Zosimus, Eunapius and Sulpicius Alexander (a Gallo-Roman historian quoted by Gregory of Tours) all refer to him as a Frank. Having served with distinction against the Goths in Thrace, he was sent by Theodosius in 388 against Maximus, who had usurped the empire of the west and had murdered Gratian. His complete success, which resulted in the destruction of Maximus and his sons and the pacification of Gaul, led Theodosius to appoint him chief minister for his young brother-in-law Valentinian II. His rule was most energetic; but while he favoured the barbarians in the imperial service, and appointed them to high office, Valentinian, openly jealous of his minister, sought to surround himself with Romans. As an offset to this, Arbogast allied himself with the pagan element in Rome, while Valentinian was strictly orthodox. In 392 Valentinian was secretly put to death at Vienne (in Gaul), and Arbogast, naming as his successor Eugenius, a rhetorician, descended into Italy to meet the expedition which Theodosius was heading against him. He proclaimed himself the champion of the old Roman gods, and as a response to the appeal of Ambrose, is said to have threatened to stable his horses in the cathedral of Milan, and to force the monks to fight in his army. His defeat in the hard-fought battle of the Frigidus saved Italy from these dangers. Theodosius, after a two days' fight, gained the victory by the treachery of one of Arbogast's generals, sent to cut off his retreat. Eugenius was captured and executed, but Arbogast escaped to the mountains, where however he slew himself three days afterwards (8th of September 394). Although we have only most distorted narratives upon which to rely —pagan eulogy and Christian denunciation—Arbogast appears to have been one of the greatest soldiers of the later empire, and a statesman of no mean rank. His energy, and his apparent disdain for the effete civilization which he protected, but which did not affect his character, make his personality one of the most interesting of the 4th century.

See T. Hodgkin, *Italy and her Invaders* (1880), vol. i. chap. ii.

ARBOIS, a town of eastern France, in the department of Jura, on the Cuisance, 29 m. N.N.E. of Lons-le-Saunier by rail. Pop. (1906) 3454. The town is the seat of the tribunal of first instance of the arrondissement of Poligny, and has a communal college. The church of St Just, founded in the 10th century, has good wood-carving. An Ursuline convent, built in 1764, serves as hôtel de ville and law court, and a church of the 14th century is used as a market. There is an old château of the dukes of Burgundy. Arbois is well known for its red and white wines, and has saw-mills, tanneries and market gardens, and manufactures paper, oil and casks.

ARBOIS DE JUBAINVILLE, MARIE HENRI D' (1827-1910), French historian and philologist, was born at Nancy on the 5th of December 1827. In 1851 he left the École des Chartes with the degree of palaeographic archivist. He was placed in control of the departmental archives of Aube, and remained in that position until 1880, when he retired on a pension. He published several volumes of inventorial abstracts, a *Répertoire archéologique du département* in 1861; a valuable *Histoire des ducs et comtes de Champagne depuis le VIe siècle jusqu'à la fin du XIe*, which was published between 1859 and 1869 (8 vols.), and in 1880 an instructive monograph upon *Les Intendants de Champagne*. But already he had become attracted towards the study of the most ancient inhabitants of Gaul; in 1870 he brought out an *Étude sur la déclinaison des noms propres dans la langue franque à l'époque mérovingienne*; and in 1877 a learned work upon *Les Premiers Habitants de l'Europe* (2nd edition in 2 vols. 1889 and 1894). Next he concentrated his efforts upon the field of Celtic languages, literature and law, in which he soon became an authority. Appointed in 1882 to the newly founded professorial chair of Celtic at the Collège de France, he began the *Cours de littérature celtique* which in 1908 extended to twelve volumes. For this he himself edited the following works: *Introduction a l'étude de la littérature celtique* (1883); *L'Épopée celtique en Irlande* (1892); *Études sur le droit celtique* (1895); and *Les Principaux Auteurs de l'antiquité à consulter sur l'histoire des Celtes* (1902). He was among the first in France to enter upon the study of the most ancient monuments of Irish literature with a solid philological preparation and without empty prejudices. We owe to him also *Les Celtes depuis les temps les plus reculés jusqu'à l'an 100 avant noire ère* (1904), and a study of comparative law in *La Famille celtique* (1905). Numerous detailed studies upon the Gaulish names of persons and places took synthetic form in the *Recherches sur l'origine de la propriété foncière* (1890), which illumined one of the most interesting aspects of the Roman occupation of Gaul. The *Recueil de mémoires concernant la littérature et l'histoire celtiques*, made by the most notable among his disciples on the occasion of his seventy-eighth birthday (1906), was a well-deserved tribute to his persevering and fruitful industry. He died in February 1910.

<div align="right">(C. B.*)</div>

ARBOR DAY, the name applied in the United States of America to a day appointed for the public planting of trees (see Arbour). Originating, or at least being first successfully put into operation, in Nebraska in 1872 through the instrumentality of J. Sterling Morton, then president of the state Board of Agriculture, it received the official sanction of the state by the proclamation of Governor R.W. Furnas in 1874 and by the enactment in 1885 of a law establishing it as a legal holiday in Nebraska. The movement spread rapidly throughout the United States until with hardly an exception every state and territory celebrates such a day either as a legal or a school holiday. The time of celebration varies in different states—sometimes even in different localities in the same state—but April or early May is the rule in the northern states, and February, January and December are the months in various southern states. A like practice has been introduced in New Zealand.

See N.H. Egleston, *Arbor Day: Its History and Observance* (Washington, 1896), Robert W. Furnas, *Arbor Day* (Lincoln, Neb., 1888), and R.H. Schauffler (ed.), *Arbor Day* (New York, 1909).

ARBORETUM, the name given to that part of a garden or park which is reserved for the growth and display of trees. The term, in this restricted sense, was seemingly first so employed in 1838 by J.C. Loudon, in his book upon arboreta and fruit trees. Professor Bayley Balfour, F.R.S., the Regius Keeper of the Royal Botanic Garden in Edinburgh, has described an arboretum as a living collection of species and varieties of trees and shrubs arranged after some definite method—it may be properties, or uses, or some other principle—but usually after that of natural likeness. The plants are intended to be specimens showing the habit of the tree or shrub, and the collection is essentially an educational one. According to another point of view, an arboretum should be constructed with regard to picturesque beauty rather than systematically, although it is admitted that for scientific purposes a systematic arrangement is a *sine qua non*. In this more general respect, an arboretum or woodland affords shelter, improves local climate, renovates bad soils, conceals objects unpleasing to the eye, heightens the effect of what is agreeable and graceful, and adds value, artistic and other, to the landscape. What Loudon called the "gardenesque" school of landscape naturally makes particular use of trees. By common consent the arboretum in the Royal Botanical Gardens at Kew is one of the finest in the world. Its beginnings may be traced back to 1762, when, at the suggestion of Lord Bute, the duke of Argyll's trees and shrubs were removed from Whitton Place, near Hounslow, to adorn the princess of Wales's garden at Kew. The duke's collection was famous for its cedars, pines and firs. Most of the trees of that date have perished, but the survivors embrace some of the finest of their kind in the gardens. The botanical gardens at Kew were thrown open to the public in 1841 under the directorate of Sir William Hooker. Including the arboretum, their total area did not then exceed 11 acres. Four years later the pleasure grounds and gardens at Kew occupied by the king of Hanover were given to the nation and placed under the care of Sir William for the express purpose of being converted into an arboretum. Hooker rose to the occasion and, zealously reinforced by his son and successor, Sir Joseph, established a collection which rapidly grew in richness and importance. It is perhaps the largest collection of hardy trees and shrubs known, comprising some 4500 species and botanical varieties. A large proportion of the total acreage (288) of the Gardens is monopolized by the arboretum. Of the more specialized public arboreta in the United Kingdom the next to Kew are those in the Royal Botanic Garden in Edinburgh and the Glasnevin Garden in Dublin. The collection of trees in the Botanic Garden at Cambridge is also one of respectable proportions. There is a small but very select collection of trees at Oxford, the oldest botanical garden in Great Britain, which was founded in 1632. In the United States the Arnold Arboretum at Boston ranks with Kew for size and completeness. It takes its name from its donor, the friend of Emerson. It was originally a well-timbered park, which, by later additions, now covers 222 acres. Practically, it forms part of the park system so characteristic of the city, being situated only 4 m. from the centre of population. There is a fine arboretum in the botanical gardens at Ottawa, in Canada (65 acres). On the continent of Europe the classic example is still the *Jardin des Plantes* in Paris, where, however, system lends more of formality than of beauty to the general effect. The collection of trees and shrubs at Schönbrunn, near Vienna, is an extensive one. At Dahlem near Berlin the new *Kgl. Neuer Botanischer Garten* has been laid out with a view to the accommodation of a very large collection of hardy trees and shrubs. There are now many large collections of hardy trees and shrubs in private parks and gardens throughout the British Islands, the interest taken in them by their proprietors having largely increased in recent years. Rich men collect trees, as they do paintings or books. They spare neither pains nor money in acquiring specimens, even from distant lands, to which they often send out expert collectors at their own expense. This, too, the Royal Horticultural Society was once wont to do, with valuable results, as in the case of David Douglas's remarkable expedition to North America in 1823-1824. It will be remembered that when the laird of Dumbiedikes lay dying (Scott's *Heart of Midlothian*, chap, viii.) he gave his son one bit of advice which Bacon himself could not have bettered. "Jock," said the old reprobate, "when ye hae naething else to do; ye may be aye sticking in a tree; it will be growing, Jock, when ye're sleeping." Sir Walter assures us that a Scots earl took this maxim so seriously to heart that he planted a large tract of country with trees, a practice which in these days is promoted by the English and Royal Scottish Arboricultural Societies.

338

ARBORICULTURE (Lat. *arbor*, a tree), the science and art of tree-cultivation. The culture of those plants which supply the food of man or nourish the domestic animals must have exclusively occupied his attention for many ages; whilst the timber employed in houses, ships and machines, or for fuel, was found in the native woods. Hence, though the culture of fruit-trees, and occasionally of ornamental trees and shrubs, was practised by the Egyptians, Greeks and Romans, the cultivation of timber-trees on a large scale only took place in modern times. In the days of Charlemagne, the greater part of France and Germany was covered with immense forests; and one of the benefits conferred on France by that prince was the rooting up of portions of these forests throughout the country, and substituting orchards or vineyards. Artificial plantations appear to have been formed in Germany sooner than in any other country, apparently as early as the 15th century. In Britain planting was begun, though sparingly, a century later. After the extensive transfers of property on the seizure of the church lands by Henry VIII., much timber was sold by the new owners, and the quantity thus thrown into the market so lowered its price, as Hollingshed informs us, that the builders of cottages, who had formerly employed willow and other cheap and common woods, now built them of the best oak. The demand for timber constantly increased, and the need of an extended surface of arable land arising at the same time, the natural forests became greatly circumscribed, till at last timber began to be imported, and the proprietors of land to think, first of protecting their native woods, afterwards of enclosing waste ground and allowing it to become covered with self-sown seedlings, and ultimately of sowing acorns and mast in such enclosures, or of filling them with young plants collected in the woods—a practice which exists in Sussex and other parts of England even now. Planting, however, was not general in England till the beginning of the 17th century, when the introduction of trees was facilitated by the interchange of plants by means of botanic gardens, which, in that century, were first established in different countries. Evelyn's *Sylva*, the first edition of which appeared in 1664, rendered an extremely important service to arboriculture; and there is no doubt that the ornamental plantations in which England

surpasses all other countries are in some measure the result of his enthusiasm. In consequence of a scarcity of timber for naval purposes, and the increased expense during the Napoleonic war of obtaining foreign supplies, planting received a great stimulus in Britain in the early part of the 19th century. After the peace of 1815 the rage for planting with a view to profit subsided; but there was a growing taste for the introduction of trees and shrubs from foreign countries, and for their cultivation for ornament and use. The profusion of trees and shrubs planted around suburban villas and country mansions, as well as in town squares and public parks, shows how much arboriculture is an object of pleasure to the people. While isolated trees and old hedgerows are disappearing before steam cultivation, the advantages of shelter from well-arranged plantations are more fully appreciated; and more attention is paid to the principles of forest conservancy both at home and abroad. In all thickly peopled countries the forests have long ceased to supply the necessities of the inhabitants by natural reproduction; and it has become needful to form plantations either by government or by private enterprise, for the growth of timber, and in some cases for climatic amelioration. This subject is, however, dealt with more fully under FORESTS AND FORESTRY (*q.v.*); and the separate articles on the various sorts of tree may be consulted for details as to each.

ARBOR VITAE (Tree of Life), a name given by Clusius to species of *Thuja*. The name *Thuja*, which was adopted by Linnaeus from the *Thuya* of Tournefort, seems to be derived from the Greek word θύος, signifying sacrifice, probably because the resin procured from the plant was used as incense. The plants belong to the natural order Coniferae, tribe Cupressineae (Cypresses). *Thuja occidentalis* is the Western or American arbor vitae, the *Cupressus Arbor Vitae* of old authors. It is a native of North America, and ranges from Canada to the mountains of Virginia and Carolina. It is a moderate-sized tree, and was introduced into Britain before 1597, when it was mentioned in Gerard's *Herbal*. In its native country it attains a height of about 50 ft. The leaves are small and imbricate, and are borne on flattened branches, which are apt to be mistaken for the leaves. When bruised the leaves give out an aromatic odour. The flowers appear early in spring, and the fruit is ripened about the end of September. In Britain the plant is a hardy evergreen, and can only be looked upon as a large shrub or low tree. It is often cut so as to form hedges in gardens. The wood is very durable and useful for outdoor work, such as fencing, posts, etc. Another species of arbor vitae is *Thuja orientalis*, known also as *Biota orientalis*. The latter generic name is derived from the Greek adjective βιωτός, formed from βίος, life, probably in connexion with the name "tree of life." This is the Eastern or Chinese arbor vitae. It is a native of China. It was cultivated in the Chelsea Physick Garden in 1752, and was believed to have been sent to Europe by French missionaries. It has roundish cones, with numerous scales and wingless seeds. The leaves, which have a pungent aromatic odour, are said to yield a yellow dye. There are numerous varieties of this plant in cultivation, one of the most remarkable of which is the variety *pendula*, with long, flexible, hanging, cord-like branches; it was discovered in Japan about 1776 by Carl Peter Thunberg, a pupil of Linnaeus, who made valuable collections at the Cape of Good Hope, in the Dutch East Indies and in Japan. The variety *pygmaea* forms a small bush a few inches high.

Thuja gigantea, the red or canoe cedar, a native of north-western America from southern Alaska to north California, is the finest species, the trunk rising from a massive base to the height of 150 to 200 ft. It was not introduced to Britain till 1853. It is one of the handsomest of conifers, forming an elongated cone of foliage, which in some gardens has already reached 70 or 80 ft. in height. It thrives in most kinds of soils. The timber is easily worked and used for construction, especially where exposed to the weather.

ARBOS, FERNANDEZ (1863-   ), Spanish violinist and composer, was born in Madrid, and trained at the conservatoire there, and later at Brussels and at Berlin under Joachim. He became a professor at Hamburg and then at Madrid, becoming famous meanwhile as one of the finest violinists of the day; and after visiting England in 1890 and establishing his reputation there, he became professor at the Royal College of Music in London. As a composer he is best known by his violin pieces, and by a comic opera, *El Centro de la Tierra* (1895).

ARBOUR, or ARBOR (originally "herber" or "erber," O. Fr. *herbier*; from Lat. *herbarium*, a collection of herbs, *herba*, grass; the word came to be spelt "arber" through its pronunciation, as in the case of Derby, and by the 16th century was written "arbour," helped by a confusion of derivation from Lat. *arbor*, a tree, and by change of meaning), a grass-plot or lawn, a herb-garden, or orchard, and a shady bower of interlaced trees, or climbing plants trained on lattice-work. The application of the word has shifted from the grass-covered ground, the proper meaning, to the covering of trees overhead. "Arbor" (from the Latin for "tree") is a term applied to the spindle of a wheel, particularly in clock-making.

ARBROATH, or ABERBROTHOCK, a royal, municipal and police burgh, and seaport of Forfarshire, Scotland. It is situated at the mouth of Brothock water, 17 m. N.E. of Dundee by the North British railway, which has a branch to Forfar, via Guthrie, on the Caledonian railway. Pop. (1891) 22,821; (1901) 22,398. The town is under the jurisdiction of a provost, bailies and council, and, with Brechin, Forfar, Inverbervie and Montrose, returns one member to parliament. The leading industries include the manufacture of sailcloth, canvas and coarse linens, tanning, boot and shoe making, and bleaching, besides engineering works, iron foundries, chemical works, shipbuilding and fisheries. The harbour, originally constructed and maintained by the abbots, by an agreement between the burgesses and John Gedy, the abbot in 1394, was replaced by one more commodious in 1725, which in turn was enlarged and improved in 1844. The older portion was converted into a wet dock in 1877, and the entrance and bar of the new harbour were deepened. A signal tower, 50 ft. high, communicates with the Bell Rock (*q.v.*) lighthouse on the Inchcape Rock, 12 m. south-east of Arbroath, celebrated in Southey's ballad. The principal public buildings are the town-hall, a somewhat ornate market house, the gildhall, the public hall, the infirmary, the antiquarian museum (including some valuable fossil remains) and the public and mechanics' libraries. The parish church dates from 1570, but has been much altered, and the spire was added in 1831. The ruins of a magnificent abbey, once one of the richest foundations in Scotland, stand in High Street. It was founded by William the Lion in 1178 for

Tironesian Benedictines from Kelso, and consecrated in 1197, being dedicated to St Thomas Becket, whom the king had met at the English court. It was William's only personal foundation, and he was buried within its precincts in 1214. Its style was mainly Early English, the western gable Norman. The cruciform church measured 276 ft. long by 160 ft. wide, and was a structure of singular beauty and splendour. The remains include the vestry, the southern transept (the famous rose window of which is still entire), part of the chancel, the southern wall of the nave, part of the entrance towers and the western doorway. It was here that the parliament met which on the 6th of April 1320 addressed to the pope the notable letter, asserting the independence of their country and reciting in eloquent terms the services which their "lord and sovereign" Robert Bruce had rendered to Scotland. The last of the abbots was Cardinal Beaton, who succeeded his uncle James when the latter became archbishop of St Andrews. At the Reformation the abbey was dismantled and afterwards allowed to go to ruin. Part of the secular buildings still stand, and the abbot's house, or Abbey House as it is now called, is inhabited. Arbroath was created a royal burgh in 1186, and its charter of 1599 is preserved. King John exempted it from "toll and custom" in every part of England excepting London. Arbroath is "Fairport" of Scott's *Antiquary*, and Auchmithie, 3 m. north-east ("Musselcrag" of the same romance), is a quaint old-fashioned place, where the men earn a precarious living by fishing. On each side of the village the coast scenery is remarkably picturesque, the rugged cliffs—reaching in the promontory of Red Head, the scene of a thrilling incident in the *Antiquary*, a height of 267 ft.—containing many curiously shaped caves and archways which attract large numbers of visitors. At the 14th-century church of St Vigeans, 1 m. north of Arbroath, stands one of the most interesting of the sculptured stones of Scotland, with what is thought to be the only legible inscription in the Pictish tongue. The parish—originally called Aberbrothock and now incorporated with Arbroath for administrative purposes—takes its name from a saint or hermit whose chapel was situated at Grange of Conon, 3½ m. north-west. Two miles west by south are the quarries of Carmyllie, the terminus of a branch line from Arbroath, which was the first light railway in Scotland and was opened in 1900.

ARBUTHNOT, ALEXANDER (1538-1583), Scottish ecclesiastic and poet, educated at St Andrews and Bourges, was in 1569 elected principal of King's College, Aberdeen, which office he retained until his death. He played an active part in the stirring church politics of the period, and was twice moderator of the kirk, and a member of the commission of inquiry into the condition of the university of St Andrews (1583). The "correctness" of his attitude on all public questions won for him the commendation of Catholic writers; he is not included in Nicol Burne's list of "periurit apostatis"; but his policy and influence were misliked by James VI., who, when the Assembly had elected Arbuthnot to the charge of the church of St Andrews, ordered him to return to his duties at King's College. He had been for some time minister of Arbuthnott in Kincardineshire. His extant works are (*a*) three poems, "The Praises of Wemen" (224 lines), "On Luve" (10 lines), and "The Miseries of a Pure Scholar" (189 lines), and (*b*) a Latin account of the Arbuthnot family, *Originis et Incrementi Arbuthnoticae Familiae Descriptio Historica* (still in MS.), of which an English continuation, by the father of Dr John Arbuthnot, is preserved in the Advocates' Library, Edinburgh. The praise of the fair sex in the first poem is exceptional in the literature of his age; and its geniality may help us to understand the author's popularity with his contemporaries. Arbuthnot must not be confused with his contemporary and namesake, the Edinburgh printer, who produced the first edition of Buchanan's *History of Scotland* in 1582. Some have discovered in the publication of this work a false clue to James's resentment against the principal of King's College.

The particulars of Arbuthnot's life are found in Calderwood, Spottiswood, and other Church historians, and in Scott's *Fasti Ecclesiae Scoticanae*. The poems are printed in Pinkerton's *Ancient Scottish Poems* (1786), i. pp. 138-155.

ARBUTHNOT, JOHN (1667-1735), British physician and author, was born at Arbuthnott, Kincardineshire, and baptized on the 29th of April 1667. His father, Alexander Arbuthnot, was an episcopalian minister who was deprived of his living in 1689 by his patron, Viscount Arbuthnott, for refusing to conform to the Presbyterian system. After his death, in 1691, John went to London, where he lived in the house of a learned linen-draper, William Pate, and supported himself by teaching mathematics. In 1692 he published *Of the Laws of Chance …*, based on the Latin version, *De Ratociniis in ludo aleae*, of a Dutch treatise by Christiaan Huygens. In 1692 he entered University College, Oxford, as a fellow-commoner, acting as private tutor to Edward Jefferys; and in 1696 he graduated M.D. at St Andrews university. In *An Examination of Dr Woodward's Account of the Deluge* (1697) he confuted an extraordinary theory advanced by Dr William Woodward. An *Essay on the Usefulness of Mathematical Learning* followed in 1701, and in 1704 he became a fellow of the Royal Society. He had the good fortune to be called in at Epsom to prescribe for Prince George of Denmark, and in 1705 he was made physician extraordinary to Queen Anne. Four years later he became royal physician in ordinary, and in 1710 he was elected fellow of the Royal College of Physicians. Arbuthnot's ready wit and varied learning made him very valuable to the Tory party. He was a close friend of Jonathan Swift and of Alexander Pope, and Lord Chesterfield says that even the generous acknowledgment they made of his assistance fell short of their real indebtedness. He had no jealousy of his fame as an author, and his abundant imagination was always at the service of his friends. In 1712 appeared "Law is a Bottomless Pit, Exemplify'd in the case of the Lord Strutt, John Bull, Nicholas Frog and Lewis Baboon, who spent all they had in a law-suit. Printed from a Manuscript found in the Cabinet of the famous Sir Humphrey Polesworth." This was the first of a series of five pamphlets advocating the conclusion of peace. Arbuthnot describes the confusion after the death of the Lord Strutt (Charles II. of Spain), and the quarrels between the greedy tradespeople (the allies). These put their cause into the hands of the attorney, Humphrey Hocus (the duke of Marlborough), who does all he can to prolong the struggle. The five tracts are printed in two parts as the "History of John Bull" in the *Miscellanies in Prose and Verse* (1727, preface signed by Pope and Swift). Arbuthnot fixed the popular conception of John Bull, though it is not certain that he originated the character, and the lively satire is still amusing reading. It was often asserted at the time that Swift wrote these pamphlets, but both he and Pope refer to Arbuthnot as the sole author. In the autumn of the same year he published a second satire, "Proposals for printing a very Curious Discourse in Two Volumes in Quarto, entitled, Ψευδολογία Πολιτική; or, A Treatise of the Art of Political Lying," best known by its sub-title. This ironical piece of work was not so popular as "John Bull." "'Tis very pretty," says Swift, "but not so obvious to be understood." Arbuthnot advises that a lie should not be contradicted by the truth, but by another judicious lie. "So there was not long ago a gentleman, who affirmed that the treaty with France for bringing popery and slavery into England was signed the 15th of September, to which another answered very judiciously, not by opposing truth to his lie, that there was no such treaty; but that, to his certain knowledge, there were many things in that treaty not yet adjusted."

Arbuthnot was one of the leading spirits in the Scriblerus Club, the members of which were to collaborate in a universal satire on the abuses of learning. *The Memoirs of the extraordinary Life, Works, and Discoveries of Martinus Scriblerus*, of which only the first book was finished, first printed in Pope's *Works* (1741), was chiefly the work of Arbuthnot, who is at his best in the whimsical account of the birth and education of Martin. Swift, writing on the 3rd of July 1714 to Arbuthnot,

says:—"To talk of Martin in any hands but yours, is a folly. You every day give better hints than all of us together could do in a twelvemonth: and to say the truth, Pope who first thought of the hint has no genius at all to it, to my mind; Gay is too young: Parnell has some ideas of it, but is idle; I could put together, and lard, and strike out well enough, but all that relates to the sciences must be from you."

The death of Queen Anne put an end to Arbuthnot's position at court, but he still had an extensive practice, and in 1727 he delivered the Harveian oration before the Royal College of Physicians. Lord Chesterfield and William Pulteney were his patients and friends; also Mrs Howard (Lady Suffolk) and William Congreve. His friendship with Swift was constant and intimate; he was friend and adviser to Gay; and Pope wrote (2nd of August 1734) that in a friendship of twenty years he had found no one reason of complaint from him. Arbuthnot's youngest son, who had just completed his education, died in December 1731. He never quite recovered his former spirits and health after this shock. On the 17th of July 1734 he wrote to Pope: "A recovery in my case, and at my age, is impossible; the kindest wish of my friends is Euthanasia." In January 1735 was published the "Epistle to Dr Arbuthnot," which forms the prologue to Pope's satires. He died on the 27th of February 1735 at his house in Cork Street, London.

Among Arbuthnot's other works are:—*An Argument for Divine Providence, taken from the constant regularity observed in the Births of both sexes* (Phil. Trans. of the Royal Soc., 1710); "Virgilius Restauratus," printed in the second edition of Pope's *Dunciad* (1729); *An Essay concerning the Effects of Air on Human Bodies* (1733); *An Essay concerning the Nature of Ailments ...* (1731); and a valuable *Table of Ancient Coins, Weights and Measures* (1727), which is an enlargement of an earlier treatise (1705). He had a share in the unsuccessful farce of *Three Hours after Marriage*, printed with Gay's name on the title-page (1717). Some pieces printed in *A Supplement to Dr Swift's and Mr Pope's Works ...* (1739) are there asserted to be Arbuthnot's. *The Miscellaneous Works of the late Dr Arbuthnot* were published at Glasgow in an unauthorized edition in 1751. This includes many spurious pieces.

See *The Life and Works of John Arbuthnot* (1892), by George A. Aitken.

ARCACHON, a coast town of south-western France, in the department of Gironde, 37 m. W.S.W. of Bordeaux on the Southern railway. Pop. (1906) 9006. Arcachon is situated on the southern border of the lagoon of Arcachon at the foot of dunes covered with splendid pine-woods. It comprises two distinct parts, the summer town, extending for 2½ m. along the shore, and bordered by a firm sandy beach, frequented by bathers, and the winter town, farther inland, consisting of numerous villas scattered amongst the pines.

Owing to the mildness of its climate the winter town is a resort for consumptive patients. The principal industries are oyster-breeding, which is conducted on a very large scale, and fishing. The port has trade with Spain and England.

ARCADE, in architecture, a range of arches, supported either by columns or piers; isolated in the case of those separating the nave of a church from the aisles, or forming the front of a covered ambulatory, as in the cloisters in Italy and Sicily, round the Ducal Palace or the Square of St Mark's, Venice, round the courts of the palaces in Italy, or in Paris round the Palais-Royal and the Place des Vosges. The earliest examples known are those of the Tabularium, the theatre of Marcellus, and the Colosseum, in Rome. In the palace of Diocletian at Spalato the principal street had an arcade on either side, the arches of which rested direct on the capital without any intervening entablature or impost block. The term is also applied to the galleries, employed decoratively, on the façades of the Italian churches, and carried round the apses where they are known as eaves-galleries. Sometimes these arcades project from the wall sufficiently to allow of a passage behind, and sometimes they are built into and form part of the wall; in the latter case, they are known as blind or wall arcades; and they were constantly employed to decorate the lower part of the walls of the aisles and the choir-aisles in English churches. Externally, blind arcades are more often found in Italy and Sicily, but there are examples in England at Canterbury, Ely, Peterborough, Norwich, St John's (Chester), Colchester and elsewhere. Internally, the oldest example is that of the old refectory in Westminster Abbey (fig. 1). Sometimes the design is varied with interlacing arches as in St John's Devizes (fig. 2), and Beverley Minster (fig. 3). In Sicily and the south of Italy these interlacing arcades are the special characteristic of the Saracenic work there found, and their origin may be found in the interlaced arches of the Mosque of Cordova in Spain. In the cathedral of Palermo and at Monreale they are carried round the apses at the east end. At Caserta-Vecchia, in South Italy, they decorate the lantern over the crossing, and at Amain the turrets on the north-west campanile.
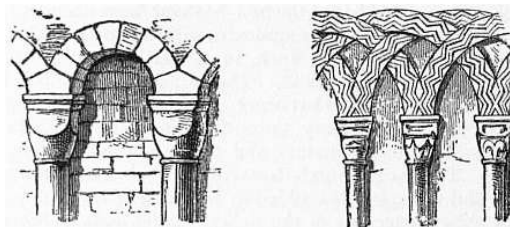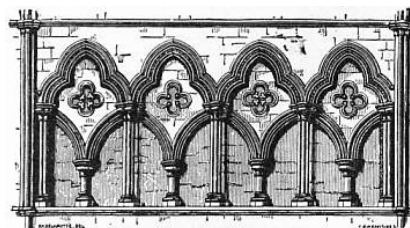
Fɪɢ. 1.—Arcade,
Westminster Abbey.

Fɪɢ. 2.—Arcade,
St John's, Devizes.

From Rickman's *Styles of Architecture*, by permission of Parker & Co.

Fɪɢ. 3.—Triforium at Beverley.

The term is also applied to the covered passages which form thoroughfares from one street to another, as in the Burlington Arcade, London; in Paris such an arcade is usually called *passage*, and in Italy *galleria*.

<div align="right">(R. P. S.)</div>

ARCADELT, or ARCHADELT, JACOB (*c.* 1514-*c.* 1556), a Netherlands composer, of the early part of the Golden Age. In 1539 he left a position at Florence to teach the choristers of St Peter's, Rome, and became one of the papal singers in 1540. He was a prolific church composer, but the works published in his Italian time consist entirely of madrigals, five books of which, published at Venice, probably gave a great stimulus to the beginnings of the Venetian school of composition. In 1555 he left Italy and entered the service of Cardinal Charles of Lorraine, duke of Guise, and after this published three volumes of masses, besides contributing motets to various collections. The *Ave Maria*, ascribed to him and transcribed as a pianoforte piece by Liszt, does not seem to be traced to an earlier source than its edition by Sir Henry Bishop, which has possibly the same kind of origin in Arcadelt as the hymn tune "Palestrina" has in the delicate and subtle *Gloria* of Palestrina's *Magnificat Quinti Toni*, the fifth in his first *Book of Magnificats*.

ARCADIA, a district of Greece, forming the central plateau of Peloponnesus. Shut off from the coast lands on all sides by mountain barriers, which rise in the northernpeaks of Erymanthus (mod. *Olonos*) to 7400, of Cyllene (Ziria) to 7900, in the southern corner buttresses of Parthenium and Lycaeum to more than 5000 ft., this inland plateau is again divided by numerous subsidiary ranges. In eastern or "locked" Arcadia these heights run in parallel courses intersected by cross-ridges, enclosing a series of upland plains whose waters have no egress save by underground channels or *zerethra*. The western country is more open, with isolated mountain-groups and winding valleys, where the Alpheus with its tributaries the Ladon and Erymanthus drains off in a complex river-system the overflow from all Arcadia. The ancient inhabitants were a nation of shepherds and huntsmen, worshipping Pan, Hermes and Artemis, primitive nature-deities. The difficulties of communication and especially the lack of a seaboard seriously hindered intercourse with the rest of Greece. Consequently the same population, whose origins Greek tradition removed back into the world's earliest days, held the land throughout historic times, without even an admixture of Dorian immigrants. Their customs and dialect persisted, the latter maintaining a peculiar resemblance to that of the equally conservative Cypriotes. Thus Arcadia lagged behind the general development of Greece, and its political importance was small owing to chronic feuds between the townships (notably between Mantineia and Tegea) and the readiness of its youth for mercenary service abroad.

The importance of Arcadia in Greek history was due to its position between Sparta and the Isthmus. Unable to force their way through Argolis, the Lacedaemonians early set themselves to secure the passage through the central plateau. The resistance of single cities, and the temporary union of the Arcadians during the second Messenian war, did not defer the complete subjugation of the land beyond the 6th century. In later times revolts were easily stirred up among individual cities, but a united national movement was rarely concerted. Most of these rebellions were easily quelled by Sparta, though in 469 and again in 420 the disaffected cities, backed by Argos, formed a dangerous coalition and came near to establishing their independence. A more whole-hearted attempt at union in 371 after the battle of Leuctra resulted in the formation of a political league out of an old religious synod, and the foundation of a federal capital in a commanding strategic position (see MEGALOPOLIS). But a severe defeat at the hands of Sparta in 368 (the "tearless battle") and the recrudescence of internal discord soon paralysed this movement. The new fortress of Megalopolis, instead of supplying a centre of national life, merely accentuated the mutual jealousy of the cities. During the Hellenistic age Megalopolis stood staunchly by Macedonia; the rest of Arcadia rebelled against Antipater (330, 323) and Antigonus Gonatas (266). Similarly the various cities were divided in their allegiance between the Achaean and the Aetolian leagues, with the result that Arcadia became the battleground of these confederacies, or fell a prey to Sparta and Macedonia. These conflicts seem to have worn out the land, which already in Roman times had fallen into decay. An influx of Slavonic settlers in the 8th century A.D. checked the depopulation for a while, but Arcadia suffered severely from the constant quarrels of its Frankish barons (1205-1460). The succeeding centuries of Turkish rule, combined with an Albanian immigration, raised the prosperity of the land, but in the Wars of Independence the strategic importance of Arcadia once more made it a centre of conflict. In modern times the population remains sparse, and pending the complete restoration of the water conduits the soil is unproductive. The modern department of Arcadia extends to the Gulf of Nauplia with a sea-coast of about 40 m.

AUTHORITIES.—Strabo pp. 388 sq.; Pausanias viii.; W.M. Leake, *Travels in the Morea* (London, 1830), chs. iii., iv., xi.-xviii., xxiii.-xxvi.; E. Curtius, *Peloponnesos* (Gotha, 1851), i. 153-178; H.F. Tozer, *Geography of Greece* (London, 1873), pp. 287-292; E.A. Freeman, *Federal Government* (ed. 1893, London), ch. iv. § 3; B.V. Head, *Historia Numorum* (Oxford, 1887), pp. 372-373; B. Niese in *Hermes* (1899), pp. 520 f.

<div align="right">(M. O. B. C.)</div>

ARCADIUS (378-408), Roman emperor, the elder son of Theodosius the Great, was created Augustus in 383, and succeeded his father in 395 along with his brother Honorius. The empire was divided between them, Honorius governing the two western prefectures (Gaul and Italy), Arcadius the two eastern (the Orient and Illyricum). Both were feeble, and, in Gibbon's phrase, slumbered on their thrones, leaving the government to others. Arcadius submitted at first to the guidance of the praetorian prefect Rufinus, and, after his murder (end of 395) by the troops, to the counsels of the eunuch Eutropius (executed end of 399). His consort Eudoxia (daughter of a Frank general, Bauto), a woman of strong will, exercised great influence over him; she died in 404. In the last year of his reign, Anthemius (praetorian prefect) was the chief adviser and support of the throne. The first years of the reign were marked by the ravaging of the Greek peninsula by the West Goths under Alaric (*q.v.*) in 395-396. The movement of the Goth Gainas (who held the post of master of soldiers) in 399-400 is less famous but was more dangerous. At that time there were two rival political parties at Constantinople, the "Roman" party led by Aurelian (son of Taurus), praetorian prefect, and supported by the empress and a Germanizing and Arianizing party led by Aurelian's brother (possibly Caesarius, praetorian prefect in 400). Gainas entered into a close league with the latter; fomented a Gothic rebellion in Phrygia; and forced the emperor to put Eutropius to death. For some months he and the party which he supported were supreme in Constantinople. He was, however, finally forced to leave, and having plundered for some time in Thrace was captured and killed by the loyal Goth Fravitta. The Roman party recovered its power; Aurelian was again praetorian prefect in 402; and the Germanization which was to befall the western world was averted from the

east. Another important question was decided in this reign, the relation of the patriarch of Constantinople to the emperor. The struggle between the court and the patriarch John Chrysostom (*q.v.*), who assumed an independent attitude and gravely offended the empress by his sermons against the worldliness and frivolity of the court, with open allusions to herself, resulted in his fall and exile (404). This virtually determined the subordination of the patriarch of Constantinople to the emperor. The rivalry of the see of Alexandria with Constantinople was also displayed in the contest, Theophilus, patriarch of Alexandria, assisting the court in bringing about the fall of Chrysostom. Throughout the reign of Arcadius there was estrangement and jealousy between the two brothers or their governments. The principal ground of this hostility was probably dissatisfaction on both sides with the territorial partition. The line had been drawn east of Dalmatia. The ministers of Arcadius desired to annex Dalmatia to his portion, while the general Stilicho, who was supreme in the west, wished to wrest from the eastern realm the prefecture of Illyricum or a considerable part of it. His designs were unsuccessful, and during the reign of Theodosius II., son of Arcadius (who died in 408), Dalmatia was transferred to the dominion of the eastern ruler.

AUTHORITIES.—Ancient: Fragments of Eunapius and Olympiodorus (in Müller's *Fragmenta Historicorum Graecorum*, vol. iv.); fragments of Philostorgius, Socrates, Sozomen, Zosimus, Synesius of Cyrene ("The Egyptian"), Claudian. Modern: Gibbon's *Decline and Fall*, vol. iii., ed. Bury; J.B. Bury, *Later Roman Empire*, vol. i. (1889); T. Hodgkin, *Italy and her Invaders*, vol. i. (ed. 2, 1892); Güldenpenning, *Geschichte des ostromischen Reiches unter den Kaisern Arcadius und Theodosius II.* (1885).

ARCADIUS, of Antioch, Greek grammarian, flourished in the 2nd century A.D. According to Suidas, he wrote treatises on orthography and syntax, and an onomaticon (vocabulary), described as a wonderful production. An epitome of the great work of Herodian on general prosody in twenty books, wrongly attributed to Arcadius, is probably the work of Theodosius of Alexandria or a grammarian named Aristodemus. This epitome (Περὶ Τόνων) only includes nineteen books of the original work; the twentieth is the work of a forger of the 16th century. Although meagre and carelessly put together, it is valuable, since it preserves the order of the original and thus affords a trustworthy foundation for its reconstruction.

Text by Barker, 1823; Schmidt, 1860; see also Galland, *De Arcadii qui fertur libra de accentibus* (1882).

ARCELLA (C.G. Ehrenberg), a genus of lobose Rhizopoda, characterized by a chitinous plano-convex shell, the circular aperture central on the flat ventral face, and more than one nucleus and contractile vacuole. It can develop vacuoles, or rather fine bubbles of carbonic acid gas in its cytoplasm, to float up to the surface of the water.

ARCESILAUS (316-241 B.C.), a Greek philosopher and founder of the New, or Middle, Academy (see ACADEMY, GREEK). Born at Pitane in Aeolis, he was trained by Autolycus, the mathematician, and later at Athens by Theophrastus and Crantor, by whom he was led to join the Academy. He subsequently became intimate with Polemon and Crates, whom he succeeded as head of the school. Diogenes Laërtius says that he died of excessive drinking, but the testimony of others (*e.g.* Cleanthes) and his own precepts discredit the story, and he is known to have been much respected by the Athenians. His doctrines, which must be gathered from the writings of others (Cicero, *Acad.* i. 12, iv. 24; *De Orat.* iii. 18; Diogenes Laërtius iv. 28; Sextus Empiricus, *Adv. Math.* vii. 150, *Pyrrh. Hyp.* i. 233), represent an attack on the Stoic φαντασία καταληπτική (*Criterion*) and are based on the sceptical element (see SCEPTICISM) which was latent in the later writings of Plato. He held that strength of intellectual conviction cannot be regarded as valid, inasmuch as it is characteristic equally of contradictory convictions. The uncertainty of sensible *data* applies equally to the conclusions of reason, and therefore man must be content with *probability* which is sufficient as a practical guide. "We know nothing, not even our ignorance"; therefore the wise man will be content with an agnostic attitude. He made use of the Socratic method of instruction and left no writings. His arguments were marked by incisive humour and fertility of ideas.

See R. Brodeisen, *De Arcesila philosopho* (1821); Aug. Geffers, *De Arcesila* (1842); Ritter and Preller, *Hist, philos. graec.* (1898); Ed. Zeller, *Phil. d. Griech.* (iii. 1448); and general works under SCEPTICISM.

ARCH, JOSEPH (1826-   ), English politician, founder of the National Agricultural Labourers' Union, was born at Barford, a village in Warwickshire, on the 10th of November 1826. His parents belonged to the labouring class. He inherited a strong sentiment of independence from his mother; and his objections to the social homage expected by those whom the catechism boldly styled his "betters" made him an "agitator." Having educated himself by unremitting exertions, and acquired fluency of speech as a Methodist local preacher, he founded in 1872 the National Agricultural Labourers' Union, of which he was president. A rise then came in the wages of agricultural labourers, but this had the unforeseen effect of destroying the union; for the labourers, deeming their object gained, ceased to "agitate." Mr Arch nevertheless retained sufficient popularity to be returned to parliament for north-west Norfolk in 1885; and although defeated next year owing to his advocacy of Irish Home Rule, he regained his seat in 1892, and held it in 1895, retiring in 1900. He was deservedly respected in the House of Commons; seldom has an agitator been so little of a demagogue.

A biography written by himself or under his direction, and edited by Lady Warwick (1898), tells the story of his career.

ARCH,[1] in building, a constructional arrangement of blocks of any hard material, so disposed on the lines of some curve
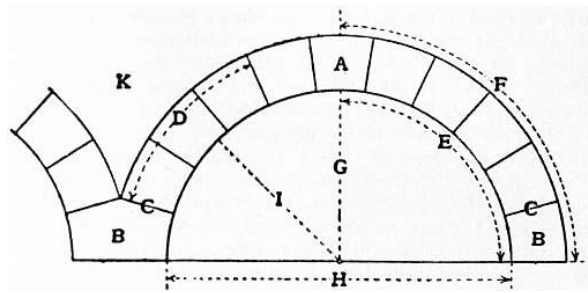
that they give mutual support one to the other.

Fig. 1.

The blocks, which are technically known as voussoirs, should be of a wedge shape, the centre or top block (see fig. 1, A) being the keystone A; the lower blocks B B which rest on the supporting pier are the springers, the upper surface of which is called the skewback, C C; the side blocks, as D, are termed the haunches. The lower surface or soffit of the arch is the intrados, E, and the upper surface the extrados, F. The rise of the arch is the distance from the springing to the soffit, G, the width between the springers is called the span, H, and the radius I. The triangular spaces between the arches are termed spandrils, K.

The arch is employed for two purposes:—(1) to span an opening in a wall and support the superstructure; (2) when continuous to form a vault known as a barrel or waggon vault.

The arch has been used from time immemorial by every nation, but owing to the tendency of the upper portion to sink, especially when bearing any superincumbent weight, it requires strong lateral support, and it is for this reason that in the earliest examples in unburnt brick at Nippur in Chaldaea, *c.* 4000 B.C., and at Rakakna (Requaqna) and Dendera in Egypt, 3500-3000 B.C., it was employed only below the level of the ground which served as an abutment on either side.

In the building of an arch, the voussoirs have to be temporarily supported, until the keystone is inserted. This at the present day is effected by means of centreing an assemblage of timbers framed together, with its upper surface of the same form as the arch required; the voussoirs are laid on the centreing till the ring of the arch is completed. In the case of arches of small span, such as the early examples referred to, limited to about 6 ft., such centreing might be dispensed with in various ways, but it is difficult to see how the arches of the great entrance gateways, shown in the Assyrian bas-reliefs, could have been built without temporary support of some kind. In those days, when any amount of labour could be obtained, even the erection of a temporary wall might have been less costly than the employment of timber, of which there was great scarcity.

The Assyrian tradition would seem to have descended first to the Parthian builders, who in the palace of El Hadr built semicircular arches with regular voussoirs decoratively treated. The Sassanians who followed them employed the elliptical or egg-shaped arch, of which the lower part was built in horizontal courses up to about one-third of the height, which lessened the span of the arched portion.

In Europe the earliest arches were those built by the Etruscans, either over canals (see article ARCHITECTURE: *Etruscan*), or in the entrance gateways of their towns. The skew-arch in the gateway at Perugia shows great knowledge in its execution. From the Etruscans the adoption of the arch passed to the Romans, who certainly employed centreing of some kind, but always economized its use, as is clearly shown by Choisy. Although their walls from the Augustan age were built in concrete, arches of brick were always turned over their entrance doorways, sometimes in two or three rings. The Romans utilized the arch in other ways, sometimes burying it in their concrete construction, as in their vaults, and sometimes introducing it as a veneer only, as in the Pantheon. In their monumental structures in stone, the arch was sometimes built with regular voussoirs, *i.e.* with a semicircular extrados, and sometimes with the joint carried far beyond. The latter was not done in the early examples of the Tabularium and the Theatre of Marcellus, but in the Colosseum and all the arches of triumph the joints run through the spandrils, notwithstanding the recognition of the arch proper by its moulded archivolt.

Although the value of the pointed arch as a stronger constructional feature than the semicircular (owing to the tendency to sink in the keystone of the latter) had been recognized by the Assyrian builders, who employed it in their drains, it was not used systematically as an architectural feature till the 9th century, in the mosque of Tulun at Cairo; it seems to have been regarded by the Mahommedans as an emblem of their faith, and its use spread through Syria to Persia, was brought to Sicily from Egypt, and was taken back by the Sicilian masons to Palestine and employed throughout the Crusaders' churches during the 12th century. As the pointed arch had already, for constructional reasons, been employed in Périgord from the commencement of the 11th century, it does not follow that the Crusaders brought it from Palestine, but there is no doubt that its universal employment in France early in the 12th century may have been partly due to its adoption in the Crusaders' churches. At first in Gothic work both the semicircular and pointed arches were used simultaneously in the same building, the larger arches being pointed, the smaller ones and windows being semicircular. The great value of the pointed arch in vaulting is described in the article VAULT.

We have suggested that the pointed arch became an emblem of Mahommedan faith, and it was introduced in India but not as a constructive feature, for the Hindus objected to the arch, which they say *never sleeps*, meaning that it is always exerting a thrust which tends to its destruction. In India therefore it was built in horizontal courses with vertical slabs leaning against one another to form the apex. The Moors of north Africa, however, never employed it, preferring the horseshoe arch which they brought into Spain and developed in the mosque of Cordova. In the additions made to this mosque the prayer chamber was enriched by the caliph Mansur, who, to eke out the height, raised arch upon arch. In the Alhambra it appears in the decorative plaster work, and travels northwards into the south of France, where at Le Puy and elsewhere it is found decorating doorways and windows; in England it was employed towards the end of the 12th century.

About the middle of the 14th century at Gloucester the four-centred pointed arch was introduced, which became afterwards the leading characteristic feature of the Tudor style. In France they adopted the three-centred arch in the 15th century.

The ogee arch was the natural result of the development of tracery in the commencement of the 14th century, and in Gloucester (about 1310) the foliations were run one into the other without the enclosing circles. About the middle of the 14th century, in the arcade of the first storey of the ducal palace in Venice, flowing tracery is found, from which the ogee arch there was probably derived, as throughout Venice it becomes the favourite feature in domestic architecture of that and the succeeding century.
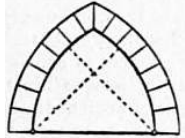
The arches are of various forms as follows:—

        2. Semicircular arch, the centre of which is in the same line
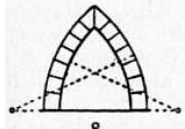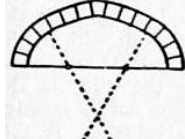   with its springers.
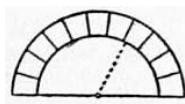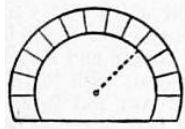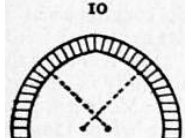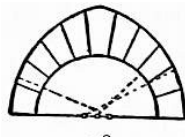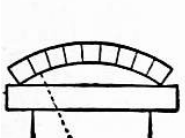
3. Segmental arch, where the centre is below the springing.
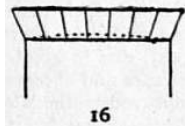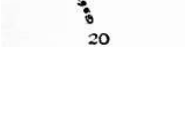
4. Horseshoe arch, with the centre above the springing; employed in Moorish architecture.

5. Stilted arches, where the centre is below the springing, but the sides are carried down vertically.

6. Equilateral pointed arches, described from two centres, the radius being the whole width of the arch.

7. Drop arches, with centres within the arch.

8. Lancet arches, with centres outside the arch.

9. Three centre arches, employed in French Flamboyant.

10. Four centre arches, employed in the Perpendicular and Tudor periods.

11. Ogee arches, with curves of counter flexure, found in English Decorated and French Flamboyant.

12. Pointed horseshoe arches, found in the mosque of Tulun, Cairo, 9th century.

13. Pointed foiled arches, in the arcades of Beverley Minster (*c.* 1230) and Netley Abbey.

14. Cusped arch; Christchurch Priory, Hants.

15. Multifoil cusped arch, invented by the Moors at Cordova in the 10th century.

16. Flat arch, where the soffit is horizontal and sometimes slightly cambered (dotted line).

17. Upright elliptical arch, sometimes called the egg-shaped arch, employed in Egyptian and Sassanian architecture.

18. The Tuscan arch, where the extrados takes the form of a pointed arch.

19. The joggled arch used in medieval chimneypieces and in Mahommedan architecture.

20. The discharging or relieving arch, built above the architrave or lintel to take off the weight of the superstructure.

21. The relieving arch as used in Egypt, in the pyramid of Cheops; and in Saxon architecture, where it was built with Roman bricks or tiles, or consisted of two sloping slabs of stone.
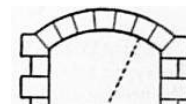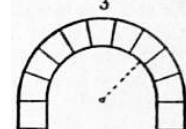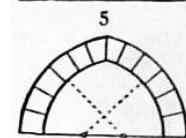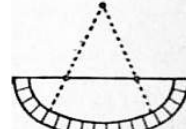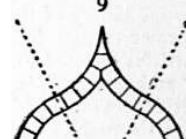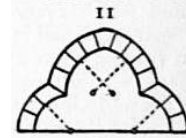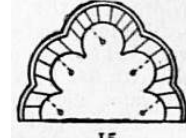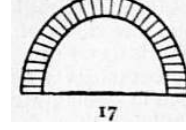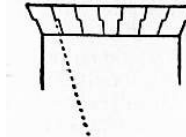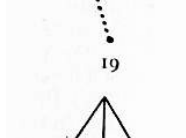
(R. P. S.)

[1] The ultimate derivation of "arch" is the Latin *arcus*, a bow, or arch, in origin meaning something bent, from which through the French is also derived "arc," a curve. In French there are two words *arche*, one meaning a chest or coffer, from Latin *arca* (*arcere*, to keep close), hence the English "ark"; the other meaning a vaulted arch, such as that of a bridge, and derived from a Low Latin corruption of *arcus*, into arca (du Cange, *Glossarium, s.v.*). The word "arch," prefixed to names of offices, seen in "archbishop," "archdeacon," "archduke," &c., means "principal" or "chief," and comes from the Greek prefix ἀρχ- or ἀρχι- from ἄρχειν, to begin, lead, or rule; it is also prefixed to other words, and usually with words implying hatred or detestation, such as "arch-fiend", "arch-scoundrel"; it is from an adaptation of this use, as seen in such expressions as "arch-rogue," extended to "arch-look," "arch-face," that the word comes to mean a mischievous, roguish expression of face or demeanour.

ARCHAEOLOGY (from Gr. ἀρχαῖα, ancient things, and λόγος, theory or science), a general term for the study of antiquities. The precise application of the term has varied from time to time with the progress of knowledge, according to the character of the subjects investigated and the purpose for which they were studied. At one time it was thought improper to use it in relation to any but the artistic remains of Greece and Rome, *i.e.* the so-called *classical archaeology*

(now dealt with in this encyclopaedia under the headings of GREEK ART and ROMAN ART); but of late years it has commonly been accepted as including the whole range of ancient human activity, from the first traceable appearance of man on the earth to the middle ages. It may thus be conceived how vast a field archaeology embraces, and how intimately it is connected with the sciences of geology (*q.v.*) and anthropology (*q.v.*), while it naturally includes within its borders the consideration of all the civilizations of ancient times.

In dealing with so vast a subject, it becomes necessary to distinguish. The archaeology of zoological species constitutes the sphere of palaeontology (*q.v.*), while that of botanical species is dealt with as palaeobotany (*q.v.*); and every different science thus has its archaeological side. For practical purposes it is now convenient to separate the sphere of archaeology in its relation to the study of the purely *artistic* character of ancient remains, from that of the investigation of these remains as an instrument for arriving at conclusions as to the political and social *history* of the nations of antiquity; and in this work the former is regarded primarily as "art" and dealt with in the articles devoted to the history of art or the separate arts, while "archaeology" is particularly regarded as the study of the evidences for the history of mankind, whether or not the remains are themselves artistically and aesthetically valuable. In this sense a knowledge of the archaeology is part of the materials from which every historical article in this encyclopaedia is constructed, and in recent years no subject has been more fertile in yielding information than "archaeology," as representing the work of trained excavators and students of antiquity in all parts of the world, but notably in the countries round the Mediterranean. It is for its services in illuminating the days before those of documentary history and for checking and reinforcing the evidence of the raw material (the "unwritten history" of architecture, tombs, art-products, &c.), that recent archaeological work has been so notable. The work of the literary critic and historian has been amplified by the spade-work of the expert excavator and explorer to an extent undreamt of by former generations; and ancient remains, instead of being treated merely as interesting objects of art, have been forced to give up their secret to the historian, as evidence for the period, character and affiliations of the peoples who produced and used them. The increase of precise knowledge of the past, due to greater opportunities of topographical research, more care and observation in dealing with ancient remains and improved methods of studying them in museums (*q.v.*) and collections, has led to more accurate reading of results by a comparison of views, under the auspices of learned societies and institutions, thus raising archaeology from among the more empirical branches of learning into the region of the more exact sciences. This change has improved not only the status of archaeology but also its material, for the higher standard of work now demanded necessarily acts as a deterrent on the poorly equipped worker, and the tendency is for the general result to be of a higher quality.

The archaeological details concerning all subjects which have their "unwritten history" are dealt with in the separate articles in this work, including the ancient civilizations of Assyria, Egypt and other countries and peoples, while the articles on separate sites where excavations have been particularly noteworthy may be referred to for their special interest; see also ANTHROPOLOGY; ETHNOLOGY, &c. It remains here to deal generally with the early conditions of the prehistoric ancient world in their broader aspects, which constitute the starting-place for the archaeologist in various parts of the world at different times, and the foundations of our present understanding of the primitive epochs in the history of man.

The beginning of archaeology, as the study of pre-documentary history, may be broadly held to follow on the last of the geological periods, viz., the Quaternary, though it is claimed, and with some reason, that traces of man have been found in

Quaternary period. deposits of the preceding or Tertiary period. Although there is no valid reason against the existence of Tertiary man, it must be confessed that the evidence in favour of the belief is of a very inconclusive and unconvincing kind. The discussion has been mainly confined to the two questions (1) whether the deposit containing the relics was without doubt of Tertiary times, and (2) whether the objects found showed undoubted signs of human workmanship. Vast quantities of material have been brought forward, and endless discussions have taken place, but hitherto without carrying entire conviction to the minds of the more serious and cautious students of prehistoric archaeology. A chronic difficulty, and one which can never be entirely removed, is our ignorance of the precise methods of nature's working. It is an obvious fact, that natural forces, such as glacial action, earthquakes, landslips and the like, must crush and chip flints and break up animal remains, grinding and scratching them in masses of gravel or sand. If it were possible to determine with precision what' were the peculiarities of the flint or bone, thus altered by natural agencies, it would be easy to separate them from others purposely made by man to serve some useful end. Our present knowledge, however, does not allow us to go so far in dealing with the ruder early attempts of man to fabricate weapons or implements. Even the one feature that is commonly held to determine human agency, the "bulb of percussion," cannot be considered satisfactory, without collateral evidence of some kind. Flint breaks with what is called a conchoidal fracture, as do many other substances, such as glass. Thus on the face of a flint flake, at the end where the blow was delivered to detach it from the nodule, is seen a lump or bulb, which is usually regarded as evidence of human workmanship. To produce such a bulb it is necessary to deliver a somewhat heavy blow of a peculiar kind at a particular point of a flattened surface; and the operation requires a certain amount of practice. The fulfilment of all the necessary conditions might well be a rare occurrence in nature, and the bulb of percussion has come to be regarded as the hall-mark of human manufacture; but recent investigations have shown that the intervention of man is not necessary and that natural forces frequently produce a similar result. When, therefore, it is a question whether or no a group of rude flints are of human workmanship, evidence of design or purpose in their forms must be established. If this be found, and in addition if a number of flints, all having this character of design, be found together, then and then only is it safe to admit them into the domain of archaeology. There can be no doubt that much time and energy have been wasted, and a number of intelligent workers have been fruitlessly occupied in following up archaeological will-o'-the-wisps, through neglecting this elementary precaution.

Whether or no man produced flint implements before Quaternary times, it would seem to be a necessity that he should

Eolithic. have passed through an earlier stage, before arriving at the precision of workmanship and the fixed types found in the old Stone Age deposits known as palaeolithic. It is now claimed that this earlier and ruder stage has actually been discovered in what are known as the Plateau-gravels of Kent, in Belgium, and even in Egypt, and the name of eolithic (ἠώς, dawn, λίθος, stone) has been bestowed upon them. The controversy as to the human character has been very keen, some alleging that the fractured edges and even the definite and fairly constant types are entirely produced by natural forces. Sir Joseph Prestwich in England, and Alfred Rutot in Belgium, the latter arguing from his own discoveries in that country, have strongly supported the artificial character of the relics. On the other hand it is pointed out that the existence of these implements on the high levels of Kent furnished confirmation of Sir Joseph Prestwich's theory of the submergence of the district, and that his support was thus somewhat biassed, while the geological conditions in Belgium are not quite comparable with those of the Kent plateau; and the Belgian evidence, whatever it may be worth in itself, is of no avail as corroboration of the Kentish case. It is to be regretted that the conditions are not more convincing, for, as stated above, they agree fairly well with the evolution theory of man's handiwork, and if they could be accepted, would carry back the evidences to a more remote time when the physical features of Kent were of a very different character. The critics of eoliths have brought forward some facts that at first sight would seem to be of a very damaging nature. It was observed that in the process of cement manufacture the flints that had passed through a rotary machine in which they were violently struck by its teeth or knocked against each other, possessed just those features that were claimed as indisputable proof of man's handiwork, and that even the forms were the same. These statements have, of course, been met by counter-statements equally forcible, and the matter may still be considered to be in suspense. The great struggle, therefore, is now more closely restricted to the nature of the chipping than as to the quasi-geological question, and if the solution is ever to be found, it will be by means of a closer examination and a better understanding of the difference between intentional and accidental flaking.

On reaching the Palaeolithic period we come to firmer ground and to evidence that is more certain and generally accepted. This evidence is fundamentally geological, inasmuch as the age of the archaeological remains is dependent upon that of the beds in which they are found. That they were deposited at the same time is now no longer questioned. The flints are found to have the same colour and surface characteristics as the unworked nodules among which they lie, and are generally rolled and abraded in the same way. This in itself suffices to show that the worked and unworked flints were deposited in their present stratigraphical position at the same time. The remote age of the beds themselves is demonstrated by the presence of bones of animals either now extinct or found only in far distant latitudes, such as the mammoth, reindeer, rhinoceros, &c., and in some cases these bones are found in such relative positions as to prove they were deposited with the flesh still adhering to them, and also that the animal was contemporary with the makers of the flint implements. Evidence of a somewhat different kind is provided for the palaeolithic period by certain caverns that have been discovered in England and on the continent. In these limestone caves palaeolithic man has lived, slept, eaten his food and made his tools and weapons. Much of his handiwork has been left, with the bones of animals on which he lived, scattered upon the floor of the cave, and has been sealed up by the infiltration of lime-charged water, so that the deposit remains, untouched to our own day, below an impermeable bed of stalagmite. In such circumstances there can be no doubt of the contemporaneous character of the remains, natural or artificial, if found on the same level. Moreover, so far as type is a criterion of age, the flint tools found in the cave deposits tend to confirm the date assigned to those of the river-gravels.

Palaeolithic.

It is fairly certain that about the middle of the Tertiary period the northern hemisphere possessed a temperate climate, such that even the polar regions were habitable. But the physical aspect of northern Europe was very different from that of Quaternary times. North of a line drawn roughly from southern England to St Petersburg all was sea. It was during the latter half of the Tertiary period that the continent assumed its present general form, though even in Pleistocene (Quaternary) times England and Ireland formed part of it. The great change of climate from temperate to arctic conditions during the latter half of the Tertiary period has been interpreted in various ways, no one of which is yet universally accepted. There can be little doubt, however, that no single cause was responsible for so complete a change. There may have been some alteration in the relative positions of the earth and the sun, which would conceivably have produced it; but what is practically certain is that the physical geography of northern Europe was affected by considerable difference in level, and it is clear that the raising of mountain ranges and the general elevation of the continent must necessarily have reacted on the climatic conditions. If in the later Tertiary time we find that the Alps, the Carpathians and the Caucasus have come into existence, it is not surprising to find that these huge condensers have brought about a humid condition of the continent to such an extent that this phase has been called the Pluvial Age. The humidity, however, was in some ways only a secondary result of the protrusion of high mountain ranges. The primary cause of the physical conditions that we now find in the valleys and plains was the formation of glaciers. These rivers of ice descending far into the lower levels during the winter months, melted during the summer, causing enormous volumes of water to rush through the valleys and over the plains, carrying with it masses of mud and boulders which were left stranded sometimes at immense distances. The intensity and force of the rivers thus formed would depend upon two factors, first the extent of the watershed, and secondly, the height of the mountains from which the water was derived. The result of increasing cold was that in course of time the northern hemisphere was surmounted by a cap of ice, of immense thickness (about 6000 ft.) in the Scandinavian area and gradually becoming thinner towards the south, but at no time does it seem to have extended quite to the south of England. This is proved by the absence of boulder-clay (glacial mud) in the districts south of London. These arctic conditions were not, however, continuous, but alternated with periods of a much less rigorous temperature during what has been called the Ice Age. Remains both of mammals and plants have been found, under conditions that are held to prove this alternation.

Such being the natural forces at work remodelling the surface of the earth; forces of such gigantic power as to be almost inconceivable in these more placid times, it can easily be understood how, in the course of the many thousands of years before the Quaternary period, when the surface of the globe attained its present aspect, the powerful river-systems of Europe wore their beds deep into the solid rocks. In some cases in Europe the erosive power of the river has worn through its bed to such an extent that the present stream is some hundreds of feet lower than its forerunner in palaeolithic times. From various causes, however, the rivers did not always wear for themselves a deep channel, but spread themselves over a wide area. This seems to have been the case with the Thames near London: the river-bed is not of any great depth, but at various periods it has occupied the space between Clapton on the north-east and Clapham on the south-west. It must not be assumed that the whole of this area of 7 m. or more was filled by the river at any one time, but rather that during the course of the palaeolithic period the river had its bed somewhere between these two limits. For instance, it is probable that at one period the bank of the Thames was at a point nearly midway between the northern and southern limits, where Gray's Inn Road now stands. It was here that the earliest recorded palaeolithic implement (now in the British Museum) was found towards the close of the 17th century in association with mammoth bones. But it is safe to say that the Thames was a very much wider and more imposing river in palaeolithic times than it is now, when its average width at London is under 300 yds. As, in the course of ages, it changed its bed and by degrees lessened in size and volume, it would leave, on the terraces formed on its banks, the deposits of brick-earth and gravel brought down by the stream, and it is on these terraces that the relics of palaeolithic man are found, sometimes in great quantities. It will be obvious from the nature of the case that the highest terraces, and those farthest apart, should contain the earliest implements; but it is by no means easy in the present state of the land surface and with our present knowledge, to place the remains in their relative sequence. More accurate observation, and a better understanding of the conditions under which these deposits were made, should solve many such problems. Much light has been thrown upon many points by Worthington Smith, who has excavated with great care two palaeolithic floors at Clapton and at Caddington near Dunstable. The latter discovery was of quite exceptional interest as confirming the geological evidence by that of archaeology. In this case the original level at which palaeolithic man had worked was clearly defined, and was prolific of dark-grey implements, which had evidently been made on the spot, as Smith found that many of the flakes could be replaced on the blocks or cores from which they had been struck by palaeolithic man; there were also the flint hammers that had been used in the operation. Above the floor was a layer of brick-earth, again covered by contorted drift, in which also implements occurred, but of a very different kind from those found below. In place of being sharp and unabraded, and with the refuse flakes accompanying them, they were rolled and disfigured, of an ochreous tint, and evidently had been transported in the drift from a much higher level now no longer existing, as the site where they occurred is the highest in the vicinity, about 500-600 ft. above sea-level. Here then we have a clear case of palaeolithic man being compelled to abandon his working place on the lower level by the descent of the waters containing the products of his own forerunners, probably then very remote. In this case the sequence of the various strata may be considered certain, and the remains thus accurately determined and correlated are naturally of extreme value and importance. But even this does not enable us to diagnose another discovery unless the internal evidence is equally clear and conclusive. One point of importance that may be noted is that the older abraded implements were mostly of the usual drift type, while the more recent ones from the "floor" contained forms more highly developed and elaborated, such as occur in the French caves. Explorations of this kind, carefully conducted in a strictly scientific spirit by men of training and intelligence, are the only means by which real progress will be made in this puzzling branch of archaeology.

Although many problems yet remain to be solved in England, its small area, and the relatively large number of workers, have together sufficed to put the main facts of the earlier stages of man's existence on a fairly satisfactory basis. In France, owing to the richness of the results, a great number of trained and ardent workers have made equal, if not better, progress. But unfortunately the real scientific spirit is not invariably found. Not so long ago an apparently serious writer in a well-

known scientific magazine gave a detailed account of his studies in primitive methods and explained at great length his attempts at the manufacture of flint and stone implements. He found by the processes he adopted that it was much more easy for him to produce a polished implement than one merely flaked. From this fact he seriously argued that a great mistake had been made in the relative ages of the neolithic and palaeolithic periods, and that the former must necessarily be the older of the two. The evidence of geological position and of the mammalian remains accompanying the obviously older flints was entirely disregarded, just as on the other hand it was forgotten that in regard to neolithic remains the proofs were in every way in favour of a relatively modern origin. Such attempts not only bring the serious study of early man into disrepute, but tend to retard the progress of real knowledge and are therefore to be deplored and when possible discouraged.

Caves (*q.v.*) have been at all periods regarded as something uncanny and mysterious, with perhaps a tinge of the supernatural. In classical times they were associated with semi-divine beings, with oracles, and even with the gods themselves, while half the legends of dwarfs and gnomes that run through the folk-lore of medieval and modern Europe are associated with caves. They have been used as shelters or habitations at all times, and *Cave Period.* in examining them it is fully as necessary to sift the evidence of age as it would be in dealing with the river-gravels. Their exploration in the first instance may well have been due to chance, but it is fairly certain that during the 16th century the search for the horn of the unicorn as an antidote to disease, was responsible for the opening up of a certain number. Among the finds were no doubt the fossil bones of Quaternary animals to which mythical names and imaginary properties were attached, and the popular belief in such amulets naturally gave a great impetus to the search. It is, however, only a little more than a century ago that these investigations took anything like a scientific turn, and even then they had only a palaeontological end in view. The idea that archaeology entered into the matter was not at all realized for some years. The remains of many extinct or migrated animals, such as the hyena, grizzly bear, reindeer and bison, were found in quantities in the now famous cave at Gailenreuth in Franconia; and later, William Buckland explored the equally well-known hyena-cave at Kirkdale in Yorkshire, where he demonstrated that these animals had lived on the spot, feeding on the mammoth, rhinoceros and other creatures that had been their prey. The remains of man, however, had not been found, nor were they even looked for. It was not until Kent's cavern, near Torquay, was examined by the Rev. J. McEnery, that man was clearly proved to have been contemporary with these extinct beasts. So contrary was this contention to the ideas prevalent in the second quarter of the 19th century, that the pioneer in this work had died (in 1841) before the immense importance of his discovery was admitted. To Godwin Austen in the first place and to W. Pengelley in the second, with the aid of the British Association, was due the vindication of McEnery's veracity and accuracy.

Several circumstances conspire to give a special interest to Kent's cavern, and not the least is the fact that the age and appearance of the various strata indicate that it has been the home or the refuge of human beings at all ages even up to medieval times, and perhaps from a period even more remote than is the case elsewhere. In the black mould that formed the uppermost layer were found fragments of medieval pottery, and relatively in close proximity were ancient British and Roman remains as well as relics of the earliest days of metallurgy, in the shape of bronze fragments. The two thousand years or more that may have separated the oldest from the most modern of these later products, is as nothing in comparison with the immense intervals that lie between the earliest of them and the infinitely more remote period when gigantic mammals first inhabited the cave. Attempts have been made from time to time to express in years what the interval must have been: but as the computations have differed by hundreds of thousands of years, according to the method adopted, it is scarcely wise to do more than speculate. Beneath the black mould, containing what may be called the recent remains, was a layer of stalagmite, some feet in thickness; and under this at one place was a great quantity of charcoal, which has been with good reason assumed to show the site of fireplaces. A quantity of implements of palaeolithic type was found, but the main layer at this level consisted of a reddish clay known as cave-earth, and in this deposit were implements both of flint and horn, as well as bones of extinct animals. The flint implements were mostly of the usual river-drift type, but some were of types generally confined to cave-deposits of this period; while the barbed harpoon heads, and more especially a bone needle, were definitely of the cave class, so well represented in the caves of Dordogne. Again, below the cave-earth was a *breccia* formed of limestone and sandstone pebbles cemented together by a calcareous paste. In this also were found implements and bones of bears.

The succession of strata indicated above may be taken as typical of the caverns used by palaeolithic man, the breccia and stalagmite flooring being in themselves proof of a very considerable age, while the association in the former, or under the latter, of remains of human handiwork, with bones of extinct animals, may be safely taken to show contemporaneous existence.

Once the mind has fairly grasped the fact that man was living at so remote a time, it is a simple and natural conclusion that he should have provided himself with weapons and tools more or less rudely fashioned from the stones he found ready to his hand. The analogy of the recently extinct Tasmanian is sufficient to show that even the meanest savage is not without such aids. But the caves of France, of the same palaeolithic period, and used by men theoretically in the same stage of culture, bring before us a race of artists of first-rate capacity, who for accuracy of observation, and for skill in indicating the character and peculiarities of the animals around them, have never been surpassed. Such a statement sounds like a contradiction in terms. We are dealing with human beings whose intellect, to judge by their physical characters, should be on a level with that of the Fuegian or the Australian black, and far below that of the Maori or the Sandwich Islander. Yet none of these gentle and relatively cultured brown races produced anything in the nature of art that can in any sense be compared with the masterly drawings or sculptures of the cave-men of France. The best-known of the engravings, that of the mammoth on a piece of ivory, is in the Jardin des Plantes in Paris. It is evidently intended to be nothing more than a sketch, the lines of the finely curved tusks being repeated several times in the desire for accuracy. But the heavy lumbering walk of the ponderous beast, his attitude, and even the character of the hairy hide, are all shown or suggested with a skill and freedom that not only denotes daily familiarity with the thing represented, but a most complete mastery of the art of translating the idea into simple line. This mammoth-drawing is probably the most important and monumental of its class, but there are many others that possess artistic qualities not less remarkable, while they have in addition a grace and beauty of line not less astonishing. One of these, in the British Museum, the head of an ibex-like creature, is outlined with a decision and refinement that can scarcely be surpassed, and many other sketches in horn or stone in the same collection show a keen appreciation of the characteristic features of the different animals as well as a masterly deftness in the handling of the graving-tool. If we are forced to marvel at the graphic skill of the cave-men, their sculptures in the round are on a still higher plane, as may be seen in the figures of reindeer in ivory in the British Museum. While they are not highly finished, they show a complete understanding of the animal's peculiar forms and contours, which are rendered in a direct, unhesitating way that should betoken a long period of artistic training and an executive power uncommon at any time. These drawings and sculptures have always been appreciated and even regarded as being of a much more advanced style than was to be expected among men who are always classed in the lower grades of culture. But enough stress has not hitherto been laid on the artistic quality of the work, which would be considered fine at any time in the world's history. This high artistic level was attained by a race of men whom we cannot credit with any great intellectual equipment; men, moreover, who were engaged in a daily struggle for the barest necessaries of life, in a trying climate and surrounded by a fauna whose means of attack and defence were infinitely superior to their own. There are many astonishing problems in archaeology, but none so badly in need of solution. Had the discovery been confined to a single drawing or even to a single site, fraud or a misreading of the conditions might have been alleged, but the case is very different. The drawings and sculptures have been found generally enough in France to demonstrate that such artistic power was fairly common, while the question of the authenticity and period of the discoveries has long since been satisfactorily settled. It is true that the

climatic conditions in pleistocene France were more favourable to man than was the case farther north, but even an agreeable climate does not necessarily produce an artistic race; if it were so, the Polynesians would probably be the greatest artists the world has ever seen. The physical remains of palaeolithic man, even when found under unquestionable conditions, are, however, so scanty, that it is unlikely that the important question of the race or races inhabiting central and northern Europe will ever be settled by their means. The evidence at present is in favour of two very different types, one dwarfish and brutal (Canstadt), the other more advanced and noble in physical character (Cro-Magnon). To the latter were due the artistic productions, and until further physical evidence is forthcoming recourse must be had to the most minute examination of the objects themselves and to accurate observation of the conditions under which they are found. So far as our present materials go, these are the only means by which more light may be thrown on the many problems of early man.

In spite of the unquestioned and unquestionable character of palaeolithic discoveries in general, it must not be assumed that there has been an absence of falsification, forgery, and what the French call "mystification"; on the contrary, such attempts to meet the demand have been common enough. Apart from Edward Simpson, who was notorious as "Flint Jack" in the middle of the 19th century, many others, both in England and on the continent of Europe, have devoted themselves to this peculiar industry. Boucher de Perthes tried to conquer the scepticism of some of his friends who doubted the human origin of the Abbeville flints, by unwisely offering his workmen a reward for the discovery of human bones in the same beds. The Moulin Quignon jaw was accordingly produced, and became the subject of much controversy; but the evidence finally showed that it had originally come from elsewhere. The cave drawings also have found their imitators in modern times. One Meillet, a man of education, took a special pleasure in the production of spurious examples, and even published an account of his pretended discoveries. But here, as in all the attempts at imitation of the cave drawings, the modern efforts were betrayed by their poor artistic quality, and a comparison of the new discoveries with the old was generally enough to disclose the forgery. Two drawings on bone of a wolf and a bear, declared to have been found in a cave at Thayingen in Switzerland, were afterwards shown to have been copied from a child's picture-book. In Switzerland also a brisk trade was carried on some years ago in false antiquities said to come from the Lake-dwellings; and fantastic types of tools and implements were placed on the market. In Italy, too, a lively discussion has taken place of late years over the authenticity of curiously shaped flint implements from the neighbourhood of Verona; while America has provided similar food for discussion in the well-known Lenapé stone and the Calaveras skull. The former bears drawings of the French cave type, while the latter if genuine would carry back the story of man in the American continent before Pliocene times.

An apparent break in the continuity of man's history in Europe occurs at the end of the palaeolithic period. Attempts have been made to bridge the gap by means of a "mesolithic" period (μέσος, middle); but it would not seem probable that the missing links will occur at all events so far north as Britain. We leave palaeolithic man in a cold climate, surrounded by a somewhat mixed fauna that formed his prey. We know him as a hunter and artist, but the remains show that he had no knowledge of pottery till towards the close of the period. Among the humbler arts he practised at least sewing, and lived in caves or took shelter at the base of overhanging rocks; but like the Australian, he frequently camped in the open. His successor of the later Stone Age (neolithic) we find to be a very different character and with very different surroundings. The configuration of the land in which he lived is practically the same as we now see it. The severe arctic conditions with the appropriate fauna had entirely disappeared, and the introduction of new arts must have radically changed his daily life. The most important of these are the training of domestic animals, agriculture, and the development of pottery. What were the burial rites of palaeolithic man we have at present no means of knowing, but for his neolithic successor we know that these were matters of great moment. The abundance of arrowheads of flint indicate the common use of the bow and arrow as a weapon, while the art of weaving marks an immense stride in the direction of comfort and civilization. Of the form and construction of his dwelling we have only a limited knowledge, derived with some uncertainty from the analogy of the dwellings for the dead (barrows) and more certainly from the remains of the villages found erected on piles on the shores of lakes.

Mesolithic.

A much-debated question arises here that cannot be passed over. The changes just mentioned are not such as would be produced by internal causes alone. Much of the evidence is in favour of neolithic man being an immigrant, coming into northern and central Europe long after palaeolithic man and his characteristic fauna had disappeared. Where did the earlier race go and who are its modern representatives, if any? The answers to this question are many. W. Boyd Dawkins is of opinion that the reindeer was followed by man in its journey to the north after the retreating glaciers, and that the modern representative of palaeolithic man is the Eskimo. His arguments are ingenious but unconvincing; they mainly consist in the similarity of the habits of both races in using harpoons and implements of similar form and make, their power of carving and drawing on bone, the absence of pottery, disregard of the dead, &c. As to the positive evidence, it is almost enough to say that the Eskimo, like the cave-men, used the material nearest to hand that served their purpose, and that nothing is more remarkable than the similarity of primitive weapons used by widely separated peoples; while the negative evidence as to the absence of pottery is of little value; their conditions of life would allow them neither to make it nor keep it. Till recently we had no evidence at all of the treatment of the dead by palaeolithic man, but this is no longer the case; the discoveries in the Grottes de Grimaldi, Monaco, show several methods of burial, near a hearth, or in rude stone cists (see Dr Verneau in *L'Anthropologie*, xvii. 291). A stronger argument would be furnished if it could be shown that by his physical character the Eskimo is an intruder in his present home, and is unrelated to his neighbours. But this has not yet been done, and the skulls of the Eskimo do not resemble any of those hitherto found in the caves. In fact, what evidence there is on the subject is rather against than in favour of the wanderings northward of the inhabitants of the caves. There are indications, on the other hand, that in the south of France, in the Pyrenees, the reindeer was in existence, with man, at a later period than that of the caves, while the type of skull is that of Cro-Magnon. Here, therefore, it may be that something like a bridging of the gap between palaeolithic and neolithic times may be forthcoming. But it still remains to be found, and for the present we must be content with uncertainty.

The neolithic period has often been loosely called the age of polished stone, from the fact that in no case has a polished or ground stone implement been found in a palaeolithic deposit. The term is not only loose but inaccurate. In the first place, there is no reason why the cave-men should not be found to have polished a stone implement on occasion, for they habitually polished their weapons of bone. Secondly, neolithic man was by no means uniform in his methods; he polished or ground the surfaces of such tools or weapons as would be improved by the process; but to take a common instance, he found that the efficacy of his arrow-point was sufficient when chipped only, and polishing is only occasionally found, as in Ireland. Many other implements also are found in neolithic times with no trace of grinding and yet with every appearance of being complete.
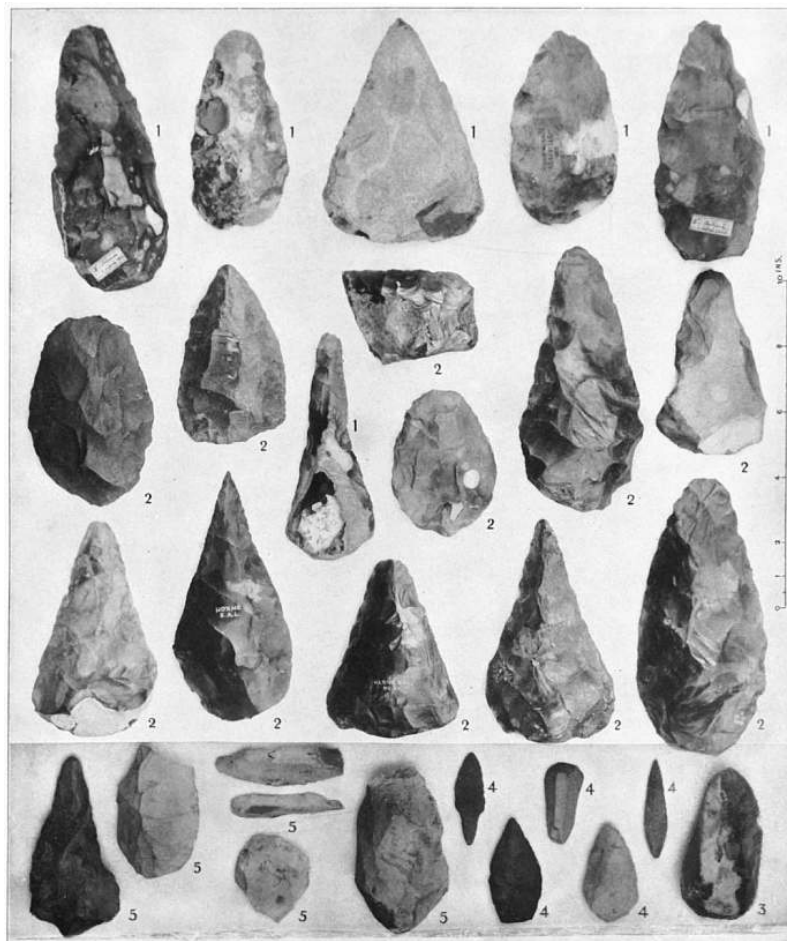
Neolithic.

The most trustworthy evidence with regard to this and the succeeding archaeological periods is to be found in the grave-mounds. For the earlier part of the neolithic age, however, these are by no means fruitful of relics. From their shape they are called in England "long barrows" to distinguish them from the round barrows which belong to a succeeding time, though evidence is being accumulated to show that this division is not of universal application. Long barrows are by no means of such frequent occurrence in Britain as the round variety; they are most common in Wiltshire, Gloucestershire and Dorset, and occur as far north as Caithness. Some of them contain within the mound a stone chamber, at times with a gallery leading to it, and in the chamber the interment or interments took place. Similar barrows have been found on the continent of Europe, and both in Britain and abroad have one feature in common, viz. that no metal, with possibly the exception of gold, has ever been found in them. This similarity of burial custom, though it may conceivably indicate intercourse, certainly does not prove identity of race, as has been sometimes claimed. The type of skulls found in the

interment is clear evidence against such an assumption.

In Britain, the burials were at times by inhumation only, and occasionally a great number of bodies were interred in the same barrow: at others, cremation had preceded burial. Another remarkable feature is that in many instances it is certain from the relative position of the bones of the unburnt burials that the corpse had been allowed to decay before the burial took place. This curious practice is known among many savage tribes of the present day. Its occurrence in Britain has been adduced in favour of the prevalence of cannibalism at this time, and not altogether without reason. While metal is entirely absent in the long barrows (and in fact relics of any kind are very rarely found), it is significant that in the succeeding round barrows also metal occurs but seldom, and then always of the types attributed to the earliest part of the Bronze Age. When, therefore, the mound pottery is of a class that may well be anterior to metal, and no metal is found with the burial, it is not unreasonable to assign such barrows to the Stone Age. A similar argument may be applied to the stone implements, but in the opposite direction. Many stone implements are found either isolated, or perhaps with no other relics that serve to fix their period. The material alone is often considered sufficient evidence of their being before the age of metals; but it is at any rate quite certain that a large number of stone axes, more particularly those with a socket for the handle, belong really to the Bronze Age. This uncertainty makes any account of the neolithic age difficult, unless the material is taken as the main basis.

Neolithic man, like his forerunners, still recognized that flint and allied stones provided the best material for his cutting and piercing implements, though he made use to a great extent of other hard stones that came ready to his hand. The mining of flint was undertaken on a large scale, and great care was taken to get down to the layer containing the best quality. In Norfolk, at Grime's Graves, and in Sussex, at Cissbury near Worthing, the flint shafts have been carefully explored by William Greenwell, General Pitt-Rivers and others. The system was to sink two shafts some little distance apart and deep enough to reach the desired flint-bed, and the two shafts were then joined by a gallery at the bottom. At Grime's Graves large numbers of deer's horns were found, which had evidently been used as picks, as is proved by the marks found in the chalk walls; and the horn had been trimmed for the purpose. Cups of chalk were also found in the galleries and were believed to have been used as lamps. At Cissbury great quantities of unfinished and defective implements were found in the work, as well as horn tools, as in Norfolk. At such factories the primitive appliances correspond very closely with those in use among existing savages. The pebble was used as a hammer or an anvil, and the more delicate flaking was done by pressure with a piece of horn rather than by blows. Naturally enough the number of completed implements found in these factories is small; the finished tools would be bartered at once and carried away from the factory. All the animal remains found in these pits belong to present geological conditions, thus emphasizing what has been stated above, that the absence of polished implements is no evidence for great age. Many other factories have been found in Britain, in Ireland and on the continent of Europe: at Grovehurst in Kent, at Stourpaine near Blandford, at Whitepark Bay, county Antrim, and in Belgium at Spiennes. Among the North American Indians the method would seem to have been somewhat different. After journeying to the site of a suitable quality of stone, they did not always complete the implements on the spot, but made a number of oval chipped disks of good stone which they carried away and worked up into the required implements at their leisure. These disks bear a strong likeness to some of the ovate implements from the Drift in Europe; in fact, but for the difference of surface condition or patina, they would be identical.
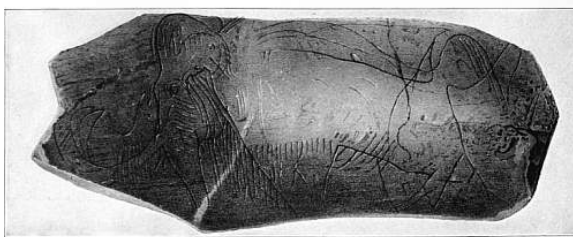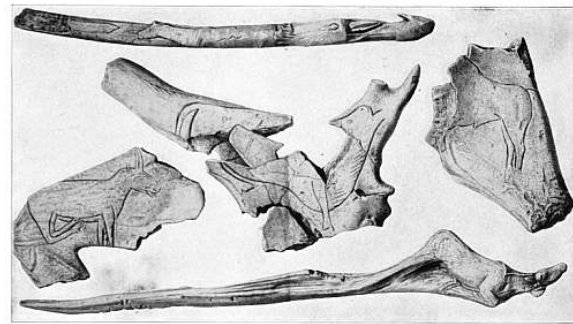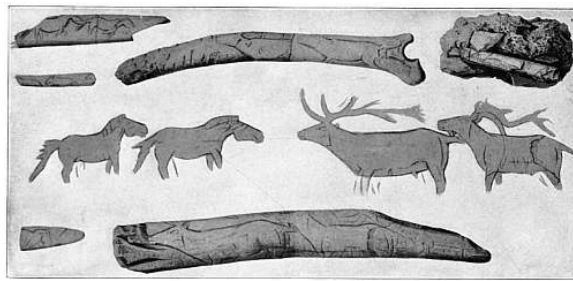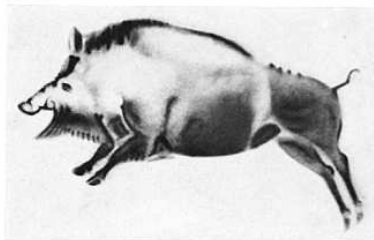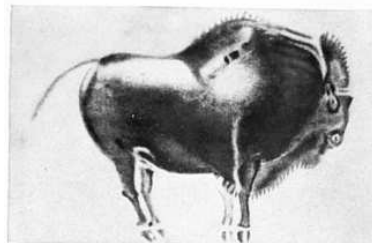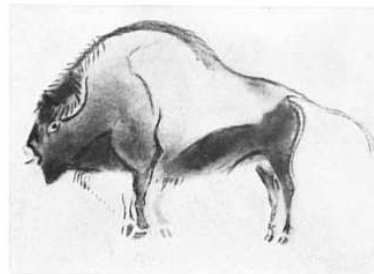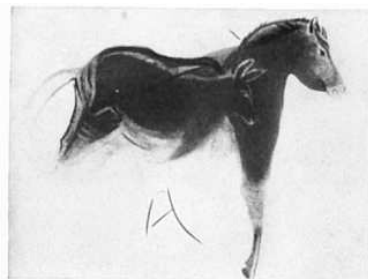
Plate I.

PALAEOLITHIC PERIOD.
1. French Drift 2. English Drift. 3. French transition (Le Moustier). 4. French Cave Period. 5. English Cave Period.
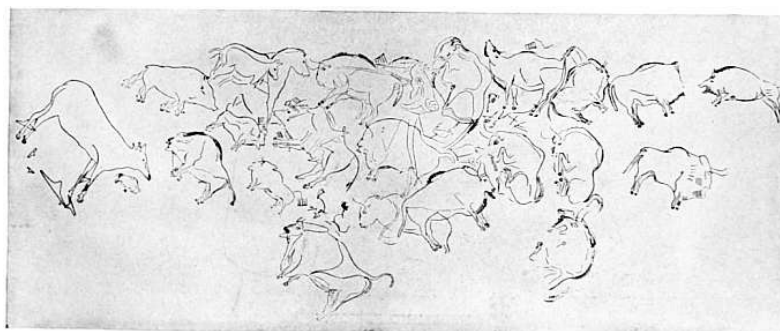
Plate II.

SCULPTURE AND ENGRAVINGS OF THE CAVE PERIOD.
FROM DORDOGNE, FRANCE.
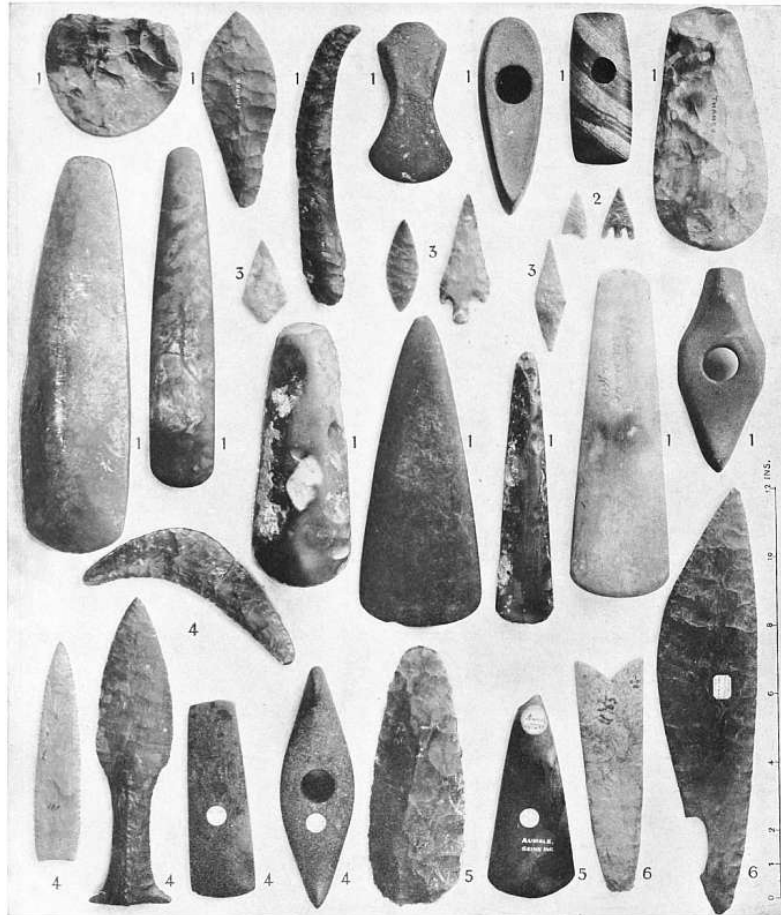
Plate III.

WALL PAINTINGS OF THE CAVE PERIOD.
CAVERN OF ALTAMIRA, SANTANDER, SPAIN.

OUTLINE OF WALL-PAINTINGS, ALTAMIRA, LENGTH ABOUT 45½ FT.

PLATE IV.

NEOLITHIC PERIOD.

1. Flint and stone implements, England   2. Flint arrow-heads, England.   3. Arrow-heads, Ireland.
4. Flint and stone implements, Denmark.   5. Flint implements, France.   6. Flint implements, Egypt.

    While the severe climatic conditions that preceded the neolithic age restricted the presence of man to the more temperate parts of the globe, it may be assumed that in neolithic times there was nothing to prevent him from occupying the greater part of the earth's surface, short of the neighbourhood of the two poles. Thus it may be expected that an age of stone will be found, if looked for, in every part of the globe. So far as our present knowledge goes, all is in favour of the use of stone before metals, in all countries. The one material requires no special treatment before being adapted to man's use, while the other demands considerable knowledge, even if reasoning power have but little place in the process. Thus the probabilities are here borne out by the facts. In the extensive "kitchen-middens" of Japan are found great numbers of chert implements mixed with pottery of a primitive type, recalling that of European early Bronze Age barrows, while the succeeding periods of metal are equally clear. Even in the Far East, therefore, the same sequence is to be observed. In China, the conditions are more obscure. The superstitious regard for ancestors has prevented the exploration of ancient tombs in that country, and thus systematic search has been impossible, while the precise details of the discovery of such relics as have come to light are difficult to obtain. In spite of the assertion that China had no Stone Age, it is surely more probable, in the absence of exact knowledge, that she followed the normal course. Modern territorial divisions, more especially if they are independent of the natural physical conditions of the land, such as mountain ranges, great rivers and the like, have but little value in considering the race problems of remote ages. If, therefore, we find that, in the countries bordering on what is now the Chinese empire, the ancient inhabitants followed the same broad lines of culture that are evident elsewhere, it is easy to believe that China too was normal in this respect. The negroes and Bantu races of Africa also were thought to have passed direct to the use of iron, perhaps owing to the existence on the Nile of a civilization of great antiquity, which enabled them to pass over the intervening stages. Inherently improbable, this is now known not to have been the case. Stone implements, whether ground or merely chipped, have been discovered on the Congo, and more recently on the Zambezi. It is quite true that in both cases they are found in superficial deposits, and may be of any age. But here again the probabilities are greatly in favour of their having been in use before iron was known. While stone tools, such as knives or arrow-heads, may possess qualities that render them superior to bronze or copper, it is certain that once the working of iron was understood, its superiority to stone would at once be perceived, and the stone tools be discarded. There can be little doubt that investigations in Central Africa will demonstrate that the same course was followed there as elsewhere. In South Africa, in Egypt and in Somaliland large quantities of stone implements have been discovered, and of the great age of most of them there can be no doubt. Some from the banks of the Nile have even been claimed as "eolithic"; but here, as in Europe, We can only say that the case is not proven: General Pitt-Rivers did good service in Egypt by discovering among the stratified gravels near Thebes a number of rude flints bearing unmistakeable signs of human workmanship, but he described them merely as of "palaeolithic type," and deplored the absence of mammalian remains in the gravels. At the same time he pointed out that the bulk of the implements claimed as palaeolithic (and, it may be, correctly) are found on the surface, and therefore cannot be dissociated from the surface types; hence form alone cannot be trusted to determine age. Further, we are by no means well informed as to the value of patination in flints found on the surface in Egypt. The depth and intensity of the patination would no doubt have a direct relation to the age of the implement, if only it could be proved that all of them had been equally subjected to the conditions that produced the discoloration. But this is clearly impossible. Some implements may conceivably have been continuously on the surface of the desert from the time they were made, and have been acted upon by the sun and air for many thousands of years, while

others, though of equal age, may have been covered by sand or otherwise protected for a large part of the intervening centuries. Patination, therefore, like form, can only claim a conditional value. It is at the best an uncertain indication of age, as great age may be possible without it. Similarly, in Somaliland, the condition of the implements is very curious, and in some respects puzzling, while their forms resemble those from the Drift in Europe. But as to the climatic conditions we know nothing, and it is therefore useless to speculate on the condition of the stones; as to the geology we know next to nothing, and no mammalian remains give us a helping hand, while the form alone is a dangerous foundation for argument.

Investigations in the more remote parts of the world, though they may occasionally produce some startling novelty in the history of mankind, can scarcely be expected to furnish the same trustworthy continuous story as is to be found in the European area. Here history provides us with a fairly truthful account of what has happened for a period varying from two to three thousand years, or in some places even longer, and we are thus able to judge whether particular discoveries come into the historical stage or not. In more primitive lands where history (if there be any) partakes more of the character of mythical tradition, the task of defining the period to which particular discoveries belong is rendered much more difficult. In America, where history may be said to have begun five hundred years ago, such a feat is of course impossible, until a great deal of work on comparative lines has been accomplished. The accounts of the civilization of Mexico and Peru at the time of the Spanish conquest show a state of culture which in some respects must have put the Spaniards to shame, while in others it was primitive in the extreme. As regards internal communications, the working of gold and copper, and the manufacture and decoration of pottery, these American kingdoms were on a level with all but the most advanced nations; but of history in the true sense of the word they have none. In spite of this, it is by no means a hopeless task to disentangle the apparent confusion of their archaeology. It is now fairly well known what were the races or tribes that inhabited particular districts, and it is thus easy to make a *corpus* of the types adopted by the various peoples. This is the first certain step in the application of archaeological method. By degrees, as these types become familiar to the trained eye, it will not be difficult to arrange them in a progressive series, from the earliest in style to the latest. That this will be done by the archaeologists of the American continent, even with the present scanty materials, there can be little doubt. Numbers of young and enthusiastic workers have now had a good training in exploration in historical lands, and will usefully employ their experience on the antiquities of their own country. But if once a key be found to the ancient Mexican inscriptions, so plentifully scattered through the ancient monuments, it may be that enlightenment will come even more suddenly and more surely. The one problem that is of the greatest interest still awaits solution, viz. whether there is any relation, in culture or more remotely in race, between the inhabitants of ancient America and those of Europe or Asia. One thing is certain, that if there be any connexion, it is of infinite remoteness. But it is at any rate noteworthy that the same designs, patterns and even games are found in ancient Mexico and in India or China; and whether these resemblances arise from relations between the peoples using them or from accident, is a problem well worth investigation.

Europe and America.

In countries like Scandinavia or Switzerland, the story of the early ages is clear and comparatively free from complications. The one by its remoteness was left to develop with but little help from the rest of Europe up to historical times; the other, protected on so many sides by its mountain ranges, seems to have enjoyed a peaceful existence during the Stone and Bronze Ages. A community of fishermen and agriculturists, they led a calm domestic life on the edges of their many lakes where they constructed dwellings on piles with only a gangway to the shore, to prevent the attacks of predatory animals. The practice of building houses in lakes was a common one not only in Switzerland, but also in Britain and in Ireland, as in modern times among the natives of New Guinea. Besides securing the safety of the inhabitants, it had the not unimportant advantage of being more healthy; all refuse of food and other useless matter could at once be thrown into the water where it would be harmless. A similar form of dwelling is the Irish "crannog," constructed on an island or shoal in a lake, in some cases artificially heightened so as to bring it above water. These crannogs were probably inhabited in Ireland up to comparatively recent times, if one may judge by the remains found on the sites.

It must not be forgotten that although the neolithic period had many phases, yet its duration is in no way comparable to the incalculable length of the palaeolithic age. For a variety of reasons it is thought that one of the earliest stages of neolithic times is represented by the now well-known kitchen-middens (refuse-heaps) of Denmark. These heaps are often of great size, sometimes reaching 10 ft. in height, and nearly 350 yds. in length. Here along the coast line the natives of Denmark lived, apparently building their huts upon the mounds and cooking their food upon hearths of stone. The conditions of their daily life would seem to have resembled those of the natives of Tierra del Fuego. Their implements of flint seem to have been chipped only, and it is conjectured that the few polished and more highly finished implements that have been found in the middens are importations from more cultured tribes living inland. Their food was in very great part composed of shell-fish, though they evidently caught and ate various kinds of deer, boar and a variety of carnivorous animals. The race which made these mounds is believed to have been akin to the Lapps, and their dwellings can hardly have been anything more than the rudest protection from the weather. The Swiss lake-dwellers were far more advanced, even in the Stone Age; their dwellings were elaborately planned and constructed, and remains of them have been plentifully found in the various Swiss lakes. Various forms of construction were adopted: in one the foundations consisted of poles driven into the bed of the lake; in others a kind of framework simply rested on the bottom, and in a third, the substructure was formed of layers of sticks reaching from the bottom of the lake up to the surface. The walls were of wattle, closed up with clay to keep out the weather; the hearths were of stone slabs, and the floors of clay well trodden down. Practically the same type of dwelling seems to have continued through the Stone and Bronze Ages, though on some sites no metal whatever is found and it is therefore assumed that these are of the earlier period. These people cultivated the land, growing wheat and barley; they were also hunters and fishermen, capable of manufacturing pottery without the aid of the wheel, which had not yet come into use so far north; and they wove mats and garments, while ropes and netting are plentiful. Their tools and weapons were made of stone, and to a great extent of deer's horn. Human remains are hardly ever found on the sites of the lake-dwellings, and it is therefore uncertain what were the social affinities of the people; but the evidence of the sites is in favour of the same race being continuous into the Bronze Age, when their condition was more comfortable, as is shown by the abundant remains of domesticated animals.

Among the most notable and obvious relics of prehistoric times, both in Britain and in many other countries such as Spain, Portugal, France and even India, are gigantic circles and avenues of stone and dolmens (see STONE MONUMENTS). These enduring monuments have excited the wonder of countless generations, and lent themselves to superstitious practices down to modern times. But the precise purpose for which they were erected and even the period to which they belonged, had never been definitely settled. They had been called burial places of great chiefs, and not unnaturally had been thought by others to have been temples or places of primitive worship used by the Druids, who moreover were often credited with their erection. Obviously such a question called for settlement, and the British Association in the year 1898 appointed a committee to investigate these stone circles with a view to ascertaining their age. Operations were begun at the well-known circle of Arbor Low, south of Buxton in Derbyshire; careful excavations were made through the ditch and the encircling mound and also within the circle, and although the evidence was not of the most complete kind, yet the committee came to the conclusion that the circle belonged to the end of the neolithic age. At Arbor Low all the stones are now lying on the ground (although, to judge from the other circles in England, they were certainly once upright), and the opportunities for surveying were thereby much diminished. It is a fortunate circumstance, therefore, that the fall of one of the stones at Stonehenge (*q.v.*) at the end of the 19th century, and the increasingly perilous state of some of the others, caused the owner, with the advice of the Society of Antiquaries of London, to undertake the raising of the great leaning stone in the interior of the circle. The work was superintended by W. Gowland, F.S.A., who made special investigations during the necessary digging, for the purpose of

Stone Age relics.

recovering any remains of man's handiwork that had been left by the builders of the monument. In this he was very successful, finding in the course of the very limited excavation at the base of the monolith, a great number of stone mauls or hammers that corresponded so nearly with the bruised surfaces of the monoliths, that there can be no doubt of their having been used to dress the standing stones.

From a review of all the evidence of an archaeological nature that was to be obtained, Gowland came to the conclusion that the construction of Stonehenge belonged to the latter part of the neolithic age. No trace of a metal implement occurred in any of the debris. This would of itself be an interesting fact, but it became infinitely more interesting from researches in quite another direction, which brought corroborative evidence of a curious kind. For many years Sir Norman Lockyer and Prof. Penrose were engaged in examining the orientation of temples in Egypt and Greece, with a view to determining on what astronomical principle, if any, the plans had been laid down. With a rectangular plan, and with portions of the interior still well defined, they were able by elaborate calculation to determine that the temples had been definitely planned with relation to the rising or setting of the sun or of a particular star. Having been successful in these investigations they proceeded to apply the test to Stonehenge. The experiment was made on the longest day in the year 1901. Owing to a gradual change in the obliquity of the earth's orbit, the point of sunrise on corresponding days of each year is not constant; and though the difference is hardly perceptible from year to year, in the course of centuries it becomes great enough for use as a measure of time. Enough remains of the monument to show the direction of sunrise at the time that Stonehenge was erected, it being always assumed that the coincidence of the main axis with the central line of the Avenue was designed with reference to sunrise on the longest day of the year. At the date of the experiment it was found that the sun had shifted nearly two diameters in the interval, and this variation gives a date of about 1680 B.C., which practically confirms the verdict of archaeology and seems to prove, moreover, that Stonehenge was a temple of the sun.

Stonehenge therefore may be taken as marking for Britain the close of the neolithic period and heralding the dawn of a new era, in which the inhabitants of the British Isles first acquired the art of working metal.

There is reason to believe that the transition from the use of stone to that of bronze was not due to the peaceful advance of civilization, but rather to the irruption of an Aryan race from the south-east of Europe into the countries to the west and north. Of these people the Celts are to some extent the representatives at a somewhat more recent period. Here, however, we are dealing with terms the precise meaning of which is not yet generally admitted, and which, moreover, have too intimate a relation to the problems of philology to be fully discussed here (see INDO-EUROPEAN). The term Aryan (*q.v.*) itself is not free from objections. It was held by Max Müller to relate to a language and a civilization that took its rise in Central Asia, while others now contend that, although it is the mother language of the Sanskrit, Greek, Latin, Teutonic and Celtic languages, it might equally well have originated in Europe. However this may be, and even this brief statement shows how wide a field the arguments would cover, there can be little doubt that the Bronze Age Celts were of this stock, and that in course of time they gradually spread their language and culture over a large part of Europe. Whether or no the knowledge of bronze started from one or more centres, it gradually spread from the south-east of Europe until it reached Scandinavia; the dates being roughly in Crete, 3000 B.C.; in Sicily, 2500 B.C.; in central France, 2000 B.C.; in Britain and in Scandinavia 1800 B.C. The appearance of the Celts in Britain is indicated by the presence of the round barrows. They were a fairly tall, short-headed race, using cremation and also inhumation in their burials, skilful in the manufacture of pottery and of the simpler forms of bronze implements, and freely using bone, jet, and at times amber, while gold was well known and evidently greatly esteemed. In the early centuries of the Bronze Age, swords, spears and shields were apparently quite unknown, the principal metallic products being flat axes, simple knives or daggers, and small tools or ornaments. In the burial places the bodies, if unburnt, are nearly always found in a crouching position, as if in the attitude of sleep; if cremated, the burnt bones are generally enshrined in an urn under the tumulus, the burial being sometimes in a cist formed of large stones. The pottery vessels are remarkable in more ways than one. In the first place they would seem to have been specially made for the burial rites, for whenever domestic pottery has been found, it is of quite a different character, unornamented and simple in outline. It must be confessed, however, that this latter is by no means common. The sepulchral vessels are at times highly decorated, and sometimes of great size. They are invariably hand made, and though they are by no means well fired they are never sun-dried, as is often said to be the case. A common kind of decoration is produced by impressing twisted cords in the damp clay, and this is believed with some reason to have had its origin in the practice of winding cords round the unbaked vessel to prevent distortion before or during the process of firing. That operation would of course burn away the cord and leave only its impression on the urn. Other forms of ornament are also used, incised lines in rudely geometrical designs, impressions of the end of a stick, and at times rows of hollows produced by the finger or thumb. The method of the burial, beyond giving an insight into the art of the period, also helps us to realize to some extent the ideas of primitive man. The underlying reason for careful and ceremonial burial is not always readily understood, apart from a knowledge of the ritual, such as existed in ancient Egypt. But in the Bronze Age in Britain it was the custom to bury with the dead not only carefully made vessels which doubtless contained food for the journey to the lower world, but also the ornaments and weapons of the deceased. Often the bonea of a pig have been found in the grave, doubtless representing part of the provender which could not conveniently be placed in the so-called food-vessel. Such practices indicate with a fair amount of certainty a belief in a future life in another world, where probably the conditions were thought to be much the same as in this. The burial of the weapons and other property of a dead man is, however, not always due to the belief that he may need them in some future state. The reason may well be that it would be thought unlucky for a survivor to use them.

Bronze Age.

Just as the neolithic age was immeasurably shorter than the palaeolithic, but was notable for great improvements in the arts of life, so the Bronze Age in its turn was shorter than the neolithic age, and again witnessed even more marked advance in culture. It is in fact an illustration of the truism that each step in knowledge renders all that follow less laborious; but it is not easy to understand how the transition from stone to metal came about, nor why bronze came to be the chosen metal rather than iron. Bronze, in the first place, is a composite metal, a mixture of copper and tin, while iron can be at once reduced from its ores; indeed, in the form of meteoric iron, it is already metallic, and needs but a hammer to produce whatever form may be wanted. From the archaeological point of view, there is, however, good reason for believing that bronze preceded iron. The forms of axes that are without doubt the earliest, are in outline much the same as the stone prototype, being only thinner in proportion. Then again, iron implements are never found on the earlier sites, and if they had been in existence some of them certainly would remain: further, at the end of the Bronze Age it is found that the forms of weapons in that metal are exactly copied in iron, as, for instance, at Hallstatt (*q.v.*) in the Salzkammergut, the famous cemetery which best illustrates the passage from the use of bronze to that of iron. It has been claimed that bronze was preceded by copper, a sequence which seems inherently probable; and whether or no it was general enough or enduring enough to constitute a period, there can be no reasonable doubt that in the Mediterranean area, and in central Europe, as well as in Ireland, great numbers of implements were made of copper alone without any appreciable admixture of tin. The casting of pure copper presents certain difficulties, in that the metal is not adapted for anything but a mould open to the air, and this would limit its utility, until the discovery that tin in a certain proportion (roughly 1 : 9) not only made the resulting metal much harder and better fitted for cutting-tools and weapons, but at the same time rendered possible the use of closed moulds.

There are thus two problems in connexion with the history of the Bronze Age. How was the metal discovered? And by whom or where? As to the first, it must be remembered that in some parts of the world, *e.g.* in China and in Cornwall, copper and tin are found together, and it may well be that tin was first accidentally included as an impurity, which, had it been noticed, would have been eliminated. Once it was found to produce a more useful metal, the blend would be

deliberately made, and repeated trials would eventually demonstrate the most suitable proportion of one metal to the other. The question of where it was first discovered is one that is not likely to be answered with certainty, but the one essential is the presence of the two metals in one and the same locality. Tin does not exist in either Egypt or Mesopotamia, although bronze articles from the fourth and third millennium respectively B.C. have been found in these countries. The tin to produce the mere metal must have come from some foreign country; and the choice seems to be very small. Spain at the other end of the Mediterranean is unlikely, and Britain still more so; central Asia, Asia Minor, or China again seem too remote; for the spread of metallurgy from these centres would imply a trade connexion nearly 4000 B.C. In later times, later perhaps by 3000 years, Spain and Britain were undoubtedly among the chief sources of the tin supply of Europe and of the Mediterranean generally; but it will long remain a problem where bronze was first produced. There is indeed, no real necessity for confining its origin to a single locality; it is easily conceivable that the invention occurred independently in more places than one.

The history of early metallurgy has been carefully studied by W. Gowland, who communicated the results of his researches to the Society of Antiquaries of London in 1899. In his opinion the ores from which copper was first obtained by smelting were originally found as pebbles or boulders in the beds of streams, where man in the Stone Age had been accustomed to search for stones to convert into implements; and in the same way the beds of rivers were for a long subsequent period the only sources of tin. Actual mining belongs in his opinion to a far later period, and naturally had its origin in the discovery of outcrops of the metal on the surface. By the simple application of fire, lumps of ore were reduced to a smaller size, and were then prepared for smelting by further reduction to the condition of a coarse powder. This latter process was carried out in the same way that grain was crushed between two stones; and stone-mills, doubtless used for the purpose, have been found in ancient workings in Wales. The next stage would be the furnace, and there can be little doubt that this would be of the simplest kind, merely a hole in the ground with the fire covering the metal, and with nothing but a natural draught. But Gowland holds that even with these singularly inadequate appliances, copper could be smelted from the surface ores, though the output would naturally be of the most uncertain and intermittent character, depending, as it must have done, on the wind. And until the discovery of bellows or some other method of increasing the draught of air, no progress could be made in this direction. With regard to the resulting metal, viz. copper, we have certain knowledge. From time to time there are found in the earth in Britain and elsewhere, hoards of fragmentary or imperfect bronze implements, portions of axes, swords, rings, &c., all of which have been failures in castings. These hoards are assumed to have been gathered together by the bronze founders to be recast into perfect and useful implements. Now, frequently associated with these hoards are portions of cakes of pure copper, originally circular in shape, flat on one face and convex on the other, like a lens with one flat face. The form of these cakes is in itself a fair proof of the prevalence of the method of smelting described above, as it is quite clear that the convex face of the cake followed the contour of the hole in the ground above which the fire was placed. The cakes are generally found broken up into small handy blocks. This can only be done in one way, viz. by watching the cake, after the fire and slag has been raked off it, until it is on the point of becoming solid, when it is quickly pulled out of the hole and broken up. It will be noted that while the implements in these founders' hoards are invariably of bronze, the cakes are as invariably of copper. This is at first sight puzzling, until it is realized that these founders probably carried the tin necessary for forming bronze in the form of ore, and that tin ore in its pure state is a snuff-coloured powder very easily overlooked when lying on the earth, which it might very nearly resemble in colour, though it would be much heavier. Thus it is probable that in many such discoveries the tin ore has accompanied the copper cakes and bronze fragments, but has hitherto eluded the eyes of the finder. Not only have we this conclusive evidence of the methods by which Bronze Age man produced his raw material, but the discovery of crucibles and moulds takes us a step further towards the finished implements. The crucibles are generally simple bowls of thick clay with an extension of the lip at one side to pour out the molten metal. Several of these, with plentiful traces of metal still remaining in them, were found by the brothers Siret in the Bronze Age settlement at El Argar in Murcia. In the same place also were found moulds of stone for the casting of simple triangular axes. These were of the class known as open moulds, one stone being hollowed to the desired form, the other half being simply a flat cover, with no relation to the form of the implement to be produced. From the nature of the metal, such a mould is the only kind in which the casting of an efficient copper implement would be possible; and among the objects discovered by the Sirets were articles in plenty of pure copper.

Much has been written in support of the theory that the bronze tools and implements found in this or that country must have been importations from southern and more highly civilized lands. More particularly has this been alleged with regard to Britain, which, lying as it did on the extreme limit of the ancient world, was regarded as being dependent on the continent for the more complex weapons. The constant discovery, however, of these hoards of rough metal, as well as of moulds of the highest finish for casting swords, daggers, celts, and almost every kind of ancient bronze implement and weapon known to us, provides a conclusive proof of the contrary. The occurrence of a foreign type of implement is so rare as to be a source of especial gratification to the collector who secures it; and it may be taken that, in general terms, all the bronze swords, daggers and spears found in Britain were of home manufacture. Relations with the continent, however, did exist, as is shown by the occurrence of an Irish type of gold ornament in France and Scandinavia, and by the similarity of ornamental motives in the British Isles and elsewhere. Among the continental races it is natural to find intercommunication more common, owing to the absence of natural barriers. The weapons of the Bronze Age were swords, spears, daggers and axes (celts), though the last would be equally well adapted for more peaceful purposes. The swords were usually of a narrow leaf shape, cast with the handle in one piece, the mounting of the grip and the pommel being added. For perfection of workmanship the weapons of this period have never been surpassed, and the skill of adjustment in the moulds, the fine and equal quality of the metal, and the flawless condition of the surfaces still excite wonder among the most expert of modern founders. The cutting edges of swords and "celts" were often, if not always, hammered to serve the double purpose of hardening that part of the weapon and sharpening the edge. In the case of the axe-heads (celts), this hammering had a distinct influence on the evolution of the form of the implement. The earliest celts, whether of copper or bronze, were in form, copies of their stone prototypes, and curiously enough exactly like the ordinary woodman's axe of to-day, but of course without the socket for the handle. Hammering rendered the cutting edge both broader and thinner, giving it at the same time a curved outline. This widened curve eventually became an ornamental feature, the two ends of the cutting edge becoming curved points and adding greatly to the elegance of the outline. Later, the other edges were finished by hammering also, at times in a simple ornamental fashion; and whether for greater rigidity or for some other reason, flanges were produced in the same way on those edges, which again affected the ultimate form of the celt. The early flat celt was no doubt simply fixed in a perforated wooden handle, which would naturally tend to split if wielded with any vigour. The side-flanges were in course of time utilized to prevent this, by allowing the use of a different form of handle. In place of the simple straight handle, a branch was cut with an elbow-joint, and its shorter limb then divided into two prongs, between which the metal passed, while the flanges, beaten up from the edges, overlapped the two forks; and no doubt a lashing of sinew was added to render the whole secure. This made a good serviceable tool or weapon, and prevented the splitting of the handle; but still another step was taken. The flanges on the edges met over the prong of the handle on either side, while the upper end of the celt itself eventually became a mere septum dividing the two openings. This septum was finally judged to be useless, and done away with; and the celt was cast with one hollow only for the reception of the ends of the handle; thus the flat celt became, by a natural process of evolution and improvement, a socketed celt. It is a curious fact, however, that the modern form of axe where the handle passes through a socket in the metal itself does not seem to have been much in favour in the Bronze Age, although it was a stone form that certainly survived into the succeeding period.

This and other shortcomings in what must have been the universal weapon and implement of the race, were remedied from time to time by various improvements in the form of the bronze axe-head and the method of hafting; and the various
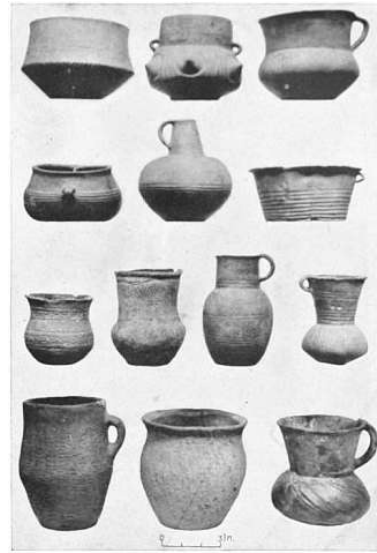
stages of development, from the flat blade of copper or bronze to the socketed implement and even to a pattern now in use, can still be traced in the Bronze Age specimens that have come down to us.
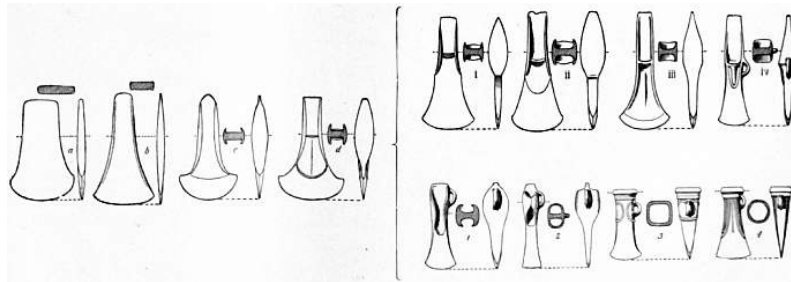
Plate V.
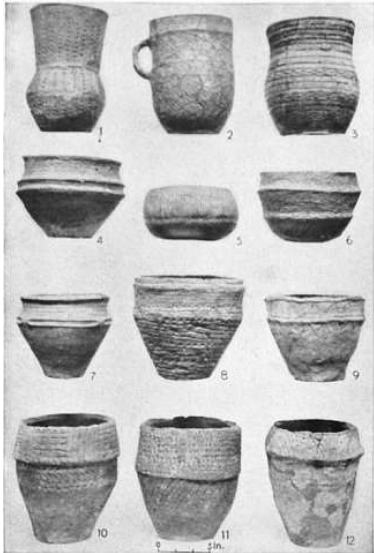
SEPULCHRAL POTTERY, BRITISH ISLES (BRONZE AGE).
1-3, Drinking cups or beakers. 4-9, Food vessels. 10-12, Cinerary urns.

SEPULCHRAL POTTERY FROM THE CONTINENT OF EUROPE (NEOLITHIC, BRONZE, AND IRON AGES).

STAGES IN THE EVOLUTION OF THE CELT OR IMPLEMENT OF CHISEL FORM.
(1) From stone to metallic form. (2) Growth of the stop ridge to palstave. (3) Growth of the wings to socket-celt.

By permission, from the British Museum *Guide to the Bronze Age.*

Plate VI.

1. Bronze shield with red enamel ornaments, found in the Thames near Battersea; about 31 in. long.
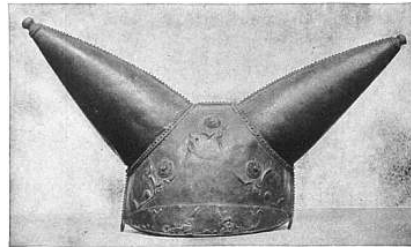
Bronze mounted wooden bucket found in a pit burial at
Aylesford.
Early Iron Age.

The objects here represented are all in the British Museum.

By permission, from the British Museum *Guide to the Early Iron Age.*
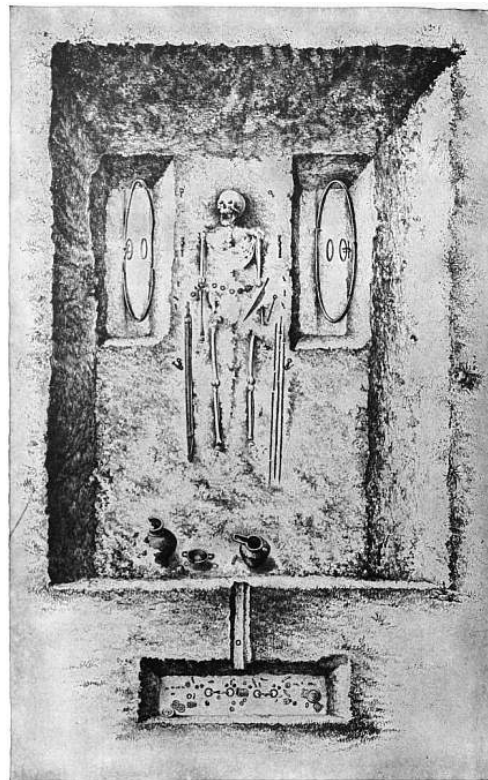
Chariot burial of a Gaulish chief, Somme Bionne, Marne, France.

Horned bronze helmet with traces of enamel ornament, found in
the Thames near Waterloo Bridge.

Iron age. With the discovery of iron as the ideal metal for cutting implements and weapons, we enter into the millennium before the Christian era; for roughly speaking, the development of the civilization associated with the gradual substitution of iron for bronze began about 1000 B.C. Again we look towards the south-east of Europe for the earliest evidence of this great advance; from that quarter it gradually spread over the whole continent, reaching the more northern parts about five hundred years later. In Egypt, the home of a marvellous civilization at a very early time, the conditions were different, and there is reason to suppose that iron was known there long before it was in use on the northern side of the Mediterranean. Our knowledge of the dates at which iron was first known in parts of Asia is still very limited, and further discoveries must be awaited.

Ireland. The archaeology of Ireland presents features in many respects different from those of the rest of the British Islands in the Stone and Bronze Ages. Such affinities in style as are traceable connect it rather with Scotland than with any part of the south, a fact doubtless due to proximity as well as in part to race connexions. A special feature is the astonishing quantity of gold that was produced in Ireland during the early Bronze Age. The frequent discovery of gold ornaments of this time has enriched to a surprising degree the museum of the Royal Irish Academy in Dublin, while many private and public collections both in Ireland and elsewhere contain a considerable number of similar relics. If these represented the total wealth of gold of the Bronze Age the amount would probably exceed that of any ancient period in any country, except perhaps the republic of Colombia in South America. But the known remains can only be a small proportion of the original wealth. Vast quantities must have been discovered from medieval times onwards, nearly all of which would be melted down, owing to the ignorance of the finders or to the uncertainty of ownership. Further, it may be taken as certain that there still remains in the earth a great mass of the metal which may or may not be discovered at some future time. If it were by any means possible to estimate what these united categories would amount to, the result would scarcely be credited. It is well known that gold has been, and still is, found in Ireland; but it is hard to believe that there were no richer deposits than are now known. It is at any rate certain that the rivers were worked as late as the opening centuries of our era. In the Bronze Age the most characteristic ornaments were penannular objects of all sizes from a small finger ring up to an armlet, generally known as "ring money" from the difficulty of assigning a definite use to the whole series; and the flat, crescent-shaped, diadem-like objects called "lunulae," which are perhaps even more definitely characteristic of Ireland. Such objects of gold, if ornamented at all, are, like some of the flat axe-heads, engraved with simple geometrical patterns, lozenge-shaped chequers and the like, a type of decoration in itself easily determined as being of the Bronze Age, but bearing at the same time an interesting and very curious analogy to remains of the same period from the Iberian Peninsula, more especially from Portugal. If any overland culture-relations existed between the two countries, it would be only reasonable to expect the occurrence of the objects in question in the intervening districts. But so far nothing of the kind has been discovered. Moreover, had it been an isolated instance of resemblance it might be negligible, but an equally odd similarity is found in the fact that the Irish were in the habit of grinding the faces of their flint arrow-heads, an apparently useless refinement, while the Portuguese of the early Bronze Age did the same. Again, the dolmens of Ireland bear a distinct resemblance to those of Spain and Portugal, while the French dolmens, with few exceptions in the north, have a different character. These curious points are in favour of the tradition that the original

inhabitants of Ireland were of Iberian origin, and further, that they did not come overland but by sea, and there are indeed signs of extensive navigation in the Bronze Age of northern Europe. It was perhaps in the middle of our Bronze Age, say about 1000 B.C., that this Iberian race was supplanted by the Celts, who took a considerable time to emerge from their native barbarism. It is, at any rate, fairly certain that for some hundreds of years previous to this Celtic invasion, Ireland was an enormously rich country, supplying not only herself, but also Britain and part of the Atlantic seaboard with gold. The fact became eventually an ingrained tradition in the history of the country, subsisting in Irish literature for centuries after the Christian era. Such natural wealth must have produced in these early times a marked effect on the relations and culture of these Iberian Irish, and one might reasonably expect a much higher level of luxury and wealth than is indicated by the remains commonly found. With the opportunities provided by communication with the continent, and the interchange of goods, with all the chances of benefiting by ideas current among other races, it is astonishing that Ireland did not play a more prominent part in Europe, more than a thousand years before the Christian era.

Mediterranean area.

While gold as a metal was known in Europe, even before copper, it is a curious fact that silver was almost unknown, and hardly ever used. One of the most interesting sites for the metal, at about the same period of which we have just been speaking in Ireland, was the Mediterranean coast of Spain. Here in the neighbourhood of Almeria have been found remains of a large and apparently prosperous population ranging from the Stone Age to the end of the Bronze Age, with houses and tombs, besides the fortifications rendered necessary, in the later period, by their possession of the rare and precious metal, silver. Rare it certainly was, for the quantity found was exceedingly small, tiny slender rings for the fingers or the ears, and rivets to hold the axe-blade in its handle; but nothing to compare with the lavish richness of the American mines. The interesting race who occupied these dwellings and finally were laid to rest in the adjoining graves were evidently connected more or less closely with the peoples inhabiting the eastern coasts of the Mediterranean.

Recent discoveries in the central Mediterranean area not only furnish new and trustworthy (though none the less surprising) dates in ancient history, but may also bridge the distance between the Levant and the Pillars of Hercules. The results achieved by Arthur Evans and other distinguished explorers in Crete (*q.v.*) opened a new chapter in the history of European civilization, and may fitly be compared with the excavation of Troy, Mycenae and Tiryns by Schliemann some thirty years before. The progress of archaeology in the interval can be well tested by a comparison of the discussions to which the two series of discoveries gave rise. The mistaken attributions and unfortunate animosities in connexion with earlier excavations are almost forgotten, while the brilliant discoveries in the island of King Minos have not only themselves been made on scientific principles, but are illumined by the splendid revelation of the civilizations of the Mycenaean and the pre-Mycenaean era.

Classical.

A great change indeed took place in the methods of classical study during the last decade of the 19th century, a change which affected the entire character of future classical research. It was formerly the common habit among students and professors of archaeology to confine their attention and their interests entirely to classical texts and even to classical sites, rejecting as outside the scope of their studies anything that was not manifestly beautiful as art. Whatever was primitive in its aspect, or wanting in the familiar characteristics that had for centuries been associated with Greek art, was either rejected entirely or at any rate relegated to a second place, as having but a poor claim to be classed with objects of the finer periods. The result was necessarily misleading. The uninstructed majority very naturally regarded the art of Pheidian times as a thing of supernatural growth, which had been bestowed by divine favour upon a chosen spot on the earth, without a human parentage, and almost without leaving any descendants. The evolutionary methods of other branches of science, however, were by degrees brought to bear upon the sacred precincts of pure Greek art. It was found that the crude products of the second millennium B.C., the formless images evolved by the uncultured dwellers in the Mediterranean area more than a thousand years before the time of Pheidias, were in truth the prototypes of the creations of himself and his contemporaries. This step being taken, the rest became easy. The most commonplace and ordinary relics were collected with as much avidity as they had formerly been rejected, in the belief that their simple forms would aid in the elucidation of their more complex and highly elaborated descendants. This minute attention, moreover, was not only given to the works of man, but even the remains of humanity received the attention they merited. It has been rightly thought, during recent years, that the question of race was a factor that deserved treatment in dealing with works of art of early times; and that natural evolution due to man's tendency to change with time, might not be sufficient to account for the differences of type observed in human remains from the same country. For this reason, not only the objects associated with the burial have been preserved, but also the skeleton itself. This has been examined, measurements taken and recorded for comparison, and inferences made, sometimes of a surprising character. For example, if a cemetery be found with a preponderance of tall, long-headed skeletons in a district where the prevailing type of skeleton is short and brachycephalic (short-headed), the observer may reasonably expect a different kind of burial-furniture, and suspect an intruding race. In this particular respect, archaeology owes a signal debt to physical anthropology and to anthropological methods in general. The combination of the two is far more likely to lead to a reasonable and satisfactory conclusion than would be possible if the one branch of science had been pursued alone.

Value of ethnology.

When once the existence of abundant remains of prehistoric man had been admitted, and their study had received recognition as a branch of science, the evidence supplied by the relics themselves and by their relation to extinct or existing animals would have sufficed to give a considerable insight into the conditions of primitive life. But, fortunately, corroborative evidence of the most useful kind was at hand, and has been of the greatest service in solving what might otherwise have been insoluble problems. Though the progress of civilization, and more especially the ever increasing rapidity of communication are rapidly changing the habits of life among the primitive peoples in various parts of the world, yet till past the middle of the 19th century, a certain number of tribes, if not races, were still in the Stone Age. Even at the present day stone-using tribes still exist, although by chance metal may be known to them. The importance of the study of their conditions of life and their technical processes, and of the collecting of their implements for the express purpose of illustrating prehistoric man, was recognized by Henry Christy (1810-1865), who had made extensive investigations and collected relics in conjunction with Edouard Lartet in the now famous caverns of the Dordogne, at a time when such explorations were somewhat of a novelty; and concurrently he formed a large collection of the productions of existing savage peoples, both collections after his death passing to the British Museum, his intention being that the one should elucidate the ether. (It is only fair to his memory, however, to state here that, by his express wish, the most important of the relics that he had obtained from the Dordogne caves were returned to France where they now are. Such instances of international courtesy are rare enough to deserve mention.) The value and interest of such a series can scarcely be over-rated. Almost till the 20th century, the Indians of North America, the Australian and Tasmanian natives, as well as those of New Zealand and the many archipelagoes of the Pacific, were, if not ignorant of the use of metals, at least habitually using stone where civilized man would use metal. The Maori made his war club of jade and the pounders for preparing his food of stone. The Australian had his stone axe-blade; and low as he stands in the culture scale, his spear-heads are chipped with an exquisite precision. The Papuan of inland New Guinea is still making his weapons of stone and wood; while until quite recently the North American Indian was making his delicate stone arrow points, and the Solomon islander his beautiful polished stone axe-blades. The knowledge gained by the study of a large series of such objects enables us to fill up very many gaps in the story of early man as told by his own remains. In fact, in this respect, the value of the comparison is much greater than could reasonably be expected; for, whatever may be the reason, nothing is more marked than the extraordinary similarity of stone implements at all times and over the whole world. An arrow-point made by a Patagonian Indian, one from a Japanese shell mound, and a third of the Stone Age from Ireland, are found to be practically identical. Whether it is that the same material and the same necessity naturally produce

a like result, or whether there has existed throughout a continuity of type, is a question that will never be satisfactorily answered. The results, however, are of eminently practical value. The arrow-heads of neolithic man, which are found by hundreds all over Europe, may be seen fixed in their shafts in the hands of an American Indian; rude pieces of quartz, which unmounted would escape notice as implements, are seen to make excellent tools when mounted in a handle by the Australian black, while flakes of slate find a use when mounted as skinning knives by the Eskimo.

Now that the narrower conception of archaeology as a minor branch of classical studies has been given up, the new science has gradually won its way to universal recognition; and anthropology, a still wider subject but in many points closely allied to the scientific study of ancient remains, has still more recently found favour at all the leading universities, and practical measures have been taken to establish the study on a firm and scientific basis. Apart from this official encouragement, much has been done towards the systematization and teaching of archaeology by practical excavators, whose pupils have attained considerable numbers and celebrity. Something has been done, too, in the national and provincial museums, to present the relics of past ages in an intelligible manner, so that the collections no longer consist of curiosities but of documents rich in instruction and interest even to the general visitor. The progress of photography, as well as the improvement and cheapening of methods of illustration, have also assisted enormously in the advance of archaeology; and similarly, the antiquities exhibited in museums and private collections to illustrate and amplify written records, have in the last generation received much attention on their own account, and have reacted in various ways on the teaching of ancient history. In some countries a further step in general education has been taken, and the lamentable waste of archaeological material arrested to some extent by the distribution of pictures and diagrams among schools and institutions, to call attention to the more ordinary local types, and to encourage those who are likely to discover them in the soil to save them from destruction and render them available for scientific study. A certain familiarity on the part of the young with the mere appearance of antiquities that come to light continually and are almost as often discarded or destroyed, would probably result in valuable additions being made to the available data.

Organized study.

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(C. H. Rᴅ.)

ARCHAEOPTERYX. The name of *Archaeopteryx lithographica* was based by Hermann von Meyer upon a feather (Gr. πτέρυξ, wing) found in 1861 in the lithographic slate quarries of Solenhofen in Bavaria, the geological horizon being that of the Kimmeridge clay of the Upper Oolite or Jurassic system. In the same year and at the same place was discovered the specimen (figs. 1 and 3) now in the British Museum, named by Andreas Wagner *Griphosaurus.* Sir R. Owen has described it as *A. macroura.* Stimulated by the high price paid by the British Museum, the quarry owners diligently searched, and in 1872 another, much finer, preserved specimen was found. This was bought by K.W. v. Siemens, who presented it to the Berlin Museum. The late W. Dames has written an excellent monograph on it.

FɪG. 1.—The British Museum specimen.

FɪG. 2.—The specimen in the Museum für Naturkunde, Berlin. After a photograph taken from a cast.

Archaeopteryx was a bird, without any doubt, but still with so many low, essentially reptilian characters that it forms a link between these two classes. About the size of a rook, its most obvious peculiarity is the long reptilian tail, composed of 20 vertebrae and not ending in a pygostyle. The last dozen vertebrae each carry a pair of well-developed typical quills.

Upon these features of the tail E. Haeckel established the subclass Saururae, containing solely Archaeopteryx, in opposition to the Ornithurae, comprising all the other birds. Herein he has been followed by many zoologists. However, the fact that various recent birds possess the same kind of caudal skeleton, likewise without a pygostyle, although reduced to at least 13 vertebrae, shows that the two terms do not express a fundamental difference.

Fig. 3.—Tail of British Museum specimen.

The importance of *Archaeopteryx* justifies the following descriptive detail. Vertebral column composed of about 50 vertebrae, viz. 10-11 cervical, 12-11 thoracic, 2 lumbar, 5-6 sacral, and 20 or 21 caudal, with a total caudal length of the Berlin specimen of 7 in. The cervical and thoracic vertebrae seem to be biconcave; the cervical ribs are much reduced and were apparently still movable; the thoracic ribs are devoid of uncinate processes. Paired abdominal ribs are doubtful. Scarcely anything is known of the sternum, and little of the shoulder-girdle, except the very stout furcula; scapula typically bird-like. Humerus about 2½ in. long, with a strong crista lateralis, which indicates a strongly developed great pectoral muscle and hence, by inference, the presence of a keel to the sternum. Radius and ulna typically avine, 2.1 in. in length. Carpus with two separate bones. The hand skeleton consists of 3 completely separate metacarpals, each carrying a complete, likewise free, finger; the shortened thumb with 2, the index with 3, the third with 4 phalanges; each finger with a curved claw. The whole wing is consequently, although essentially avine, still reptilian in the unfused state of the metacarpals and the numbers of the phalanges. The pelvis is imperfectly known. The preacetabular portion of the ilium is shorter than the posterior half. The hind-limb is typically avine, with intertarsal joint, distally reduced fibula, and the three elongated metatarsals which show already considerable anchylosis; reduction of the toes to four, with 2, 3, 4 and 5 phalanges; the hallux is separate, and as usual in recent birds posterior in position. Skull bird-like, except that the short bill cannot have been enclosed in a horny rhamphotheca, since the upper jaw shows a row of 13, the lower jaw 3 conical teeth, all implanted in distinct sockets.

The remiges and rectrices indicate perfect feathers, with shaft and complete vanes which were so neatly finished that they must have possessed typical radii and hooklets. Some of the quills measure fully 5 in. in length. Six or seven remiges were attached to the hand, ten to the ulna.

It is idle to speculate on the habits of this earliest of known birds. That it could fly is certain, and the feet show it to have been well adapted to arboreal life. The clawed slender fingers did not make *Archaeopteryx* any more quadrupedal or bat-like in its habits than is a kestrel hawk, with its equally large, or even larger thumb-claw.

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(H. F. G.)

ARCHAISM (adj. "archaic"; from Gr. ἀρχαῖος, old), an old-fashioned usage, or the deliberate employment of an out-of-date and ancient mode of expression.

ARCHANGEL (ARCHANGELSK), a government of European Russia, bounded N. by the White Sea and Arctic Ocean, W. by Finland and Olonets, S. by Vologda, and E. by the Ural mountains. It comprehends the islands of Novaya-Zemlya, Vaygach and Kolguev, and the peninsula of Kola. Its area is 331,505 sq. m., and its population in 1867 was 275,779 and in 1897, 349,943. The part which lies within the Arctic Circle is very desolate and sterile, consisting chiefly of sand and reindeer moss. The winter is long and severe, and even in summer the soil is frozen. The rivers (Tuloma, Onega, Dvina, Mezen and Pechora) are closed in September and scarcely thaw before July. The Kola peninsula is, however, diversified by hills exceeding 3000 ft. in altitude and by large lakes (*e.g.* Imandra), and its coast enjoys a much more genial climate. South of the Arctic Circle the greater part of the country is covered with forests, intermingled with lakes and morasses, though in places there is excellent pasturage. Here the spring is moist, with cold, frosty nights; the summer a succession of long foggy days; the autumn again moist. The rivers are closed from October to April. The inhabitants of the northern districts— nomad tribes of Samoyedes, Zyryans, Lapps, and the Finnish tribes of Karelians and Chudes—support themselves by fishing and hunting. In the southern districts hemp and flax are raised, but grain crops are little cultivated, so that the bark of trees has often to be ground up to eke out the scanty supply of flour. Potatoes are grown as far north as 65°. Shipbuilding is carried on, and the forests yield timber, pitch and tar. Excellent cattle are raised in the district of Kholmogory on the Dvina, veal being supplied to St Petersburg. Gold is found in the districts of Kola, naphtha and salt in those of Kem and Pinega, and lignite in Mezen. Sulphurous springs exist in the districts of Kholmogory and Shenkursk. The industry and commerce are noticed below in the article on the town Archangel, which is the capital. The government is divided into nine districts,

the chief towns of which are—Alexandrovsk or Kola (pop. 300), Archangel (*q.v.*), Kem (1825), Kholmogory (1465), Mezen (2040), Novaya-Zemlya (island), Pechora, Pinega (1000) and Shenkursk (1308).

See A.P. Engelhardt, *A Russian Province of the North* (Eng. trans., by H. Cooke, 1899).

ARCHANGEL (Archangelsk), chief town of the government of Archangel, Russia, at the head of the delta of the Dvina, on the right bank of the river, in lat. 64° 32′ N. and long. 40° 33′ E. Pop. (1867) 19,936; (1897) 20,933. As early as the 10th century, if not earlier, the Norsemen frequented this part of the world (Bjarmeland) on trading expeditions; the best-known is that made by Ottar or Othere between 880 and 900 and described (or translated) by Alfred the Great, king of England. The modern town dates, however, from the visit of the English voyager, Richard Chancellor, in 1553. An English factory was erected on the lower Dvina soon after that date, and in 1584 a fort was built, around which the town grew up. Archangel was for long the only seaport of Russia (or Muscovy). The tsar Boris Godunov (1598-1605) threw the trade open to all nations; and the chief participants in it were England, Holland and Germany. In 1668-1684 the great bazaar and trading hall was built, principally by Tatar prisoners. In 1691-1700 the exports to England averaged £112,210 annually. After Peter the Great made St Petersburg the capital of his dominions (1702), he placed Archangel under vexatious commercial disabilities, and consequently its trade declined. In 1762 it was granted the same privileges as St Petersburg, and since then it has gradually recovered its former prosperity. It is the seat of a bishop, and has a cathedral (1709-1743), a museum, the monastery of the Archangel Michael (whence the city gets its name), an ecclesiastical seminary, a school of navigation and a naval hospital. Linen, leather, canvas, cordage, mats, tallow, potash and beer are manufactured. There is a lively trade with St Petersburg, and the sea-borne exports, which consist chiefly of timber, flax, linseed, oats, flour, pitch, tar, skins and mats, amount in value to about 1½ millions sterling annually (82½ % for timber), but the imports (mostly fish) are worth only about £200,000. A fish fair is held every year on the 1st (15th) of September. Archangel communicates with the interior of Russia by river and canal, and has a railway line (522 m.) to Yaroslavl. The harbour, deepened to 18¼ ft., is about a mile below the city, and is accessible from May to October. About 12 m. lower down there are a government dockyard and merchants' warehouses. A new military harbour, Alexandrovsk or Port Catherine, has been made on Catherine (Ekaterininsk) Bay, on the Murman coast of the Kola peninsula. The shortest day at Archangel has only 3 hrs. 12 min., the longest 21 hrs. 48 min. of daylight.

ARCHBALD, a borough of Lackawanna county, Pennsylvania, U.S.A., in the N.E. part of the state, 10 m. N.E. of Scranton. Pop. (1890) 4032; (1900) 5396; (1869 foreign-born); (1910) 7194. It is served by the Delaware & Hudson, and the New York, Ontario & Western railways, and by an interurban electric line. It is about 900 ft. above sea-level; in the vicinity are extensive deposits of anthracite coal, the mining and breaking of which is the principal industry; silk throwing and weaving is another industry of the borough. At Archbald is a large glacial "pot hole," about 20 ft. in diameter and 40 ft. in depth. Archbald, named in honour of James Archbald, formerly chief engineer of the Delaware & Hudson railway, was a part of Blakely township (incorporated in 1818) until 1877, when it became a borough.

ARCHBISHOP (Lat. *archiepiscopus*, from Gr. ἀρχιεπίσκοπος), in the Christian Church, the title of a bishop of superior rank, implying usually jurisdiction over other bishops, but no superiority of order over them. The functions of the archbishop, as at present exercised, developed out of those of the metropolitan (*q.v.*); though the title of archbishop, when it first appeared, implied no metropolitan jurisdiction. Nor are the terms interchangeable now; for not all metropolitans are archbishops,[1] nor all archbishops metropolitans. The title seems to have been introduced first in the East, in the 4th century, as an honorary distinction implying no superiority of jurisdiction. Its first recorded use is by Athanasius, bishop of Alexandria, who applied it to his predecessor Alexander as a mark of respect. In the same way Gregory of Nazianzus bestowed it upon Athanasius himself. In the next century its use would seem to have been more common as the title of bishops of important sees; for several archbishops are stated to have been present at the council of Chalcedon in 451. In the Western Church the title was hardly known before the 7th century, and did not become common until the Carolingian emperors revived the right of the metropolitans to summon provincial synods. The metropolitans now commonly assumed the title of archbishop to mark their pre-eminence over the other bishops; at the same time the obligation imposed upon them, mainly at the instance of St Boniface, to receive the *pallium* (*q.v.*) from Rome, definitely marked the defeat of their claim to exercise metropolitan jurisdiction independently of the pope.

At the present day, the title of archbishop is retained in the Roman Catholic Church, the various oriental churches, the Anglican Church, and certain branches of the Lutheran (Evangelical) Church.

In the Roman Catholic Church the powers of the archbishop are considerably less extensive than they were in the middle ages. According to the medieval canon law, based on the decretals, and codified in the 13th century in the *Corpus juris canonici*, by which the earlier powers of metropolitans had been greatly curtailed, the powers of the archbishop consisted in the right (1) to confirm and consecrate suffragan bishops; (2) to summon and preside over provincial synods; (3) to superintend the suffragans and visit their dioceses, as well as to censure and punish bishops in the interests of discipline, the right of deprivation, however, being reserved to the pope; (4) to act as a court of appeal from the diocesan courts; (5) to exercise the *jus devolutionis, i.e.* present to benefices in the gift of bishops, if these neglect their duty in this respect. These rights were greatly curtailed by the council of Trent. The confirmation and consecration of bishops (*q.v.*) is now reserved to the Holy See. The summoning of provincial synods, which was made obligatory every three years by the council, was long neglected, but is now more common wherever the political conditions, *e.g.* in the United States, Great Britain and France, are favourable. The disciplinary powers of the archbishop, on the other hand, can scarcely be said to survive. The right to hold a visitation of a suffragan's diocese or to issue censures against him was, by Sess. xxiv. c. 3 *de ref.*, of the council of Trent, made dependent upon the consent of the provincial synod after cause shown (*causa cognita et probata*); and the only two powers left to the archbishop in this respect are to watch over the diocesan seminaries and to compel the residence of the bishop in his diocese. The right of the archbishop to exercise a certain disciplinary power over the regular orders is possessed by him, not as archbishop, but as the delegate *ad hoc* of the pope. Finally, the function of the archbishop as judge in a court of appeal, though it still subsists, is of little practical importance now that the clergy, in civil matters, are universally subject

to the secular courts.

Besides archbishops who are metropolitans there are in the Roman Catholic Church others who have no metropolitan jurisdiction. Such are the titular archbishops *in partibus*, and certain archbishops of Italian sees who have no bishops under them. Archbishops rank immediately after patriarchs and have the same precedence as primates. The right to wear the *pallium* is confined to those archbishops who are not merely titular. It must be applied for, either in person or by proxy, at Rome by the archbishop within three months of his consecration or enthronement, and, before receiving it, he must take the oaths of fidelity and obedience to the Holy See. Until the *pallium* is granted, the archbishop is known only as archbishop-elect, and is not empowered to exercise his *potestas ordinis* in the archdiocese nor to summon the provincial synod and exercise the jurisdiction dependent upon this. He may, however, exercise his purely *episcopal* functions. The special ensign of his office is the cross, *crux erecta* or *gestatoria*, carried before him on solemn occasions (see Cross).

In the Orthodox and other churches of the East the title of archbishop is of far more common occurrence than in the West, and is less consistently associated with metropolitan functions. Thus in Greece there are eleven archbishops to thirteen bishops, the archbishop of Athens alone being metropolitan; in Cyprus, where there are four bishops and only one archbishop, all five are of metropolitan rank.

Eastern Church.

In the Protestant churches of continental Europe the title of archbishop has fallen into almost complete disuse. It is, however, still borne by the Lutheran bishop of Upsala, who is metropolitan of Sweden, and by the Lutheran bishop of Åbo in Finland. In Prussia the title has occasionally been bestowed by the king on general superintendents of the Lutheran church, as in 1829, when Frederick William III. gave it to his friend and spiritual adviser, the celebrated preacher, Ludwig Ernst Borowski (1740-1831), general superintendent of Prussia (1812) and bishop (1816).

Lutheran Church.

In the Church of England and its sister and daughter churches the position of the archbishop is defined by the medieval canon law as confirmed or modified by statute since the Reformation. It is, therefore, as regards both the *potestas ordinis* and jurisdiction, substantially the same as in the Roman Catholic Church, save as modified on the one hand by the substitution of the supremacy of the crown for that of the Holy See, and on the other by the restrictions imposed by the council of Trent.

Church of England.

The ecclesiastical government of the Church of England is divided between two archbishops—the archbishop of Canterbury, who is "primate of all England" and metropolitan of the province of Canterbury, and the archbishop of York, who is "primate of England" and metropolitan of the province of York. The jurisdiction of the archbishop of Canterbury as primate of all England extends in certain matters into the province of York. He exercised the jurisdiction of *legatus natus* of the pope throughout all England before the Reformation, and since that event he has been empowered, by 25 Hen. VIII. c. 21, to exercise certain powers of dispensation in cases formerly sued for in the court of Rome. Under this statute the archbishop continues to grant special licences to marry, which are valid in both provinces; he appoints notaries public, who may practise in both provinces; and he grants dispensations to clerks to hold more than one benefice, subject to certain restrictions which have been imposed by later statutes. The archbishop also continues to grant degrees in the faculties of theology, music and law, which are known as Lambeth degrees. His power to grant degrees in medicine, qualifying the recipients to practise, was practically restrained by the Medical Act 1858.

The archbishop of Canterbury exercises the twofold jurisdiction of a metropolitan and a diocesan bishop. As metropolitan he is the guardian of the spiritualities of every vacant see within the province, he presents to all benefices which fall vacant during the vacancy of the see, and through his special commissary exercises the ordinary jurisdiction of a bishop within the vacant diocese. He exercises also an appellate jurisdiction over each bishop, which, in cases of licensed curates, he exercises personally under the Pluralities Act 1838; but his ordinary appellate jurisdiction is exercised by the judge of the Arches court (see Arches, Court of). The archbishop had formerly exclusive jurisdiction in all causes of wills and intestacies, where parties died having personal property in more than one diocese of the province of Canterbury, and he had concurrent jurisdiction in other cases. This jurisdiction, which he exercised through the judge of the Prerogative court, was transferred to the crown by the Court of Probate Act 1857. The Arches court was also the court of appeal from the consistory courts of the bishops of the province in all testamentary and matrimonial causes. The matrimonial jurisdiction was transferred to the crown by the Matrimonial Causes Act 1857. The court of Audience, in which the archbishop presided personally, attended by his vicar-general, and sometimes by episcopal assessors, has fallen into desuetude. The vicar-general, however, exercises jurisdiction in matters of ordinary marriage licences and of institutions to benefices. The master of the faculties regulates the appointment of notaries public, and all dispensations which fall under 25 Hen. VIII. c. 21.

A right very rarely exercised by the archbishop of Canterbury, but one of great importance, is that of the visitation and deprivation of inferior bishops. Since there is no example of the archbishop of York exercising or being reputed to have such disciplinary jurisdiction over his suffragans,[2] and this right could, according to the canon law cited above, in the middle ages only be exercised normally in concert with the provincial synod, it would seem to be a survival of the special jurisdiction enjoyed by the pre-Reformation archbishop as *legatus natus* of the pope. It was somewhat freely exercised by Cranmer and his successors immediately after the Reformation; but the main precedent now relied upon is that of Dr Watson, bishop of St Davids, who was deprived in 1695 by Archbishop Tennison for simony and other offences, the legality of the sentence being finally confirmed by the House of Lords on the 25th of January 1705. It was proved in the course of the long argument in this case that the archbishop of Canterbury had undoubtedly exercised such independent power of visitation both before and after the Reformation; and it was on this precedent that in 1888 the judicial committee of the privy council mainly relied in deciding that the archbishop had the right to cite before him the bishop of Lincoln (Dr Edward King), who was accused of certain irregular ritual practices. The trial began on the 12th of February 1889 before the archbishop and certain assessors, the protest of Dr King, based on the claim that he could only be tried in a provincial synod, being overruled by Archbishop Benson on the grounds above stated. The main importance of the "Lincoln Judgment," delivered on the 21st of November 1890, is that it set a new precedent for the effective jurisdiction of the archbishop, based on the ancient canon law, and so did something towards the establishment of a purely "spiritual" court, the absence of which had been one of the main grievances of a large body of the clergy.

It is the privilege of the archbishop of Canterbury to crown the kings and queens of England. He is entitled to consecrate all the bishops within his province and was formerly entitled, upon consecrating a bishop, to select a benefice within his diocese at his option for one of his chaplains, but this practice was indirectly abolished by 3 and 4 Vict. c. III, § 42. He is entitled to nominate eight chaplains, who had formerly certain statutory privileges, which are now abolished. He is *ex officio* an ecclesiastical commissioner for England, and has by statute the right of nominating one of the salaried ecclesiastical commissioners.

The archbishop exercises the ordinary jurisdiction of a bishop over his diocese through his consistory court at Canterbury, the judge of which court is styled the commissary-general of the city and diocese of Canterbury. The archbishop holds a visitation of his diocese personally every three years, and he is the only diocesan who has kept up the triennial visitation of the dean and chapter of his cathedral.[3] The archbishop of Canterbury takes precedence immediately after princes of the blood royal and over every peer of parliament, including the lord chancellor.

The archbishop of York has immediate spiritual jurisdiction as metropolitan in the case of all vacant sees within the

province of York, analogous to that which is exercised by the archbishop of Canterbury within the province of Canterbury. He has also an appellate jurisdiction of an analogous character, which he exercises through his provincial court, whilst his diocesan jurisdiction is exercised through his consistorial court, the judges of both courts being nominated by the archbishop. His ancient testamentary and matrimonial jurisdiction was transferred to the crown by the same statutes which divested the see of Canterbury of its jurisdiction in similar matters. It is the privilege of the archbishop of York to crown the queen consort and to be her perpetual chaplain. The archbishop of York takes precedence over all subjects of the crown not of royal blood, but after the lord high chancellor of England. He is ex officio an ecclesiastical commissioner for England (see further ENGLAND, CHURCH OF).

The Church of Ireland had at the time of the Act of Union four archbishops, who took their titles from Armagh, Dublin, Cashel and Tuam. By acts of 1833 and 1834, the metropolitans of Cashel and of Tuam were reduced to the status of diocesan bishops. The two archbishoprics of Armagh and Dublin are maintained in the disestablished Church of Ireland.

The title archbishop has been used in certain of the colonial churches, *e.g.* Australia, South Africa, Canada, and the West Indies, since 1893, when it was assumed by the metropolitans of Canada and Rupert's Land (see ANGLICAN COMMUNION). Archbishops have the title of His (or Your) Grace and Most Reverend Father in God.

See Hinschius, *System des katholischen Kirchenrechts* (Berlin, 1869), also article "Erzbischof," in Hauck, *Realencyklopadie* (1898); Phillimore, *The Ecclesiastical Law of the Church of England*, and authorities there cited.

(W. A. P.)

1   In the Roman Church it is safe to say that all metropolitans are archbishops. In, *e.g.*, the Scottish and American episcopal churches, however, the metropolitan is the senior bishop *pro tem.*

2   Unless the case of the claim of Mark, bishop of Carlisle, to be tried by his ordinary instead of by a temporal court, be a precedent (Phillimore, *Eccles. Law*, p. 74, ed. 1895).

3   The court of Peculiars is no longer held, inasmuch as the peculiars have been placed by acts of parliament under the ordinary jurisdiction of the bishops of the respective dioceses in which they are situated.

ARCHCHANCELLOR (Lat. *Archicancellarius*; Ger. *Erzkanzler*), or chief chancellor, a title given to the highest dignitary of the Holy Roman Empire, and also used occasionally during the middle ages to denote an official who supervised the work of chancellors or notaries.

In the 9th century Hincmar, archbishop of Reims, in his work, *De ordine palatii et regni*, speaks of a *summus cancellarius*, evidently an official at the court of the Carolingian emperors and kings. A charter of the emperor Lothair I. dated 844 refers to Agilmar, archbishop of Vienne, as archchancellor, and there are several other references to archchancellors in various chronicles. This office existed in the German kingdom of Otto the Great, and about this time it appears to have become an appanage of the archbishopric of Mainz. When the Empire was restored by Otto in 962, a separate chancery seems to have been organized for Italian affairs, and early in the 11th century the office of archchancellor for the kingdom of Italy was in the hands of the archbishop of Cologne. The theory was that all the imperial business in Germany was supervised by the elector of Mainz, and for Italy by the elector of Cologne. However, the duties of archchancellor for Italy were generally discharged by deputy, and after the virtual separation of Italy and Germany, the title alone was retained by the elector. When the kingdom of Burgundy or Arles was acquired by the emperor Conrad II. in 1032 it is possible that a separate chancery was established for this kingdom. However this may be, during the 12th century the elector of Trier took the title of archchancellor for the kingdom of Arles, although it is doubtful if he ever performed any duties in connexion with this office. This threefold division of the office of imperial archchancellor was acknowledged in 1356 by the Golden Bull of the emperor Charles IV., but the duties of the office were performed by the elector of Mainz. The office in this form was part of the constitution of the Empire until 1803 when the archbishopric of Mainz was secularized. The last elector, Karl Theodor von Dalberg, however, retained the title of archchancellor until the dissolution of the Empire in 1806. H. Reincke in *Der alte Reichstag und der neue Bundesrat* (Tübingen, 1906) points out a marked resemblance between the medieval archchancellor and the German imperial chancellor of the present day.

See du Cange, *Glossarium*, s. "Archicancellarius"; and CHANCELLOR.

ARCHDEACON (Lat. *archidiaconus*, Gr. ἀρχιδιάκονος), a high official of the Christian Church. The office of archdeacon is of great antiquity. So early as the 4th century it is mentioned as an established office, and it is probable that it was in existence in the 3rd. Originally the archdeacon was, as the name implies, the chief of the deacons attached to the bishop's cathedral, his duty being, besides preaching, to supervise the deacons and their work, *i.e.* more especially the care of the sick and the arrangement of the externals of divine worship. Even thus early their close relation to the bishop and their employment in matters of episcopal administration gave them, though only in deacons' orders, great importance, which continually developed. In the East, in the 5th century, the archdeacons were already charged with the proof of the qualifications of candidates for ordination; they attended the bishops at ecclesiastical synods, and sometimes acted as their representatives; they shared in the administration of sees during a vacancy. In the West, in the 6th and 7th centuries, besides the original functions of their office, archdeacons had certain well-defined rights of visitation and supervision, being responsible for the good order of the lower clergy, the upkeep of ecclesiastical buildings and the safe-guarding of the church furniture—functions which involved a considerable disciplinary power. During the 8th and 9th centuries the office tended to become more and more exclusively purely administrative, the archdeacon by his visitations relieving the bishop of the minutiae of government and keeping him informed in detail of the condition of his diocese. The archdeacon had thus become, on the one hand, the *oculus episcopi*, but on the other hand, armed as he was with powers of imposing penance and, in case of stubborn disobedience, of excommunicating offenders, his power tended more and more to grow at the bishop's expense. This process received a great impulse from the erection in the 11th and 12th centuries of defined territorial jurisdictions for the archdeacons, who had hitherto been itinerant representatives of the central power of the diocese. The dioceses were now mapped out into several archdeaconries (*archidiaconatus*), which corresponded with the political divisions of the countries; and these defined spheres, in accordance with the prevailing feudal tendencies of the age, gradually came to be regarded as independent centres of jurisdiction.[1] The bishops, now increasingly absorbed in secular affairs, were content with a somewhat theoretical power of control, while the archdeacons rigorously asserted an independent position which implied great power and possibilities of wealth. The custom, moreover, had grown up of bestowing the coveted office of archdeacon on the provosts, deans and canons of the cathedral churches, and the archdeacons were thus involved in the struggle of the chapters against the episcopal authority. By the 12th century the

archdeacon had become practically independent of the bishop, whose consent was only required in certain specified cases.

The power of the archdeacon reached its zenith at the outset of the 13th century. Innocent III. describes him as *judex ordinarius*, and he possesses in his own right the powers of visitation, of holding courts and imposing penalties, of deciding in matrimonial causes and cases of disputed jurisdiction, of testing candidates for orders, of inducting into benefices. He has the right to certain procurations, and to appoint and depose archpriests and rural deans. And these powers he may exercise through delegated *officiales*. His jurisdiction has become, in fact, not subordinate to, but co-ordinate with that of the bishop. Yet, so far as orders were concerned, he remained a deacon; and if archdeacons were often priests, this was because priests who were members of chapters were appointed to the office.

From the 13th century onward a reaction set in. The power of the archdeacons rested upon custom and prescription, not upon the canon law; and though the bishops could not break, they could circumvent it. This they did by appointing new officials to exercise in their name the rights still reserved to them, or to which they laid claim. These were the *officiales:* the *officiales foranei*, whose jurisdiction was parallel with that of the archdeacons, and the *officiales principales* and vicars-general, who presided over the courts of appeal. The clergy having thus another authority, and one moreover more canonical, to appeal to, the power of the archdeacons gradually declined; and, so far as the Roman Catholic Church is concerned, it received its death-blow from the council of Trent (1564), which withdrew all matrimonial and criminal causes from the competence of the archdeacons, forbade them to pronounce excommunications, and allowed them only to hold visitations in connexion with those of the bishop and with his consent. These decrees were not, indeed, at once universally enforced; but the convulsions of the Revolutionary epoch and the religious reorganization that followed completed the work. In the Roman Church to-day the office of archdeacon is merely titular, his sole function being to present the candidates for ordination to the bishop. The title, indeed, hardly exists save in Italy, where the archdeacon is no more than a dignified member of a chapter, who takes rank after the bishop. The ancient functions of the archdeacon are exercised by the vicar-general. In the Lutheran church the title *Archidiakonus* is given in some places to the senior assistant pastor of a church.

In the Church of England, on the other hand, the office of archdeacon, which was first introduced at the Norman conquest, survives, with many of its ancient duties and prerogatives. Since 1836 there have been at least two archdeaconries in each diocese, and in some dioceses there are four archdeacons. The archdeacons are appointed by their respective bishops, and they are, by an act of 1840, required to have been six full years in priest's orders. The functions of the archdeacon are in the present day ancillary in a general way to those of the bishop of the diocese. It is his especial duty to inspect the churches within his archdeaconry, to see that the fabrics are kept in repair, and to hold annual visitations of the clergy and churchwardens of each parish, for the purpose of ascertaining that the clergy are in residence, of admitting the newly elected churchwardens into office, and of receiving the presentments of the outgoing churchwardens. It is his privilege to present all candidates for ordination to the bishop of the diocese. It is his duty also to induct the clergy of his archdeaconry into the temporalities of their benefices after they have been instituted into the spiritualities by the bishop or his vicar-general. Every archdeacon is entitled to appoint an official to preside over his archidiaconal court, from which there is an appeal to the consistory court of the bishop. The archdeacons are *ex officio* members of the convocations of their respective provinces.

It is the privilege of the archdeacon of Canterbury to induct the archbishop and all the bishops of the province of Canterbury into their respective bishoprics, and this he does in the case of a bishop under a mandate from the archbishop of Canterbury, directing him to induct the bishop into the real, actual, and corporal possession of the bishopric, and to install and to enthrone him; and in the case of the archbishop, under an analogous mandate from the dean and chapter of Canterbury, as being guardians of the spiritualities during the vacancy of the archiepiscopal see. In the colonies there are two or more archdeacons in each diocese, and their functions correspond to those of English archdeacons. In the Episcopal church of America the office of archdeacon exists in only one or two dioceses.

See Hinschius, *Kirchenrecht*, ii., §§ 86. 87; Schröder, *Die Entwicklung des Archdiakonats bis zum 11. Jahrhundert* (Munich, 1890); Wetzer and Welte, *Kirchenlexikon* (Freiburg-im-Breisgau, 1882-1901); Herzog-Hauck, *Realencyklopadie* (ed. 1896); Phillimore, *Ecclesiastical Law*, part ii. chap. v. (London, 1895).

(W. A. P.)

[1] Archdeaconries were, indeed, sometimes treated as ordinary fiefs and were held as such by laymen. Thus Ordericus Vitalis says that "(Fulk) granted to the monks the archdeaconry which he and his predecessors held in fee of the archbishop of Rouen" (*Hist. Eccl.* iii. 12).

ARCHDUKE (Lat. *archidux*, Ger. *Erzherzog*,) a title peculiar now to the Austrian royal family. According to Selden it denotes "an excellency or pre-eminence only, not a superiority or power over other dukes, as in archbishop it doth over other bishops." Yet in this latter sense it would seem to have been assumed by Bruno of Saxony, archbishop of Cologne, and duke of Lorraine (953-965), when he divided his duchy into the dukedoms of Upper and Lower Lorraine. The designation was, however, exceedingly rare during the middle ages. The title of archduke of Lorraine ceased with the circumstances which had produced it. The later dynasties of Brabant and Lorraine, when these fiefs became hereditary, bore only the title of duke. The house of Habsburg, therefore, did not acquire this title with the inheritance of the dukes of Lorraine. Nor does it occur in any of the charters granted to the dukes of Austria by the emperors; though in that creating the first duke of Austria the *archiduces palatii, i.e.* the principal dukes of the court, are mentioned. The "Archidux Austriae, seu Austriae inferioris" is spoken of by Abbot Rudolph (d. 1138) in his chronicles of the abbey of St Trond (*Gesta Abbatum Trudonensium*) but this is no more than a rhetorical flourish, and the title of "archduke palatine" (Pfalz-Erzherzog) was, in fact, assumed first by Duke Rudolph IV. (d. 1365), and was one of the rights and privileges included in his famous forgery of the year 1358, the *privilegium maius*, which purported to have been bestowed by the emperor Frederick I. on the dukes of Austria in extension of the genuine *privilegium minus* of 1156, granted to the margrave Henry II. Rudolph IV. used the title on his seals and charters till he was compelled to desist by the emperor Charles IV. The title was also assumed for a time, probably on the strength of the *privilegium maius*, by Duke Ernest of Styria (d. 1424); but it did not legally belong to the house of Habsburg until 1453, when Duke Ernest's son, the emperor Frederick III. (Frederick V., duke of Styria and Carinthia, 1424-1493, of Austria, 1463-1493), confirmed the *privilegium maius* and conferred the title of archduke of Austria on his son Maximilian and his heirs. The title archduke (or archduchess) is now borne by all members of the Austrian imperial house.

See John Selden, *Titles of Honor* (1672); Antonius Matthaeus, *De nobilitate, de principibus, deducibus, &c., libriquatuor* (Amsterdam and Leiden, 1696, lib. i. cap. 6); Pfeffel, *Abrégé chronologique de l'hist, el du droit public d'Allemagne* (Paris, 1766); Brinckmeier, *Glossarium diplomaticum, &c.* (1850-1863, 2 vols.); J.F. Joachim, "Abhandlung von dem Titel 'Erzherzog,' welchen das Haus Oesterreich fuhrt." in *Prufende Gesellschaft zu Halle, 7*; F. Wachter, art. "Erzherzog," in *Allgem. Encykl. der Wissenschiften u. Kunste* (1842, pub. by Ersch and Gruber); A. Huber, *Ueber die Entstehungszeit der oesterreichischen Freiheitsbriefe* (Vienna, 1860); W. Erben, *Das Privilegium Friedrichs I. für das Herzogtum Österreich*

ARCHEAN SYSTEM (from ἀρχή, beginning), in geology. Below the lowest distinctly fossiliferous strata, that is, below those Cambrian rocks which bear the *Olenellus* fauna, there lies a great mass of stratified, metamorphic and igneous rock, to which the non-committal epithet "pre-Cambrian" is often applied; and indeed in not a few instances this general term is sufficiently precise for the present state of our knowledge. Nevertheless there are large tracts, both in the Old World and in the New, in which a subdivision of this assemblage of ancient rocks is not only possible but desirable. It is quite clear in certain regions that there is a lowermost group with a prevailing granitoid, gneissic and schistose facies, mainly of igneous origin, above which there are one or several groups bearing a distinctly sedimentary aspect. It is to this lowermost gneissic group that the term "Archean" may be conveniently limited.

Distribution of
Archean Rocks
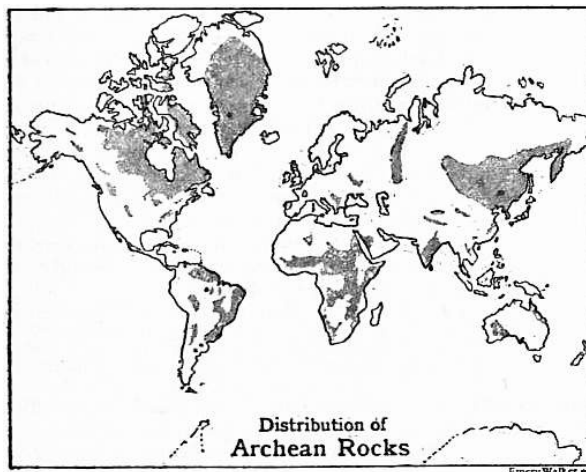
Thus, while the name "pre-Cambrian" may be used to indicate all these very old rocks whenever there is still any difficulty in subdividing them further, it is an advantage to have a special appellation for the oldest group where this can be distinguished.

It must be pointed out that the term "Archean" has been used as a synonym for pre-Cambrian; and that the expressions *Azoic* (from α-, privative; ζωή, life), *Eozoic* (from ἠώς, dawn), and *Fundamental Complex*, have been employed in somewhat the same sense. *Archeozoic* has been proposed by American writers to apply to the lowest pre-Cambrian rocks with the same significance as "Archean" in the restricted sense employed here; but it is perhaps safer to avoid any reference to the supposed stage of life development where all direct evidence is non-existent. The so-called "Azoic" rocks have already been made to yield evidence of life, and there is no reason to presuppose the impossibility of finding other records of still earlier organisms.

The prevailing rocks of the Archean system are igneous, with metamorphosed varieties of the same; sedimentary rocks, distinctly recognizable as such, are scarce, though highly metamorphosed rocks supposed to be sediments, in some regions, take an important place.

There are several features which are peculiarly characteristic of the Archean rocks:—(1) the extraordinary complexity of the assemblage of igneous materials; (2) the extreme metamorphism and deformation which nearly all the rocks have suffered; and (3) the inextricable intermixture of igneous rocks with those for which a sedimentary origin is postulated. Wherever the Archean rocks have been closely examined two great groups of rocks are distinguishable, an older, schistose group and a younger, granitoid and gneissic group. For many years the latter was supposed to be the older, hence the epithets "primitive" or "fundamental" were applied to it. Now, however, it has been shown, both in Europe and in North America, that in certain regions a schistose series is penetrated by a gneissose series and when this occurs the schists must be the older. But bearing in mind the difficulties of interpretation, it is not at all unreasonable to assume that there may yet be regions where the gneissose rocks are the oldest; for where no schistose series is present there may be no criterion for estimating the age of the granites and gneisses. The exceedingly great difficulties which lie in the way of every attempt to unravel the history of an Archean rock-complex cannot be too forcibly emphasized; for to be able to demonstrate the order of events and succession of rocks we should at least know whether we are dealing with sediments, flows of volcanic material, or intrusions, yet in many instances this cannot be done. In some areas the gradual passage of highly foliated and metamorphosed schists may be traced into comparatively unaltered arkoses, greywackes, conglomerates; or into volcanic lava-flows, pyro-clastic rocks or dikes; or again through a gneissose rock into a granite or a gabbro; but the districts wherein these relationships have been thoroughly worked out are very few.

This much may be said, that where the Archean system has been most carefully studied, there appears to be (1) a schistose series, of itself by no means simple but containing the foliated equivalents of sedimentary and igneous rocks; into this series a gneissose group (2) has been intruded in the form of batholites, great sheets and sills with accompanying intrusional prolongations into the schists; subsequently, into the gneisses and schists, after they had been further deformed, sheared and foliated, another set (3) of dikes or thin sheet-like intrusions penetrated. All this, namely, the formation of sediments, the outpouring of volcanic rocks, their repeated deformation by powerful dynamic agencies and then their penetration by dikes and sheets had been completed and erosion had been at work upon the hardened and exposed rocks, before the earliest pre-Cambrian sediment was deposited.

There has been much premature speculation as to the nature and origin of these very ancient rocks. The prevalence of regular foliation with layers of different mineral composition, producing a close resemblance to bedding, has led some to imagine that the gneisses and schists were themselves the product of the primeval oceans, a supposition that is no longer worthy of further discussion. Others have supposed that the gneisses were largely produced by the resorption and fusion of older sediments in the molten interior of the earth; there is no evidence that this has taken place upon an extended scale, though there is reason to believe that something of this kind has happened in places, and there is in the hypothesis nothing radically untenable. In one way the sedimentary schists have undoubtedly been incorporated within the gneissose mass, namely, by the extremely thorough and intimate penetration of the former by the latter along planes of foliation; and when a complex mass such as this has been further sheared and metamorphosed, a uniform gneiss appears to result from the intermixture.

A not uncommon cause of the apparently bedded arrangement of layers of different mineralogical composition may be traced to the original differentiation of the granitoid magma into different mineral-sheets. When these mineralogically different layers were forced into other rocks, sometimes before the complete consolidation of the former and sometimes subsequent to it, in the generally metamorphosed condition of the whole, it is easy to see a superficial resemblance to bedding.

The Archean rocks have frequently been spoken of as the original crust of the earth; but even granting a cooling molten globe with a first-formed stony surface, it is tolerably clear that such a crust has nowhere yet been found, nor is it ever likely to be discovered. The very earliest recognizable sediments are the result of the destruction of still earlier exposures of rock; the oldest known volcanic rocks were poured upon a surface we can no longer distinguish, and as for the great granitoid masses, they could only have been formed under the pressure of superincumbent masses of material. The earliest known sediments must have been deep in the zones of shearing and rock flowage before the first pre-Cambrian denudation. The time required for these changes is difficult to conceive.

As regards the life of the Archean, or, as some call it, the "Archeozoic" period, we know nothing. The presence of carbonaceous shale and graphitic schists as well as of the altered sedimentary iron ores has been taken as indicative of vegetable life. Similarly, the occurrence of limestones suggests the existence of organic activity, but direct evidence is wanting. Much interest naturally attaches to this remote period, and when Sir William E. Logan in 1854 found the foraminifera-like *Eozoon Canadense*, high hopes of further discoveries were entertained, but the inorganic nature of this structure has since been clearly proved.

Distribution.—It is generally assumed that the Archean rocks underlie all the younger formations over the whole globe, and presumably this is the only system that does so. Naturally, the area of its outcrop is limited, for, directly or indirectly, all the younger rock groups must rest upon it.

It has been estimated that Archean rocks appear at the surface over one-fifth of the land area (omitting coverings of superficial drifts). This estimate is no more than the roughest approximation, and is liable at any time to revision as our knowledge of little-known regions is increased. It must ever be borne in mind that the presence of a gneissose or schistose complex does not in itself imply the Archean age of such a set of rocks. Local manifestations of a similar petrological facies may and do appear which are of vastly inferior geological age; and unless there is unequivocal evidence that such rocks lie beneath the oldest fossil-bearing strata, there can be no absolute certainty as to their antiquity. It is more than likely that certain occurrences of gneiss and schist, at present regarded as Archean, may prove on fuller examination to be metamorphosed representatives of younger periods.

Britain.—The most important exposure of Archean rocks in Britain is in the north-west of Scotland, where they form the mainland in Sutherland and Ross-shire, and appear also in the outer Hebrides. Their great development in the isle of Lewis has given rise to the term "Lewisian" (Hebridean), by which the gneisses of this region are now generally known. The Lewisian series comprises two great groups of rocks, (1) the so-called "fundamental complex," an assemblage of acid, basic and intermediate irruptive rocks, associated together in a complex of extraordinary intricacy, and (2) a series of dikes, which like the rocks they traverse, show every gradation from ultra-basic to ultra-acid types. But the above bald statement conveys no idea of the complexity of the series, for before the "fundamental complex" had been pierced by the later dike system it had been subjected to severe dynamo-metamorphism and many of the massive rocks had been folded, thrust and sheared, and a very general state of foliation had been produced. Nor was this all, for after the intrusion of the dikes, great movements brought about vertical dislocations, and thrust planes, which traversed the rocks at all angles, accompanied by still further internal shearing and superinduced foliation.

In the valley of Loch Maree and thence south-westward into Glenelg, a series of mica-schists, quartz-schists, saccharoid limestones and graphitic schists has been regarded as a group of sedimentary origin through which the Lewisian rocks have been irrupted.

In England several small masses of gneiss, notably at Primrose Hill on the Wrekin, Shropshire, in the Malvern hills, and on the island of Anglesey in North Wales, are supposed to correspond with the Lewisian of Scotland.

North America.—In this continent there is a great development of Archean rocks in Canada. On the eastern side it covers nearly the whole of the Labrador peninsula, and extends into Baffin Bay and possibly over much of Greenland; a broad tract unites the great lake region with Labrador, and from the same region, by way of the Mackenzie valley, a similar tract extends in a north-westerly direction to the Arctic Ocean. This northern (Canadian) area of Archean includes portions of the states of Minnesota, Michigan, Wisconsin and the Adirondack region of New York. On the western side of the continent a series of disconnected exposures of Archean rocks runs downwards in a narrow belt from Alaska to New Mexico; and on the eastern side a similar belt reaches from Newfoundland to Alabama.

Much attention is now being given to the more scattered exposures of Archean rocks, but the best-known area is the classical ground in the vicinity of Lake Superior and Lake Huron and in the Ottawa gneiss region of Canada. Some of the more important districts are the following:—

Rainy Lake district, Canada: The Archean rocks here consist of altered diorites and diabases (the lower Keewatin series) and black hornblende schists (probably altered igneous rocks), with mica gneisses which are perhaps of sedimentary origin.

The Mona and Kiticni schists; metamorphosed lava and tuffs, with serpentine and dolomite, probably derived from peridotites; there are also gneissic granites and syenites.

In the Menominee region of Michigan and Wisconsin, the Quinnesec schist series mainly consist of schistose quartz porphyry with associated gneisses.

In the Mesaba district of Minnesota the Archean consists of a complex of more or less foliated igneous rocks mostly basic in character.

The Archean of the Vermilion district of Minnesota comprises the Soudan formation, an altered sedimentary series with banded cherts, jasper and magnetite schists; the iron ores are extensively mined. At the base is a conglomerate containing pebbles from the formation below, the Ely greenstone, which is made up of altered basalts and andesites, generally in a schistose condition, but occasionally exhibiting spherulitic structures. Into these two formations a series of granites have been intruded.

Europe.—In Scandinavia, as in Scotland, the pre-Cambrian is represented by an earlier and a later series of rocks of which the former (Grundfjeldet, Urberget) may be taken to be the equivalent of the Lewisian gneisses. This assemblage of coarse red and grey banded gneisses, with associated granulites and many varieties of acid, basic and intermediate rocks in a gneissose condition, is intimately related to a highly metamorphosed sedimentary series comprising limestones, quartzites and schists, which, as in Scotland, is apparently older than the gneisses. Similar rocks occur in Sweden and Finland.

In Bavaria and Bohemia the Archean is divisible into a lower red gneiss, a comparatively simple series, called by C.W. von Gümbel the "gneiss of Bojan"; and an upper, grey gneiss with other schistose rocks, serpentine and graphitic limestone, termed by the same author the "Hercynian gneiss."

In Brittany a gneissose and schistose igneous series lies at the base of the pre-Cambrian. The pre-Cambrian cores of the eastern and central Pyrenees, consisting of gneiss, schists and altered limestones, are presumably of Archean age.

Asia, Australia, &c.—In northern China, mica-gneisses and granite-gneisses with associated schists may be regarded as

Archean. In India the system is represented by the Bundelkhand gneiss and the central older gneisses of the Himalayas. In Japan, in the Abukuma plateau, there is much granite, gneiss and schist which may be of this age. In Australia, similar rocks are recognized as Archean in South Australia and Westralia, and they are estimated to cover an area of no less than 20,000 sq. m.; in Tasmania they are well developed on the western side. Although a great area is occupied by crystalline rocks in New Zealand, the Archean age of any portion of the series is not yet satisfactorily established; the lower granites and gneisses may belong to this period. Africa contains enormous tracts of crystalline gneisses, granites and schists, and some of these are almost certainly of Archean age; but in the present state of our knowledge it is impossible to speak more exactly.

REFERENCES.—A good general account of the Archean system will be found in Sir A. Geikie's *Text Book of Geology*, vol. ii., 4th ed. (1903), and in T.C. Chamberlin and R.D. Salisbury's *Geology*, vol. ii. (1906); these volumes contain references to all important literature.

(J. A. H.)

ARCHELAUS OF CAPPADOCIA (1st century B.C.), general of Mithradates the Great in the war against Rome. In 87 B.C. he was sent to Greece with a large army and fleet, and occupied the Peiraeus after three days' fighting with Bruttius Sura, prefect of Macedonia, who in the previous year had defeated Mithradates' fleet under Metrophanes and captured the island of Sciathus. Here he was besieged by Sulla, compelled to withdraw into Boeotia, and completely defeated at Chaeroneia (86). A fresh army was sent by Mithradates, but Archelaus was again defeated at Orchomenus, after a two days' battle (85). On the conclusion of peace, Archelaus, finding that he had incurred the suspicion of Mithradates, deserted to the Romans, by whom he was well received. Nothing further is known of him.

Appian, *Mithrid*. 30, 49, 56, 64; Plutarch, *Sulla*, 11, 16-19, 20, 23; *Lucullus*, 8.

ARCHELAUS, king of Egypt, was his son. In 56 B.C. he married Berenice, daughter of Ptolemy Auletes, queen of Egypt, but his reign only lasted six months. He was defeated by Aulus Gabinius and slain (55).

See Strabo xii. p. 558, xvii. p. 796; Dio Cassius xxxix. 57-58; Cicero, *Pro Rabirio*, 8; Hirtius (?), *Bell. Alex*. 66; also PTOLEMIES.

ARCHELAUS, king of Cappadocia, was grandson of the last named. In 41 B.C. (according to others, 34), he was made king of Cappadocia by Mark Antony, whom, however, he deserted after the battle of Actium. Octavian enlarged his kingdom by the addition of part of Cilicia and Lesser Armenia. He was not popular with his subjects, who even brought an accusation against him in Rome, on which occasion he was defended by Tiberius. Subsequently he was accused by Tiberius, when emperor, of endeavouring to stir up a revolution, and died in confinement at Rome (A.D. 17). Cappadocia was then made a Roman province. Archelaus was said to have been the author of a geographical work, and to have written treatises *On Stones* and *Rivers*.

Strabo xii. p. 540; Suetonius, *Tiberius*, 37, *Caligula*, 1; Dio Cassius xlix. 32-51; Tacitus, *Ann*. ii. 42.

ARCHELAUS, king of Judaea, was the son of Herod the Great. He received the kingdom of Judaea by the last will of his father, though a previous will had bequeathed it to his brother Antipas. He was proclaimed king by the army, but declined to assume the title until he had submitted his claims to Augustus at Rome. Before setting out, he quelled with the utmost cruelty a sedition of the Pharisees, slaying nearly 3000 of them. At Rome he was opposed by Antipas and by many of the Jews, who feared his cruelty; but Augustus allotted to him the greater part of the kingdom (Judaea, Samaria, Ituraea) with the title of ethnarch. He married Glaphyra, the widow of his brother Alexander, though his wife and her second husband, Juba, king of Mauretania, were alive. This violation of the Mosaic law and his continued cruelty roused the Jews, who complained to Augustus. Archelaus was deposed (A.D. 7) and banished to Vienne. The date of his death is unknown.

Archelaus is mentioned in Matt. ii. 22, and the parable of Luke xix. 11 f. probably refers to his journey to Rome.

See Schürer, *Gesch. des jüdischen Volkes*, i. 449-453.

(J. H. A. H.)

ARCHELAUS, king of Macedonia (413-399 B.C.), was the son of Perdiccas and a slave mother. He obtained the throne by murdering his uncle, his cousin and his half-brother, the legitimate heir, but proved a capable and beneficent ruler. He fortified cities, constructed roads and organized the army. He endeavoured to spread among his people the refinements of Greek civilization, and invited to his court, which he removed from Aegae to Pella, many celebrated men, amongst them Zeuxis, Timotheus, Euripides and Agathon. In 399 he was killed by one of his favourites while hunting; according to another account he was the victim of a conspiracy.

Diodorus Siculus xiii. 49, xiv. 37; Thucydides ii. 100. See MACEDONIA.

ARCHELAUS OF MILETUS, Greek philosopher of the 5th century B.C., was born probably at Athens, though Diogenes Laërtius (ii. 16) says at Miletus. He was a pupil of Anaxagoras, and is said by Ion of Chios (*ap*. Diog. Laërt. ii. 23) to have been the teacher of Socrates. Some argue that this is probably only an attempt to connect Socrates with the Ionian school; others (*e.g.* Gomperz, *Greek Thinkers*) uphold the story. There is similar difference of opinion as regards the statement that Archelaus formulated certain ethical doctrines. In general, he followed Anaxagoras, but in his cosmology he went back to the earlier Ionians. He postulated primitive Matter, identical with air and mingled with Mind, thus avoiding the dualism of Anaxagoras. Out of this conscious "air," by a process of thickening and thinning, arose cold and warmth, or water and fire, the one passive, the other active. The earth and the heavenly bodies are formed from mud, the product of fire and water,

from which springs also man, at first in his lower forms. Man differs from animals by the possession of the moral and artistic faculty. No fragments of Archelaus remain; his doctrines have to be extracted from Diogenes Laërtius, Simplicius, Plutarch and Hippolytus.

See IONIAN SCHOOL; for his ethical theories see T. Gomperz, *Greek Thinkers* (Eng. trans., 1901), vol. i. p. 402.

ARCHENHOLZ, JOHANN WILHELM VON (1743-1812), German historian, was born at Langfuhr, a suburb of Danzig, on the 3rd of September 1743. From the Berlin Cadet school he passed into the Prussian army at the age of sixteen, and took part in the last campaigns of the Seven Years' War. Retiring from military service, on account of his wounds, with the rank of captain in 1763, he travelled for sixteen years and visited nearly all the countries of Europe, and resided in England for ten years (1769-1779). Returning to Germany in 1780, he obtained a lay canonry at the cathedral of Magdeburg, and immediately entered upon a literary career by publishing the periodical *Litteratur- und Völkerkunde* (Leipzig, 1782-1791). This was followed in 1785 by *England und Italien* (2nd ed., Leipzig, 1787), in which he gives a remarkably unprejudiced appreciation of English political and social institutions. Between 1789 and 1798 he published his *Annalen der britischen Geschichte* (20 vols). But the work by which he is best known to fame is his brilliantly written history of the Seven Years' War, *Geschichte des siebenjährigen Krieges* (first published in the *Berliner historisches Taschenbuch* of 1787, and later in 2 vols., Berlin, 1793; 13th ed., Leipzig, 1892). This work, though as regards the main facts and details it only follows other writers, is still a useful source of information upon the epoch with which it deals. In 1792 Archenholz removed to Hamburg, and there, from 1792 to 1812, edited the journal *Minerva*, which had a great reputation for its literary, historical and political information. Archenholz died at his country seat, Oyendorf, near Hamburg, on the 28th of February 1812.

ARCHER, WILLIAM (1856-   ), English critic, was born at Perth on the 23rd of September 1856, and was educated at Edinburgh University. He became a leader-writer on the *Edinburgh Evening News* in 1875, and after a year in Australia returned to Edinburgh. In 1879 he became dramatic critic of the *London Figaro*, and in 1884 of the *World*. In London he soon took a prominent literary place. Mr Archer had much to do with introducing Ibsen to the English public by his translation of *The Pillars of Society*, produced at the Gaiety Theatre, London, in 1880. He also translated, alone or in collaboration, other productions of the Scandinavian stage: Ibsen's *Doll's House* (1889), *Master Builder* (1893); Edvard Brandes's *A Visit* (1892); Ibsen's *Peer Gynt* (1892); *Little Eyolf* (1895); and *John Gabriel Borkman* (1897); and he edited *Henrik Ibsen's Prose Dramas* (5 vols., 1890-1891). Among his critical works are:—*English Dramatists of To-day* (1882); *Masks or Faces?* (1888); five vols. of critical notices reprinted, *The Theatrical World* (1893-1897); *America To-day, Observations and Reflections*; *Poets of the Younger Generation* (1901); *Real Conversations* (1904).

ARCHERMUS, a Chian sculptor of the middle of the 6th century B.C. His father Micciades, and his sons, Bupalus and Athenis, were all sculptors of marble, using doubtless the fine marble of their native land. The school excelled in draped female figures. Archermus is said by a scholiast (on Aristophanes' *Birds*, v. 573) to have been the first to represent Victory and Love with wings. This statement gives especial interest to a discovery made at Delos of a basis signed by Micciades and Archermus which was connected with a winged female figure in rapid motion (see GREEK ART), a figure naturally at first regarded as the Victory of Archermus. Unfortunately further investigation has discredited the notion that the statue belongs to the basis, which seems rather to have supported a sphinx.

ARCHERY, the art and practice of shooting with the bow (*arcus*) and arrow, or with crossbow and bolts. Though these weapons are by no means widely used amongst savage tribes of the present day, their origin is lost in the mists of antiquity.

History in war. Amongst the great peoples of ancient history the Egyptians were the first and the most famous of archers, relying on the bow as their principal weapon in war. Their bows were somewhat shorter than a man, and their arrows varied between 2 ft. and 2 ft. 8 in. in length. Here, as elsewhere, flint heads for arrows were by no means rare, but bronze was the usual material employed. The Biblical bow was of reed, wood or horn, and the Israelites used it freely both in war (Gen. xlviii. 22) and in the chase (xxi. 20). The Assyrians also were a nation of archers. Amongst the Greeks of the historic period archery was not much in evidence, in spite of the tradition of Teucer, Ulysses and many other archers of the *Iliad* and *Odyssey*. The Cretans, however, supplied Greek armies with the bowmen required. In the "Ten Thousand" figured two hundred Cretan bowmen of Sosias' corps. Rüstow and Köchly (*Geschichte des griechischen Kriegwesens*, p. 131) estimate the range of the Cretan bow at eighty to one hundred paces, as compared with the sling-bullet's forty or fifty, and the javelin's thirty to forty. The Romans as a nation were, equally with the Greeks, indifferent to archery; in their legions the archer element was furnished by Cretans and Asiatics. On the other hand nearly all Asiatic and derived nations were famous bowmen, from the nations who fought under Xerxes' banner onwards. The Persian, Scythian and Parthian bow was far more efficient than the Cretan, though the latter was not wanting in the heterogeneous armies of the East. The *sagittarii*, three thousand strong, who fought in the Pharsalian campaign, were drawn from Crete, Pontus, Syria, &c. But the Roman view of archery was radically altered when the old legionary system perished at Adrianople (A.D. 378). After this time the armies of the empire consisted in great part of horse-archers. Their missiles, we are told, pierced cuirass and shield with ease, and they shot equally well dismounted and at the gallop. These troops, combined with heavy cavalry and themselves not unprovided with armour, played a decisive part in the Roman victories of the age of Belisarius and Narses. The destruction of the Franks at Casilinum (A.D. 554) was practically the work of the horse-archers.

In the main, the nations whose migrations altered the face of Europe were not archers. Only with the Welsh, the Scandinavians, and the peoples in touch with the Eastern empire was the bow a favourite weapon. The edicts of Charlemagne could not succeed in making archery popular in his dominions, and Abbot Ebles, the defender of Paris in 886, is almost the only instance of a skilled archer in the European records of the time. The sagas, on the other hand, have much

to say as to the feats of northern heroes with the bow. With English, French and Germans the bow was the weapon of the poorest military classes. The Norman archers, who doubtless preserved the traditions of their Danish ancestors, were in the forefront of William's line at Hastings (1066), but contemporary evidence points conclusively to the short bow, drawn to the chest, as the weapon used on this occasion. The combat of Bourgthéroulde in 1124 shows that the Normans still combined heavy cavalry and archers as at Hastings. Horse-archers too (contrary to the usual belief) were here employed by the English.

Yet the "Assize of Arms" of 1181 does not mention the bow, and Richard I. was at great pains to procure crossbowmen for the Crusades. The crossbow had from about the 10th century gradually become the principal missile weapon in Europe, in spite of the fact that it was condemned by the Lateran Council of 1139. As early as 1270 in France, and rather later in Spain, the master of the crossbowmen had become a great dignitary, and in Spain the weapon was used by a *corps d'élite* of men of gentle birth, who, with their gay apparel, were a picturesque feature of continental armies of the period. But the Genoese, Pisans and Venetians were the peoples which employed the crossbow most of all. Many thousand Genoese crossbowmen were present at Creçy.

It was in the Crusades that the crossbow made its reputation, opposing heavier weight and greater accuracy to the missiles of the horse-archers, who invariably constituted the greatest and most important part of the Asiatic armies. So little change in warfare had centuries brought about that a crusading force in 1104 perished at Carrhae, on the same ground and before the same mounted-archer tactics, as the army of Crassus in 55 B.C. But individually the crusading crossbowman was infinitely superior to the Turkish or Egyptian horse-archer.

England, which was to become the country of archers *par excellence*, long retained the old short bow of Hastings, and the far more efficient crossbow was only used as a rule by mercenaries, such as the celebrated Falkes de Breauté and his men in the reign of John. South Wales, it seems certain, eventually produced the famous long-bow. In Ireland, in Henry II.'s time, Strongbow made great use of Welsh bowmen, whom he mounted for purposes of guerrilla warfare, and eventually the prowess of Welsh archers taught Edward I. the value of the hitherto discredited arm. At Falkirk (*q.v.*), once for all, the long-bow proved its worth, and thenceforward for centuries it was the principal weapon of English soldiers. By 1339, archers had come to be half of the whole mass of footmen, and later the proportion was greatly increased. In 1360 Edward III. mounted his archers, as Strongbow had done. The long-bow was about 5 ft., and its shaft a cloth-yard long. Shot by a Welsh archer, a shaft had penetrated an oak door (at Abergavenny in 1182) 4 in. thick and the head stood out a hand's breadth on the inner side. Drawn to the right ear, the bow was naturally capable of long shooting, and in Henry VIII.'s time practice at a less range than one furlong was forbidden. In rapidity it was the equal of the short bow and the superior of the crossbow, which weapon, indeed, it surpassed in all respects. Falkirk, and still more Creçy, Poitiers and Agincourt, made the English archers the most celebrated infantry in Europe, and the kings of England, in whatever else they differed from each other, were, from Edward II. to Henry VIII., at one in the matter of archery. In 1363 Edward III. commanded the general practice of archery on Sundays and holidays, all other sports being forbidden. The provisions of this act were from time to time re-issued, particularly in the well-known act of Henry VIII. The price of bows and arrows was also regulated in the reign of Edward III., and Richard III. ordained that for every ton of certain goods imported ten yew-bows should be imported also, while at the same time long-bows of unusual size were admitted free of duty. In order to prevent the too rapid consumption of yew for bow-staves, bowyers were ordered to make four bows of wych-hazel, ash or elm to one of yew, and only the best and most useful men were allowed to possess yew-bows. Distant and exposed counties were provided for by making bowyers, fletchers, &c., liable (unless freemen of the city of London) to be ordered to any point where their services might be required. In Scotland and Ireland also, considerable attention was paid to archery. In 1478 archery was encouraged in Ireland by statute, and James I. and James IV. of Scotland, in particular, did their best to stimulate the interest of their subjects in the bow, whose powers they had felt in so many battles from Falkirk to Homildon Hill.

The introduction of hand-firearms was naturally fatal to the bow as a warlike weapon, but the conservatism of the English, and the non-professional character of wars waged by them, added to the technical deficiencies of early firearms, made the process of change in England very gradual. The mercenary or professional element was naturally the first to adopt the new weapons. At Pont de l'Arche in 1418 the English had "*petits canons*" (which seem to have been hand guns), and during the latter part of the Hundred Years' War their use became more and more frequent. The crossbow soon disappeared from the more professional armies of the continent. Charles the Bold had, before the battle of Morat (1476), ten thousand *coulevrines à main*. But in the hands of local forces the crossbow lingered on, at least in rural France, until about 1630. Its last appearance in war was in the hands of the Chinese at Taku (1860). But the long-bow, an incomparably finer weapon, endured as one of the principal arms of the English soldier until about 1590. Edward IV. entered London after the battle of Barnet with 500 "smokie gunners" (foreign mercenaries), but at that engagement Warwick's centre consisted solely of bows and bills (1471). The new weapons gradually made their way, but even in 1588, the year of the Armada, the local forces of Devonshire comprised 800 bows to 1600 "shot," and 800 bills to 800 pikes. But the Armada year saw the last appearance of the English archer, and the same county in 1598 provides neither archers nor billmen, while in the professional army in Ireland these weapons had long given way to musket and caliver, pike and halberd. Archers appeared in civilized warfare as late as 1807, when fifteen hundred "baskiers," horse-archers, clad in chain armour, fought against Napoleon in Poland.

As a weapon of the chase the bow was in its various forms employed even more than in war. The rise of archery as a sport in England was, of course, a consequence of its military value, which caused it to be so heartily encouraged by all English sovereigns.

The Japanese were from their earliest times great archers, and the bow was the weapon *par excellence* of their soldiers. The standard length of the bow (usually bamboo) was 7 ft. 6 in., of the arrow 3 ft. to 3 ft. 9 in. Numerous feats of archery are recorded to have taken place in the "thirty-three span" halls of Kioto and Tokyo, where the archer had to shoot the whole length of a very low corridor, 128 yds. long. Wada Daihachi in the 17th century shot 8133 arrows down the corridor in twenty-four consecutive hours, averaging five shots a minute, and in 1852 a modern archer made 5583 successful shots in twenty hours, or over four a minute.

The Pastime of Archery.—The use of the bow and arrow as a pastime naturally accompanied their use as weapons of war, but when the gun began to supersede the bow the pastime lost its popularity. Charles II., however, and his queen, Catherine of Braganza, interested themselves in English archery, the queen in 1676 presenting a silver badge or shield to the "Marshall of the Fraternity of Archers," which badge, once the property of the Finsbury Archers, was transferred to the keeping of the Royal Toxophilite Society, when in 1841 the two clubs combined. The Toxophilite Society was founded in 1781; for though in the north archery had long been practised, its resuscitation in the south really dates from the formation of this club by Sir Ashton Lever. This society received the title of "Royal" in 1847, though it had long been patronized by royalty. It is an error to suppose that the Finsbury Archers were connected with the Archers' division of the Hon. Artillery Company, but many members of the Toxophilite Society joined that division, and used its ground for shooting, securing, however, a London ground of their own in the district where Gower Street, W.C., now is. When this ground became unavailable, the shooting probably took place at Highbury, and later in 1820, on Lord's cricket ground, the present ground in the Inner Circle of Regent's Park, near the Botanical Gardens, not being acquired till 1833. The society may be regarded as the most important body connected with archery, most of the leading archers belonging to it, though the Grand National Archery Society controls the public meetings. Among its more

important events is the shooting of 144 arrows at 100 yds. for the Crunder Cup and Bugle. In the early days of the club targets of different sizes were used at the different ranges, and the scores were recorded in money (*e.g.* "Mr Elwin, 86 hits, £5 : 5 : 6"). The Woodmen of Arden can claim an almost equal antiquity, having been founded—some say "revived"— in 1785. The number of members is limited to 80; at one time there were 81, Sir Robert Peel having been elected as a supernumerary by way of compliment. The headquarters of the Woodmen are at Meriden in Warwickshire; the club has a nominal authority over vert and venison, whence its officers bear appropriate names-warden, master-forester and verderers; and the annual meeting is called the Wardmote. The master-forester, or captain for the year, is the maker of the first "gold" at the annual target; he who makes the second is the senior verderer. The club devotes itself to the old-fashioned clout-shooting at long ranges, reckoned by "scores," nine score meaning 180 yds., and so on. (*Vide* "Clout-shooting" *infra*.) The chief matches in which the Woodmen engage are those against the Royal Company of Scottish Archers. The Royal British Bowmen date back to the end of the 18th century. Like many others, during the Napoleonic war they suspended operations, revived when peace was made. The club was finally dissolved in 1880. The Royal Kentish Bowmen were founded in 1785, but did not survive the war. John O'Gaunt's Bowmen, who still meet at Lancaster, were revived, not created, at the same time, and still flourish. The Herefordshire Bowmen only shoot at 60 yds., while the West Berks Society is limited to twelve members, who meet at each other's houses, except for their Autumn Handicap, shot on the Toxophilite Grounds— 216 arrows at 100 yds. The Royal Company of Archers is the chief Scottish society. Originally a semi-military body constituted in 1676, it practised archery as a pastime from the time of its foundation, several meetings being held in the first few years of its existence. It devoted itself to "rovers," or long-range shooting at the "clout," among its most interesting trophies being the "Musselburgh Arrow," first shot for in 1603, possibly even earlier, in that town; the competition was then open to all comers, for archery was long popular in Scotland, especially at Kilwinning, the headquarters of popinjay (*q.v.*) shooting. Other prizes are the "Peebles Silver Arrow," dating back to 1626, the "Edinburgh Silver Arrow" (1709), the "Selkirk Arrow," a very ancient prize, the "Dalhousie Sword," the "Hopetoun Royal Commemoration Prize," and others, shot for at ranges of 180 or 200 yds. The most curious is the "Goose Medal." Originally a goose was buried in a butt with only its head visible, and this was the archers' mark; now a small glass globe is substituted. The "Popingo (Popinjay) Medal," for which a stuffed parrot was once used as the mark, is now contested at the ordinary butts. The Kilwinning Society of Archers, founded in 1688, did not disband till 1870; the Irvine Toxophilites flourished from 1814 till about 1867. But of all societies the Grand National Archery Society, regulating the great meetings, though comparatively young, is the most important. Various open meetings were already in existence, but in 1844 a few leading archers projected a Grand National Meeting, which was held in York in that year and in 1845 and 1846, and subsequently in other places. But the society did not exist as such till 1861, after the meeting held at Liverpool, since when, notwithstanding some financial troubles, it has been the legislative and managing body of English archery. The chief meetings are the "Championship," the "Leamington and Midland Counties," the "Crystal Palace," the "Grand Western" and the "Grand Northern." For some years a "Scottish Grand National" was held, but fell into abeyance. The "Scorton Arrow" is no longer shot for in the Yorkshire village of that name, but the meeting, held regularly in the county, dates back to 1673 by record, and is probably far older. The silver arrow and the captaincy are awarded to the man who makes the first gold; the silver bugle and lieutenancy to the first red; the gold medal to most hits, and a horn spoon to the last white.

In the United States archery has had a limited popularity. The only one of the early clubs that lasted long was the "United Bowmen of Philadelphia," founded in 1828, but defunct in 1859. There was a revival twenty years later, when a National Association was formed; and various meetings were held annually and championships instituted, but there was never any popular enthusiasm for the sport, though it showed signs of increasing favour towards the end of the 19th century. The longer ranges are not greatly favoured by American archers, though at some meetings the regulation "York Round" (*vide infra* under "Targets") and the "National" are shot. Other rounds are the "Potomac," 24 arrows at 80, 24 at 70, and 24 at 60 yds.; the "Double American," 60 arrows each at 60, 50 and 40 yds.; and the "Double Columbia," for ladies, 48 each at 50, 40 and 30 yds. In team matches ladies shoot 96 arrows at 50 yds., gentlemen 96 at 60.

The Bow.—As used in the pastime of archery the length of the bows does not vary much, though it bears some relation to the length of the arrow and the length of the arrow to the strength of the archer, to which the weight of the bow has to be adapted. The proper weight of a bow is the number of ℔ which, attached to the string, will draw a full-length arrow to its head. For men's bows the drawing-power varies from 40 to 60 ℔, anything above this being extreme; ladies' bows draw from 24 to 32 ℔ Estimating 50 ℔ as a fair average, such a bow would be 6 ft. 1 in. long for a 30-in., 6 ft. for a 28-in., and 5 ft. 11 in. for a 27-in. arrow, but the height as well as the strength of the archer have to be considered. Similarly a lady's bow on the average measures about 5 ft. 6 in. and her arrows 25 in. Modern bows are either made entirely of yew (occasionally of other woods), when they are called "self-bows," or of a combination of woods, when they are called "backed-bows." Self-bows are rarely or never made in a single stave, owing to the difficulty of obtaining true and flawless wood of the necessary length; hence two staves joined by a double fish-joint, which forms the centre of the bow, are used, tested and adjusted so that they may be as equally elastic as possible. The best yew is imported from Italy and Spain, and is allowed to season for three years before it is made into a bow, which again is not used till it is two years older. In backed-bows the belly, the rounded part nearest to the string, is generally but not necessarily made of yew, the back, or flat part, of yew (the best), hickory, lance or other woods, glued together in strips. The centre of the bow, for about 18 in., should be stiff and resisting, then tapering off gradually to the horns in which the string is fitted, the greatest care being taken that the two limbs are uniform. The bow of self-yew is generally considered more agreeable to handle and has a better "cast," throwing the arrow more smoothly and with less jar, and since no glued parts are exposed, it is less liable to injury from wet. On the other hand, "crysals" (tiny cracks, which are apt to extend) are more frequent in this class of bow. Self-yew bows cost £8 or £10, where a good backed-bow can be bought for about half that. The self-bow is more sensitive than other bows, and its work is mostly done during the last few inches of the pull, where the backed-bow pulls evenly throughout. The backed-bow should be perfectly straight in the back, but after use often loses its shape either by "following the string," *i.e.* getting bent inwards on the string-side, or by becoming "reflex" (bending the opposite way). Self-bows are even more apt to lose their shape than backed-bows, as there is no hard wood to counteract the natural grain. A bow that is strongly reflexed at the ends is known as a "Cupid's bow." To form the handle the wood of the bow is left thick in the centre, and braid, leather or indiarubber is wound round it to give a better grip.

The String and Stringing.—The string is made of three strands of hemp, dressed with a preparation of glue, and should be perfectly round, smooth and not frayed, as a broken string may result in a broken bow. The string, at its centre, is 6 in. from the belly of the man's bow; 5 in. in the lady's bow. The clenched fist with the thumb upright was the old, rough and ready estimate, known as "fist-mele." For a few inches above and below the nocking point the string is lapped with carpet-thread to save it from fraying by contact with the arm; the nocking point being made by another lapping of filoselle silk, so that the string may exactly fit the nock of the arrow. When a bow is properly strung the string should be longitudinally along the middle of the belly.

Arrows and Nocking.—The parts of the arrow are the shaft, the "nock" or notch, the "pile" or point, and the feathers. The shaft is made of seasoned red deal, and may be "self" or "footed." Most arrows are "footed," *i.e.* a piece of hard wood to which the pile is attached is spliced to the deal shaft, which should be perfectly straight and stiff. The shaft is made in several shapes. Most archers prefer the "parallel" pattern—the shaft being the same size from nock to pile; the next is the "barrelled," the shape being thick in the centre and tapering towards the ends. The "bob-tail" diminishes from the pile to the nock; the "chested" tapers from the middle to the pile. The pile should not be taper but cylindrical, "broadshouldered" where the point begins. The nock is cut square. There are three feathers, the body feathers of a turkey or peacock being the best. They should all curve the same way, are about 1½ in. long and ½ in. deep, with the ends near the nock either square, or balloon-shaped. The weight of an arrow is its weight in new English silver; a five-shilling arrow is heavy for a man's bow, while four-shillings is light. A 28-in. arrow for a 50-℔ bow may weigh four-and-ninepence; a 27-in. arrow four-and-sixpence.

This may serve as a rough standard.

Other Implements.—The archer uses finger-tips, or a "tab" of leather, to protect the fingers against the string, and a leather "bracer" to protect the left arm from its blow. Quivers are not now used except by ladies. A special box for carrying bows and arrows about; a proper cupboard, known as an "ascham," in which they may be kept at home in a dry, even temperature, not too hot; and a baize or leather case for use on the ground, are important minor articles of equipment.

Targets, Scoring and Handicapping.—The targets, 4 ft. in diameter, are made of straw 3 to 4 in. thick, and are supported sloping slightly backwards by an iron stand. The faces are of floor-cloth painted with concentric rings, 4⅘ in. each in breadth. The outer ring, white, counts one point; the next, black, three; the next, blue, five; the next, red, seven; and the next, gold—a complete circle of 4⅘ in. radius—nine. The exact centre of the gold is called the "pin-hole." The targets are set up in pairs, facing each other, the distances for men being 100, 80 and 60 yds.; for ladies, 60 and 50; for convenience, 5 yds. are added to allow for a shooting-line that distance in front of each target. The centre of the gold should be 4 ft. from the ground. Each archer shoots three arrows—an "end"—at one target; they then cross over and mark the scores. If an arrow cuts two rings, the archer is credited with the value of the higher one. In matches a "York Round" or a "St George's Round" is usually shot by men, the former consisting of 144 arrows, 72 at 100 yds., 48 at 80 yds., and 24 at 60 yds., the latter of 36 arrows at each of these distances. One York Round only is shot on a day; a double York Round is shot, one on each day, at the more important meetings. Ladies usually shoot the "National Round" of 48 arrows at 60 yds. and 24 at 50 yds. At most meetings the prizes are awarded on the gross scores; at others, including the Championship meeting, on points, two points for the highest score on the round and two for most hits on the round, one point each for highest score and most hits at each of the three ranges, ten points in all. Ladies' scores are calculated similarly. To decide the Championship, the Grand National Archery Society passed a rule in 1894 that "The Champion prizes shall be awarded to the archer gaining the greatest number of points, provided that those for gross hits or gross score are included; any points won by other archers shall be redistributed among those gaining the points for gross hits or gross score." Handicapping may be done by "rings," the winner of a first prize not being allowed to count "whites" at subsequent meetings, and "blacks" and "blues" being lost for further successes. Better methods are (1) to deduct a percentage from the gross score of successful shooters, (2) to handicap by points, as in other pastimes, or (3) to rate a shooter according to the average of his last year's performances, re-rating him monthly, or at convenient intervals, the system being to add his average of the current year to his average of last year, and divide the sum by two to form his new rating.

Clout and Long Distance Shooting.—This form of archery is chiefly supported by the Woodmen of Arden and the Royal Company. At 100 yds., the target (smaller by 4 in. than the usual one, but with an inner white circle instead of the blue) is set up against a butt only 18 in. from the ground, but for nine-score, ten-score, and twelve-score shooting it is a white target, 2 ft. 6 in. in diameter, with a black centre. The target, the centre and the arrow that hits the centre are each known as a "clout." Hits and misses are signalled by a marker stationed, rather perilously, by the side of the butt. The target is sloped backwards to an angle of 60°, with rings marked round it on the ground at distances of 1½ ft., 3 ft., 6 ft. and 9 ft., a hit in the outer ring counting one, and in the next two, and so on, the clout or centre counting six. For the longer ranges lighter arrows are used. The Scottish clout was a piece of canvas, stretched on a frame; the range 180 or 200 yds.; all arrows counted one that were within 24 ft. of the target, the clout counting two. Modern archers have paid scant attention to mere distance-shooting, which is an art of its own, but their experiments prove that with a fairly heavy bow, say 60 ℔ or 63 ℔, and a long light arrow, known as a "flight arrow," a good archer should be able to reach 300 or 310 yds. With a heavier bow, properly under control, 50 or 60 yds. might be added to this by a strong man. These experiments seem to be verified by a quotation from Shakespeare (Henry IV. Act iii. Sc. 2): "A' would have clapped i' the clout and twelve score, and carried you a forehand shaft a fourteen and fourteen and a half," *i.e.* 280 or 290 yds. Instances are recorded of Englishmen shooting 340 and 360 yds., but in 1795 Mahmoud Effendi of the Turkish embassy shot 482 yds. with a Turkish bow, and Sultan Selim 972. The Turk, however, used a Turkish bow and a 14-in. arrow, with a grooved rest on his left arm along which the arrow passed, to compensate for the difference between the draw of the bow and the shortness of the arrow. The diplomatist's shot is supported by good evidence, but the sultan's is regarded as improbable at least.

Championship and Scores.—The British championship meetings, instituted in 1844, are conducted under the laws of the Grand National Archery Society: the prizes, apart from the Challenge prizes, are given in money, there being also a rule that any one who makes three golds at one end receives a shilling from all others of the same sex who are shooting. The most notable champion was Horace A. Ford (d. 1880), who held the title for eleven consecutive years, 1849 to 1859 inclusive, and again in 1867. He made a four-figure score at four other championship meetings, his highest, 1251 (in 1857) for 245 hits being unapproached. To him the modern scientific practice of archery must largely be attributed, together with its improvement and its popularity. The names of G. Edwards, Major C. Hawkins Fisher, H.H. Palairet, C.E. Nesham, and G.E.S. Fryer, are also notable as champions. Among ladies Mrs Horniblow was champion for eleven years between 1852 and 1881, Miss Legh for nineteen years between 1880 and 1908; Mrs Piers Legh, Miss Betham and Mrs Bowly claim the title on four occasions. Mrs Bowly's score of 823 (1894) was the highest made for the championship till Miss Legh made 825 with 143 hits—only one arrow missed altogether—in 1898; beating her own record with a score of 841 (143 hits) in 1904. It should not be forgotten that as the championship is awarded by points, the highest score does not necessarily win.

See Roger Ascham, *Toxophilus* (1545), edited by Edward Arber (London, 1868); *The Arte of Warre*, by William Garrard (London 1591); *The Arte of Archerie*, by Gervase Markham (London, 1634); *Ancient and Modern Methods of Arrow Release*, by E.S. Morse (1885); *The English Bowman*, by T. Roberts (London, 1801); *A Treatise on Archery*, by Thomas Waring (London, 9th ed., 1832); *The Theory and Practice of Archery*, by Horace A. Ford (new ed., London, 1887); *Archery*, by C.J. Longman and H. Walrond (Badminton Library, London, 1894).

(W. J. F.)

ARCHES, COURT OF, the English ecclesiastical court of appeal of the archbishop of Canterbury, as metropolitan of the province of Canterbury, from all the consistory and commissary courts in the province. It derives its name from its ancient place of judicature, which was in the church of *Beata Maria de Arcubus*—St Mary-le-Bow or St Mary of the Arches, "by reason of the steeple thereof raised at the top with stone pillars in fashion like a bow bent archwise." This parish was the chief of thirteen locally situated within the diocese of London but exempt from the bishop's jurisdiction, and it was no doubt owing to this circumstance that it was selected originally as the place of judicature for the archbishop's court. The proper designation of the judge is official principal of the Arches court, but by custom he came to be styled the dean of the Arches, a title belonging formerly to the chief official of the subordinate court. Originally, the official principal exercised metropolitan jurisdiction, while the dean of the Arches exercised the "peculiar" jurisdiction. The jurisdictions called "peculiars" at one time numbered nearly 300 in England. They were originally introduced by the pope for the purpose of curtailing the bishop's legitimate authority within his diocese; "an object which," says Phillimore, "they certainly attained, to the great confusion of ecclesiastical jurisdiction for many years." The dean of the Arches originally had jurisdiction over the thirteen London parishes above mentioned, but as the official principal was often absent as ambassador on the continent, he became his substitute, and gradually the two offices were blended together. The original office of the dean of the Arches may now be regarded as extinct, though the title is still popularly used, for no dean of the Arches has been appointed *eo nomine* for several centuries, and by an act of 1838 bishops have jurisdiction over all peculiars within their diocese. The judge of the Arches court was until 1874 appointed by the archbishop of Canterbury by patent which, when

confirmed by the dean and chapter of Canterbury, conferred the office for the life of the holder. He took the oaths of office required by the 127th canon. But by the Public Worship Regulation Act 1874 the two archbishops were empowered, subject to the approval of the sovereign by sign-manual, from time to time to appoint a practising barrister of ten years' standing, or a person who had been a judge of one of the superior courts (being a member of the Church of England) to be, during good behaviour, a judge for the purpose of exercising jurisdiction under that act, and it was enacted (sec. 7) that on a vacancy occurring in the office of official principal of the Arches court the judge should become *ex officio* such official principal. In this way the late Lord Penzance became dean on the retirement of Sir Robert Phillimore in 1875. Lord Penzance received in 1878 a supplemental patent as dean from Archbishop Tait, but did not otherwise fulfil the conditions observed on the appointment of his predecessors. On Lord Penzance's retirement in 1899, his successor, Sir Arthur Charles, received a patent from the archbishop of Canterbury as official principal of the Arches court, and he took the oaths of office according to the practice before the Public Worship Regulation Act. He was subsequently and separately appointed judge under that act. Sir A. Charles resigned in 1903 and was succeeded by Sir L.T. Dibdin, who qualified in the same way as his immediate predecessor. The official principal of the Arches court is the only ecclesiastical judge who is empowered to pass a sentence of deprivation against a clerk in holy orders. The appeals from the decisions of the Arches court were formerly made to the king in chancery, but they are now by statute addressed to the king in council, and they are heard before the judicial committee of the privy council. By an act of Henry VIII. (Ecclesiastical Jurisdiction Act 1532) the Arches court is empowered to hear, in the first instance, such suits as are sent up to it by letters of request from the consistorial courts of the bishops of the province of Canterbury, and by the Church Discipline Act 1840, this jurisdiction is continued to it, and it is further empowered to accept letters of request from the bishops of the province of Canterbury after they have issued commissions of inquiry under that statute, and the commissioners have made their report.

The Arches court was also the court of appeal from the consistory courts of the bishops of the province in all testamentary and matrimonial causes. The matrimonial jurisdiction was transferred to the crown by the Matrimonial Causes Act 1857. Under the Clergy Discipline Act 1892 an appeal lies from the judgment of a consistory court under that act, in respect of fact by leave of the appellate court, and in respect of law without leave, to either the Arches court or the judicial committee of the privy council at the option of the appellant. Under the Benefices Act 1898 the official principal of the archbishop is required to institute a presentee to a benefice if the tribunal constituted under that act decides that there is no valid ground for refusing institution and the bishop of the diocese notwithstanding fails to institute him. After the College of Advocates was incorporated and had established itself in Doctors' Commons, the archbishop's court of appeal, as well as his prerogative court, were usually held in the hall of the College of Advocates, but after the destruction of the buildings of the college, the court of appeal held its sittings, for the most part, in Westminster Hall. For many years past there has been but little business in the Arches court, mainly owing to the unwillingness of a large number of the clergy to recognize the jurisdiction of what they deny to be any longer a spiritual court, and the consistent use by the bishops of their right of veto in the case of prosecutions under the Public Worship Regulation Act. On the rare occasions when a sitting of the court is necessary, it is held in the library of Lambeth Palace, or at the Church House, Westminster.

ARCHESTRATUS, of Syracuse or Gela, a Greek poet, who flourished about 330 B.C. After travelling extensively in search of foreign delicacies for the table, he embodied the result in a humorous poem called Ἡδυπάθεια, afterwards freely translated by Ennius under the title *Heduphagetica*. About 300 lines of this gastronomical poem are preserved in Athenaeus. The writer, who has been styled the Hesiod or Theognis of gluttons, parodies the style of the old gnomic poets; chief attention is paid to details concerning fish.

Ribbeck, *Archestrati Reliquiae* (1877); Brandt, *Corpusculum Poesis Epicae Graecae ludibundae*, i. 1888; Schmid, *De Archestrati Gelensis Fragmentis* (1896).

ARCHIAC, ÉTIENNE JULES ADOLPHE DESMIER DE SAINT SIMON, Vicomte D' (1802-1868), French geologist and palaeontologist, was born at Reims on the 24th of September 1802. He was educated in the Military School of St Cyr, and served for nine years as a cavalry officer until 1830, when he retired from the service. Prior to this he had published an historical romance; but now geology came to occupy his chief attention. In his earlier scientific works, which date from 1835, he described the Tertiary and Cretaceous formations of France, Belgium and England, and dealt especially with the distribution of fossils geographically and in sequence. Later on he investigated the Carboniferous, Devonian and Silurian formations. His great work, *Histoire des progrès de la géologie*, 1834-1859, was published in 8 volumes at Paris (1847-1860). In 1853 the Wollaston Medal of the Geological Society was awarded to him. In the same year, with Jules Haime (1824-1856), he published a monograph on the Nummulitic formation of India. In 1857 he was elected a member of the Academy of Sciences, and in 1861 he was appointed professor of palaeontology in the Muséum d'Histoire Naturelle in Paris. Of later works his *Paléontologie stratigraphique*, in 3 vols. (1864-1865); his *Géologie et paléontologie* (1866); and his palaeontological contributions to de Tchihatcheff's *Asie mineure* (1866), may be specially mentioned.

He died on the 24th of December 1868.

See *Notice sur les travaux scientifiques du vicomte d'Archiac*, par A. Gaudry (Meulan, 1874); *Extrait du Bull. Soc. Géol. de France*, ser. 3, t. ii. p. 230 (1874).

ARCHIAS, AULUS LICINIUS, Greek poet, was born at Antioch in Syria 120 B.C. In 102, his reputation having been already established, especially as an improvisatore, he came to Rome, where he was well received amongst the highest and most influential families. His chief patron was Lucullus, whose gentile name he assumed. In 93 he visited Sicily with his patron, on which occasion he received the citizenship of Heracleia, one of the federate towns, and indirectly, by the provisions of the lex Plautia Papiria, that of Rome. In 61 he was accused by a certain Gratius of having assumed the citizenship illegally; and Cicero successfully defended him in his speech *Pro Archia*. This speech, which furnishes nearly all the information concerning Archias, states that he had celebrated the deeds of Marius and Lucullus in the Cimbrian and Mithradatic wars, and that he was engaged upon a poem of which the events of Cicero's consulship formed the subject. The Greek Anthology contains thirty-five epigrams under the name of Archias, but it is doubtful how many of these (if any) are the work of the poet of Antioch.

Cicero, *Pro Archia*; T. Reinach, *De Archia Poeta* (1890).

ARCHIDAMUS, the name of five kings of Sparta, of the Eurypontid house.

1. The son and successor of Anaxidamus. His reign, which began soon after the close of the second Messenian War, is said to have been quiet and uneventful (Pausanias iii. 7. 6).

2. The son of Zeuxidamus, reigned 476-427 B.C. (but see Leotychides). He succeeded his grandfather Leotychides upon the banishment of the latter, his father having already died. His coolness and presence of mind are said to have saved the Spartan state from destruction on the occasion of the great earthquake of 464 (Diodorus xi. 63; Plutarch, *Cimon*, 16), but this story must be regarded as at least doubtful. He was a friend of Pericles and a man of prudence and moderation. During the negotiations which preceded the Peloponnesian War he did his best to prevent, or at least to postpone, the inevitable struggle, but was overruled by the war party. He invaded Attica at the head of the Peloponnesian forces in the summers of 431, 430 and 428, and in 429 conducted operations against Plataea. He died probably in 427, certainly before the summer of 426, when we find his son Agis on the throne.

> Herod, vi. 71; Thuc. i. 79-iii. 1; Plut. *Pericles*, 29. 33; Diodorus xi. 48-xii. 52.

3. The son and successor of Agesilaus II., reigned 360-338 B.C. During his father's later years he proved himself a brave and capable officer. In 371 he led the relief force which was sent to aid the survivors of the battle of Leuctra. Four years later he captured Caryae, ravaged the territory of the Parrhasii and defeated the Arcadians, Argives and Messenians in the "tearless battle," so called because the victory did not cost the Spartans a single life. In 364, however, he sustained a severe reverse in attempting to relieve a besieged Spartan garrison at Cromnus in south-western Arcadia. He showed great heroism in the defence of Sparta against Epaminondas immediately before the battle of Mantineia (362). He supported the Phocians during the Sacred War (355-346), moved, no doubt, largely by the hatred of Thebes which he had inherited from his father; he also led the Spartan forces in the conflicts with the Thebans and their allies which arose out of the Spartan attempt to break up the city of Megalopolis. Finally he was sent with a mercenary army to Italy to protect the Tarentines against the attacks of Lucanians or Messapians; he fell together with the greater part of his force at Mandonion[1] on the same day as that on which the battle of Chaeronea was fought.

> Xen. *Hell.* v. 4, vi. 4, vii. 1. 4, 5; Plut. *Agis*, 3, *Camillus*, 19, *Agesilaus*. 25, 33, 34, 40; Pausanias iii. 10, vi. 4; Diodorus xv. 54, 72, xvi. 24, 39, 59, 62, 88.

4. The son of Eudamidas I., grandson of Archidamus III. The dates of his accession and death are unknown. In 294 B.C. he was defeated at Mantineia by Demetrius Poliorcetes, who invaded Laconia, gained a second victory close to Sparta, and was on the point of taking the city itself when he was called away by the news of the successes of Lysimachus and Ptolemy in Asia Minor and Cyprus.

> Plut. *Agis*, 3, *Demetrius*, 35; Pausanias, i. 13. 6, vii. 8. 5; Niese, *Gesch. der griech. u. makedon. Slaalen*, i. 363.

5. The son of Eudamidas II., grandson of Archidamus IV., brother of Agis IV. On his brother's murder he fled to Messenia (241 B.C.). In 227 he was recalled by Cleomenes III., who was then reigning without a colleague, but shortly after his return he was assassinated. Polybius accuses Cleomenes of the murder, but Plutarch is probably right in saying that it was the work of those who had caused the death of Agis, and feared his brother's vengeance.

> Plutarch, *Cleomenes*, i. 5; Polybius v. 37, viii. I; Niese, *op. cit.* ii. 304, 311.

(M. N. T.)

[1] So Plut. *Agis*, 3 (all MSS.). Following Cellarius, some authorities read Manduria or Mandyrium.

ARCHIL (a corruption of "orchil," Ital. *oricello*, the origin of which is unknown), a purple dye obtained from various species of lichens. Archil can be extracted from many species of the genera *Roccella*, *Lecanora*, *Umbilicaria*, *Parmelia* and others, but in practice two species of *Roccella—R. tinctoria* and *R. fuciformis*—are almost exclusively used. These, under the name of "orchella weed" or "dyer's moss," are obtained from Angola, on the west coast of Africa, where the most valuable kinds are gathered; from Cape Verde Islands; from Lima, on the west coast of South America; and from the Malabar coast of India. The colouring properties of the lichens do not exist in them ready formed, but are developed by the treatment to which they are subjected. A small proportion of a colourless, crystalline principle, termed orcinol (a dioxytoluene), is found in some, and in all a series of acid substances, erythric, lecanoric acids, &c. Orcinol in presence of oxygen and ammonia takes up nitrogen and becomes changed into a purple substance, orceine ($C_7H_7NO_3$), which is essentially the basis of all lichen dyes. Two other colouring-matters, azoerythin and erythroleinic acid, are sometimes present. Archil is prepared for the dyer's use in the form of a "liquor" (archil) and a "paste" (persis), and the latter, when dried and finely powdered, forms the "cudbear" of commerce, a dye formerly manufactured in Scotland from a native lichen, *Lecanora tartarea*. The manufacturing process consists in washing the weeds, which are then ground up with water to a thick paste. If archil paste is to be made this paste is mixed with a strong ammoniacal solution, and agitated in an iron cylinder heated by steam to about 140° F. till the desired shade is developed—a process which occupies several days. In the preparation of archil liquor the principles which yield the dye are separated from the ligneous tissue of the lichens, agitated with a hot ammoniacal solution, and exposed to the action of air. When potassium or sodium carbonate is added, a blue dye known as litmus, much used as an "indicator," is produced. French purple or lime lake is a lichen dye prepared by a modification of the archil process, and is a more brilliant and durable colour than the other. The dyeing of worsted and home-spun cloth with lichen dyes was formerly a very common domestic employment in Scotland; and to this day, in some of the outer islands, worsted continues to be dyed with "crottle," the name given to the lichens employed.

ARCHILOCHUS, Greek lyric poet and writer of lampoons, was born at Paros, one of the Cyclades islands. The date of his birth is uncertain, but he probably flourished about 650 B.C.; according to some, about forty years earlier but certainly not before the reign of Gyges (687-652), whom he mentions in a well-known fragment. His father, Telesicles, who was of noble

family, had conducted a colony to Thasos, in obedience to the command of the Delphic oracle. To this island Archilochus himself, hard pressed by poverty, afterwards removed. Another reason for leaving his native place was personal disappointment and indignation at the treatment he had received from Lycambes, a citizen of Paros, who had promised him his daughter Neobule in marriage, but had afterwards withdrawn his consent. Archilochus, taking advantage of the licence allowed at the feasts of Demeter, poured out his wounded feelings in unmerciful satire. He accused Lycambes of perjury, and his daughters of leading the most abandoned lives. Such was the effect produced by his verses, that Lycambes and his daughters are said to have hanged themselves. At Thasos the poet passed some unhappy years; his hopes of wealth were disappointed; according to him, Thasos was the meeting-place of the calamities of all Hellas. The inhabitants were frequently involved in quarrels with their neighbours, and in a war against the Saians—a Thracian tribe—he threw away his shield and fled from the field of battle. He does not seem to have felt the disgrace very keenly, for, like Alcaeus and Horace, he commemorates the event in a fragment in which he congratulates himself on having saved his life, and says he can easily procure another shield. After leaving Thasos, he is said to have visited Sparta, but to have been at once banished from that city on account of his cowardice and the licentious character of his works (Valerius Maximus vi. 3, *externa* 1). He next visited Siris, in lower Italy, a city of which he speaks very favourably. He then returned to his native place, and was slain in a battle against the Naxians by one Calondas or Corax, who was cursed by the oracle for having slain a servant of the Muses.

The writings of Archilochus consisted of elegies, hymns—one of which used to be sung by the victors in the Olympic games (Pindar, *Olympia*, ix. i)—and of poems in the iambic and trochaic measures. To him certainly we owe the invention of iambic poetry and its application to the purposes of satire. The only previous measures in Greek poetry had been the epic hexameter, and its offshoot the elegiac metre; but the slow measured structure of hexameter verse was utterly unsuited to express the quick, light motions of satire. Archilochus made use of the iambus and the trochee, and organized them into the two forms of metre known as the iambic trimeter and the trochaic tetrameter. The trochaic metre he generally used for subjects of a serious nature; the iambic for satires. He was also the first to make use of the arrangement of verses called the epode. Horace in his metres to a great extent follows Archilochus (*Epistles*, i. 19. 23-35). All ancient authorities unite in praising the poems of Archilochus, in terms which appear exaggerated (Longinus xiii. 3; Dio Chrysostom, *Orationes*, xxxiii.; Quintilian x. i. 60; Cicero, *Orator*, i.). His verses seem certainly to have possessed strength, flexibility, nervous vigour, and, beyond everything else, impetuous vehemence and energy. Horace (*Ars Poetica*, 79) speaks of the "rage" of Archilochus, and Hadrian calls his verses "raging iambics." By his countrymen he was reverenced as the equal of Homer, and statues of these two poets were dedicated on the same day.

His poems were written in the old Ionic dialect. Fragments in Bergk, *Poetae Lyrici Graeci*; Liebel, *Archilochi Reliquiae* (1818); A. Hauvette-Besnault, *Archiloque, sa vie et ses poésies* (1905).

ARCHIMANDRITE (from Gr. ἄρχων, a ruler, and μάνδρα, a fold or monastery), a title in the Greek Church applied to a superior abbot, who has the supervision of several abbots and monasteries, or to the abbot of some specially great and important monastery, the title for an ordinary abbot being hegumenos. The title occurs for the first time in a letter to Epiphanius, prefixed to his *Panarium* (c. 375), but the *Lausiac History* of Palladius may be evidence that it was in common use in the 4th century as applied to Pachomius (*q.v.*). In Russia the bishops are commonly selected from the archimandrites. The word occurs in the *Regula Columbani* (c. 7), and du Cange gives a few other cases of its use in Latin documents, but it never came into vogue in the West. Owing to intercourse with Greek and Slavonic Christianity, the title is sometimes to be met with in southern Italy and Sicily, and in Hungary and Poland.

See the article in the *Dictionnaire d'archéologie chrétienne et de liturgie*.

ARCHIMEDES (*c.* 287-212 B.C.), Greek mathematician and inventor, was born at Syracuse, in Sicily. He was the son of Pheidias, an astronomer, and was on intimate terms with, if not related to, Hiero, king of Syracuse, and Gelo his son. He studied at Alexandria and doubtless met there Conon of Samos, whom he admired as a mathematician and cherished as a friend, and to whom he was in the habit of communicating his discoveries before publication. On his return to his native city he devoted himself to mathematical research. He himself set no value on the ingenious mechanical contrivances which made him famous, regarding them as beneath the dignity of pure science and even declining to leave any written record of them except in the case of the σφαιροποιΐα (*Sphere-making*), as to which see below. As, however, these machines impressed the popular imagination, they naturally figure largely in the traditions about him. Thus he devised for Hiero engines of war which almost terrified the Romans, and which protracted the siege of Syracuse for three years. There is a story that he constructed a burning mirror which set the Roman ships on fire when they were within a bowshot of the wall. This has been discredited because it is not mentioned by Polybius, Livy or Plutarch; but it is probable that Archimedes had constructed some such burning instrument, though the connexion of it with the destruction of the Roman fleet is more than doubtful. More important, as being doubtless connected with the discovery of the principle in hydrostatics which bears his name and the foundation by him of that whole science, is the story of Hiero's reference to him of the question whether a crown made for him and purporting to be of gold, did not actually contain a proportion of silver. According to one story, Archimedes was puzzled till one day, as he was stepping into a bath and observed the water running over, it occurred to him that the excess of bulk occasioned by the introduction of alloy could be measured by putting the crown and an equal weight of gold separately into a vessel filled with water, and observing the difference of overflow. He was so overjoyed when this happy thought struck him that he ran home without his clothes, shouting εὕρηκα, εὕρηκα, "I have found it, I have found it." Similarly his pioneer work in mechanics is illustrated by the story of his having said δός μοι ποῦ στῶ καὶ κινῶ τὴν γῆν (or as another version has it, in his dialect, πᾶ βῶ καὶ κινῶ τὰν γᾶν), "Give me a place to stand and I (will) move the earth." Hiero asked him to give an illustration of his contention that a very great weight could be moved by a very small force. He is said to have fixed on a large and fully laden ship and to have used a mechanical device by which Hiero was enabled to move it by himself: but accounts differ as to the particular mechanical powers employed. The water-screw which he invented (see below) was probably devised in Egypt for the purpose of irrigating fields.

Archimedes died at the capture of Syracuse by Marcellus, 212 B.C. In the general massacre which followed the fall of the city, Archimedes, while engaged in drawing a mathematical figure on the sand, was run through the body by a Roman soldier. No blame attaches to the Roman general, Marcellus, since he had given orders to his men to spare the house and person of the sage; and in the midst of his triumph he lamented the death of so illustrious a person, directed an honourable burial to be given him, and befriended his surviving relatives. In accordance with the expressed desire of the philosopher, his tomb was marked by the figure of a sphere inscribed in a cylinder, the discovery of the relation between the volumes of a sphere and its circumscribing cylinder being regarded by him as his most valuable achievement. When Cicero was

quaestor in Sicily (75 B.C.), he found the tomb of Archimedes, near the Agrigentine gate, overgrown with thorns and briers. "Thus," says Cicero (*Tusc. Disp.*, v. c. 23, § 64), "would this most famous and once most learned city of Greece have remained a stranger to the tomb of one of its most ingenious citizens, had it not been discovered by a man of Arpinum."

Works.—The range and importance of the scientific labours of Archimedes will be best understood from a brief account of those writings which have come down to us; and it need only be added that his greatest work was in geometry, where he so extended the method of *exhaustion* as originated by Eudoxus, and followed by Euclid, that it became in his hands, though purely geometrical in form, actually equivalent in several cases to *integration*, as expounded in the first chapters of our text-books on the integral calculus. This remark applies to the finding of the area of a parabolic segment (mechanical solution) and of a spiral, the surface and volume of a sphere and of a segment thereof, and the volume of any segments of the solids of revolution of the second degree.

The extant treatises are as follows:—

(1) *On the Sphere and Cylinder* (Περὶ σφαίρας καὶ κυλίνδρου). This treatise is in two books, dedicated to Dositheus, and deals with the dimensions of spheres, cones, "solid rhombi" and cylinders, all demonstrated in a strictly geometrical method. The first book contains forty-four propositions, and those in which the most important results are finally obtained are: 13 (surface of right cylinder), 14, 15 (surface of right cone), 33 (surface of sphere), 34 (volume of sphere and its relation to that of circumscribing cylinder), 42, 43 (surface of segment of sphere), 44 (volume of sector of sphere). The second book is in nine propositions, eight of which deal with segments of spheres and include the problems of cutting a given sphere by a plane so that (*a*) the surfaces, (*b*) the volumes, of the segments are in a given ratio (Props. 3, 4), and of constructing a segment of a sphere similar to one given segment and having (*a*) its volume, (*b*) its surface, equal to that of another (5, 6).

(2) *The Measurement of the Circle* (Κύκλου μέτρησις) is a short book of three propositions, the main result being obtained in Prop. 2, which shows that the circumference of a circle is less than $3\frac{1}{7}$ and greater than $3\frac{10}{71}$ times its diameter. Inscribing in and circumscribing about a circle two polygons, each of ninety-six sides, and assuming that the perimeter of the circle lay between those of the polygons, he obtained the limits he has assigned by sheer calculation, starting from two close approximations to the value of √3, which he assumes as known (265/153 < √3 < 1351/780).

(3) *On Conoids and Spheroids* (Περὶ κωνοειδέων καὶ σφαιροειδέων) is a treatise in thirty-two propositions, on the solids generated by the revolution of the conic sections about their axes, the main results being the comparisons of the volume of any segment cut off by a plane with that of a cone having the same base and axis (Props. 21, 22 for the paraboloid, 25, 26 for the hyperboloid, and 27-32 for the spheroid).

(4) *On Spirals* (Περὶ ἑλίκων) is a book of twenty-eight propositions. Propositions 1-11 are preliminary, 13-20 contain tangential properties of the curve now known as the spiral of Archimedes, and 21-28 show how to express the area included between any portion of the curve and the radii vectores to its extremities.

(5) *On the Equilibrium of Planes or Centres of Gravity of Planes* (Περὶ ἐπιπέδων ἰσορροπιῶν ἤ κεντρα βαρῶν ἐπιπέδων). This consists of two books, and may be called the foundation of theoretical mechanics, for the previous contributions of Aristotle were comparatively vague and unscientific. In the first book there are fifteen propositions, with seven postulates; and demonstrations are given, much the same as those still employed, of the centres of gravity (1) of any two weights, (2) of any parallelogram, (3) of any triangle, (4) of any trapezium. The second book in ten propositions is devoted to the finding the centres of gravity (1) of a parabolic segment, (2) of the area included between any two parallel chords and the portions of the curve intercepted by them.

(6) *The Quadrature of the Parabola* (Τετραγωνισμὸς παραβολῆς) is a book in twenty-four propositions, containing two demonstrations that the area of any segment of a parabola is $\frac{4}{3}$ of the triangle which has the same base as the segment and equal height. The first (a mechanical proof) begins, after some preliminary propositions on the parabola, in Prop. 6, ending with an integration in Prop. 16. The second (a geometrical proof) is expounded in Props. 17-24.

(7) *On Floating Bodies* (Περὶ ὀχουμένων) is a treatise in two books, the first of which establishes the general principles of hydrostatics, and the second discusses with the greatest completeness the positions of rest and stability of a right segment of a paraboloid of revolution floating in a fluid.

(8) The *Psammites* (Ψαμμίτης, Lat. *Arenarius*, or sand reckoner), a small treatise, addressed to Gelo, the eldest son of Hiero, expounding, as applied to reckoning the number of grains of sand that could be contained in a sphere of the size of our "universe," a system of naming large numbers according to "orders" and "periods" which would enable any number to be expressed up to that which we should write with 1 followed by 80,000 ciphers!

(9) *A Collection of Lemmas*, consisting of fifteen propositions in plane geometry. This has come down to us through a Latin version of an Arabic manuscript; it cannot, however, have been written by Archimedes in its present form, as his name is quoted in it more than once.

Lastly, Archimedes is credited with the famous *Cattle-Problem*, enunciated in the epigram edited by G.E. Lessing in 1773, which purports to have been sent by Archimedes to the mathematicians at Alexandria in a letter to Eratosthenes. Of lost works by Archimedes we can identify the following: (1) investigations on *polyhedra* mentioned by Pappus; (2) Ἀρχαί, *Principles*, a book addressed to Zeuxippus and dealing with the *naming of numbers* on the system explained in the *Sand Reckoner*; (3) Περὶ ζυγῶν, *On balances or levers*; (4) Κεντροβαρικά, *On centres of gravity*; (5) Κατοπτρικά, an optical work from which Theon of Alexandria quotes a remark about refraction; (6) Ἐφόδιον, a *Method*, mentioned by Suidas; (7) Περὶ σφαιροποιΐας, *On Sphere-making*, in which Archimedes explained the construction of the sphere which he made to imitate the motions of the sun, the moon and the five planets in the heavens. Cicero actually saw this contrivance and describes it (*De Rep.* i. c. 14, §§ 21-22).

BIBLIOGRAPHY.—The *editio princeps* of the works of Archimedes, with the commentary of Eutocius, is that printed at Basel, in 1544, in Greek and Latin, by Hervagius. D. Rivault's edition (Paris, 1615) gave the enunciations in Greek and the proofs in Latin somewhat retouched. A Latin version of them was published by Isaac Barrow in 1675 (London, 4to); Nicolas Tartaglia published in Latin the treatises on *Centres of Gravity*, on the *Quadrature of the Parabola*, on the *Measurement of the Circle*, and on *Floating Bodies*, i. (Venice, 1543); Trojanus Curtius published the two books on *Floating Bodies* in 1565 after Tartaglia's death; Frederic Commandine edited the Aldine edition of 1558, 4to, which contains *Circuli Dimensio*, *De Lineis Spiralibus*, *Quadratura Paraboles*, *De Conoidibus et Spheroidibus*, and *De numero Arenae*; and in 1565 the same mathematician published the two books *De iis quae vehuntur in aqua*. J. Torelli's monumental edition of the works with the commentaries of Eutocius, published at Oxford in 1792, folio, remained the best Greek text until the definitive text edited, with Eutocius' commentaries, Latin translation, &c., by J.L. Heiberg (Leipzig, 1880-1881) superseded it. The *Arenarius* and *Dimensio Circuli*, with Eutocius' commentary on the latter, were edited by Wallis with Latin translation and notes in 1678 (Oxford), and the *Arenarius* was also published in English by George Anderson (London, 1784), with useful notes and illustrations. The first modern translation of the works is the French edition published by F. Peyrard (Paris, 1808, 2 vols. 8vo.). A valuable German translation with notes, by E. Nizze, was published at Stralsund in 1824. There is a complete edition in modern notation by T.L. Heath (*The Works of Archimedes*, Cambridge, 1897). On Archimedes himself, see Plutarch's *Life of Marcellus*.

(T. L. H.)

ARCHIMEDES, SCREW OF, a machine for raising water, said to have been invented by Archimedes, for the purpose of removing water from the hold of a large ship that had been built by King Hiero II. of Syracuse. It consists of a water-tight cylinder, enclosing a chamber walled off by spiral divisions running from end to end, inclined to the horizon, with its lower open end placed in the water to be raised. The water, while occupying the lowest portion in each successive division of the spiral chamber, is lifted mechanically by the turning of the machine. Other forms have the spiral revolving free in a fixed cylinder, or consist simply of a tube wound spirally about a cylindrical axis. The same principle is sometimes used in machines for handling wheat, &c. (see CONVEYORS).

ARCHIPELAGO, a name now applied to any island-studded sea, but originally the distinctive designation of what is now generally known as the Aegean Sea (Αἰγαῖον πέλαγος), its ancient name having been revived. Several etymologies have been proposed: *e.g.* (1) it is a corruption of the ancient name, *Egeopelago*; (2) it is from the modern Greek, Ἁγιο πέλαγο, the Holy Sea; (3) it arose at the time of the Latin empire, and means the Sea of the Kingdom (*Archi*); (4) it is a translation of the Turkish name, Ak Denghiz, *Argon Pelagos*, the White Sea; (5) it is simply *Archipelagus*, Italian, *arcipelago*, the chief sea. For the Grecian Archipelago see AEGEAN SEA. Other archipelagoes are described in their respective places.

ARCHIPPUS, an Athenian poet of the Old Comedy, who flourished towards the end of the 5th century B.C. His most famous play was the *Fishes*, in which he satirized the fondness of the Athenian epicures for fish. The Alexandrian critics attributed to him the authorship of four plays previously assigned to Aristophanes. Archippus was ridiculed by his contemporaries for his fondness for playing upon words (Schol. on Aristophanes, *Wasps*, 481).

Titles and fragments of six plays are preserved, for which see T. Kock, *Comicorum Atticorum Fragmenta*, i. (1880); or A. Meineke, *Poetarum Comicorum Graecorum Fragmenta* (1855).

ARCHITECTURE (Lat. *architectura*, from the Gr. ἀρχιτέκτων, a master-builder), the art of building in such a way as to accord with principles determined, not merely by the ends the edifice is intended to serve, but by high considerations of beauty and harmony (see FINE ARTS). It cannot be defined as the art of building simply, or even of building well. So far as mere excellence of construction is concerned, see BUILDING and its allied articles. The end of building as such is convenience, use, irrespective of appearance; and the employment of materials to this end is regulated by the mechanical principles of the constructive art. The end of architecture as an art, on the other hand, is so to arrange the plan, masses and enrichments of a structure as to impart to it interest, beauty, grandeur, unity, power. Architecture thus necessitates the possession by the builder of gifts of imagination as well as of technical skill, and in all works of architecture properly so called these elements must exist, and be harmoniously combined.

Like the other arts, architecture did not spring into existence at an early period of man's history The ideas of symmetry and proportion which are afterwards embodied in material structures could not be evolved until at least a moderate degree of civilization had been attained, while the efforts of primitive man in the construction of dwellings must have been at first determined solely by his physical wants. Only after these had been provided for, and materials amassed on which his imagination might exercise itself, would he begin to plan and erect structures, possessing not only utility, but also grandeur and beauty. It may be well to enumerate briefly the elements which in combination form the architectural perfection of a building. These elements have been very variously determined by different authorities. Vitruvius, the only ancient writer on the art whose works have come down to us, lays down three qualities as indispensable in a fine building: *Firmitas, Utilitas, Venustas*, stability, utility, beauty. From an architectural point of view the last is the principal, though not the sole element; and, accordingly, the theory of architecture is occupied for the most part with aesthetic considerations, or the principles of beauty in designing. Of such principles or qualities the following appear to be the most important: size, harmony, proportion, symmetry, ornament and colour. All other elements may be reduced under one or other of these heads.

With regard to the first quality, it is clear that, as the feeling of power is a source of the keenest pleasure, size, or vastness of proportion, will not only excite in the mind of man the feelings of awe with which he regards the sublime in nature, but will impress him with a deep sense of the majesty of human power. It is, therefore, a double source of pleasure. The feelings with which we regard the Pyramids of Egypt, the great hall of columns at Karnak, the Pantheon, or the Basilica of Maxentius at Rome, the Trilithon at Baalbek, the choir of Beauvais cathedral, or the Arc de l'Étoile at Paris, sufficiently attest the truth of this quality, *size*, which is even better appreciated when the buildings are contemplated simply as masses, without being disturbed by the consideration of the details.

Proportion itself depends essentially upon the employment of mathematical ratios in the dimensions of a building. It is a curious but significant fact that such proportions as those of an exact cube, or of two cubes placed side by side—dimensions increasing by one-half (*e.g.*, 20 ft. high, 30 wide and 45 long)—or the ratios of the base, perpendicular and hypotenuse of a right-angled triangle (*e.g.* 3, 4, 5, or their multiples)—please the eye more than dimensions taken at random. No defect is more glaring or more unpleasant than want of proportion. The Gothic architects appear to have been guided in their designs by proportions based on the equilateral triangle.

By harmony is meant the general balancing of the several parts of the design. It is proportion applied to the mutual relations of the details. Thus, supported parts should have an adequate ratio to their supports, and the same should be the case with solids and voids. Due attention to proportion and harmony gives the appearance of stability and repose which is indispensable to a really fine building. Symmetry is uniformity in plan, and, when not carried to excess, is undoubtedly effective. But a building too rigorously symmetrical is apt to appear cold and tasteless. Such symmetry of general plan, with diversity of detail, as is presented to us in leaves, animals, and other natural objects, is probably the just medium between the excesses of two opposing schools.

Next to general beauty or grandeur of form in a building comes architectural ornament. Ornament, of course, may be used to excess, and as a general rule it should be confined to the decoration of constructive parts of the fabric; but, on the other hand, a total absence or a paucity of ornament betokens an unpleasing poverty. Ornaments may be divided into two classes—mouldings and the sculptured representation of natural or fanciful objects. Mouldings, no doubt, originated, first, in simply taking off the edge of anything that might be in the way, as the edge of a square post, and then sinking the

chamfer in hollows of various forms; and thence were developed the systems of mouldings we now find in all styles and periods. Each of these has its own system; and so well are their characteristics understood, that from an examination of them a skilful architect will not only tell the period in which any building has been erected, but will even give an estimate of its probable size, as professors of physiology will construct an animal from the examination of a single bone. Mouldings require to be carefully studied, for nothing offends an educated eye like a confusion of mouldings, such as Roman forms in Greek work, or Early English in that of the Tudor period. The same remark applies to sculptured ornaments. They should be neither too numerous nor too few, and above all, they should be consistent. The carved ox skulls, for instance, which are appropriate in a temple of Vesta or of Fortune would be very incongruous on a Christian church.

Colour must be regarded as a subsidiary element in architecture, and although it seems almost indispensable and has always been extensively employed in interiors, it is doubtful how far external colouring is desirable. Some contend that only local colouring, *i.e.* the colour of the materials, should be admitted; but there seems no reason why any colour should not be used, provided it be employed with discretion and kept subordinate to the form or outline.

Origin of the Art.—The origin of the art of architecture is to be found in the endeavours of man to provide for his physical wants; in the earliest days the cave, the hut and the tent may have given shelter to those who devoted themselves to hunting and fishing, to agriculture and to a pastoral and nomadic life, and in many cases still afford the only shelter from the weather. There can be no doubt, however, that climate and the materials at hand affect the forms of the primitive buildings; thus, in the two earliest settlements of mankind, in Chaldaea and Egypt, where wood was scarce, the heat in the day-time intense, and the only material which could be obtained was the alluvial clay, brought down by the rivers in both those countries, they shaped this into bricks, which, dried in the sun, enabled them to build rude huts, giving them the required shelter. These may have been circular or rectangular on plan, with the bricks laid in horizontal courses, one projecting over the other, till the walls met at the top. The next advance in Egypt was made by the employment of the trunks of the palm tree as a lintel over the doorway, to support the wall above, and to cover over the hut and carry the flat roof of earth which is found down to the present day in all hot countries. Evidence of this system of construction is found in some of the earliest rock-cut tombs at Giza, where the actual dwelling of the deceased was reproduced in the tomb, and from these reproductions we gather that the corners, or quoins of the hut were protected by stems of the douva plant, bound together in rolls by the leaves, which, in the form of torus rolls, were also carried across the top of the wall. Down to the present day the huts of the fellahs are built in the same way, and, surmounted as they are by pigeon-cots, bear so strong a resemblance to the pylons and the walls of the temples as at all events to suggest, if not to prove, that in their origin these stone erections were copies of unburnt brick structures. From long exposure in the sun, these bricks acquire a hardness and compactness not much inferior to some of the softer qualities of stone, but they are unable to sustain much pressure; consequently it is necessary to make the walls thicker at the bottom than at the top, and it is this which results in the batter or raking sides of all the unburnt brick walls. The same raking sides are found in all their *mastabas*, or tombs, sometimes built in unburnt brick and sometimes in stone, in the latter case being simple reproductions of the former. In some of the early mastabas, built in brick, either to vary the monotony of the mass and decorate the walls, or to ensure greater care in their construction, vertical brick pilasters are provided, forming sunk panels. These form the principal decoration, as reproduced in stone, of an endless number of tombs, some of which are in the British Museum. At the top of each panel they carve a portion of trunk necessary to support the walls of brick, and over the doorway a similar feature. In Chaldaea the same decorative features are found in the stage towers which constituted their temples, and broad projecting buttresses, indented panels and other features, originally constructive, form the decorations of the Assyrian palaces. There also, built in the same material, unburnt brick, the walls have a similar batter, though they were faced with burnt bricks. In later times in Greece and Asia Minor, where wood was plentiful, the stone architecture suggests its timber origin, and though unburnt brick was still employed for the mass of the walls, the remains in Crete and the representations in painting, &c., show that it was encased in timber framing, so that the raking walls were no longer a necessary element in their structure. The clearest proofs of original timber construction are shown in the rock-cut tombs of Lycia, where the ground sill, vertical posts, cross beams, purlins and roof joists are all direct imitations of structures originally erected in wood.

The numerous relics of structures left by primeval man have generally little or no architectural value; and the only interesting problem regarding them—the determination of their date and purpose and of the degree of civilization which they manifest—falls within the province of archaeology (see ARCHAEOLOGY; BARROW; LAKE-DWELLINGS; STONE MONUMENTS).

Technical terms in architecture will be found separately explained under their own headings in this work, and in this article a general acquaintance with them is assumed. A number of architectural subjects are also considered in detail in separate articles; see, for instance, CAPITAL; COLUMN; DESIGN; ORDER; and such headings as ABBEY; AQUEDUCT; ARCH; BASILICA; BATHS; BRIDGES; CATACOMB; CRYPT; DOME; MOSQUE; PALACE; PYRAMID; TEMPLE; THEATRE; &c., &c. Also such general articles on national art as CHINA: *Art*; EGYPT: *Art and Archaeology*; GREEK ART; ROMAN ART; &c., and the sections on architecture and buildings under the headings of countries and towns.

In the remainder of this article the general history of the evolution of the art of architecture will be considered in various sections, associated with the nations and periods from which the leading historic styles are chronologically derived, in so far as the dominant influences on the art, and not the purely local characteristics of countries outside the main current of its history, are concerned; but the opportunity is taken to treat with some attempt at comprehensiveness the leading features of the architectural history of those countries and peoples which are intimately connected with the development of modern architecture.

These consecutive sections are as follows:—

Egyptian
Assyrian
Persian
Greek
Parthian
Sassanian
Etruscan
Roman
Byzantine
Early Christian
Early Christian Work in Central Syria
Coptic Church in Egypt
Romanesque and Gothic in—
    Italy
    France
    Spain
    England
    Germany
    Belgium and Holland
Renaissance: Introduction
    Italy
    France

Spain
England
Germany
Belgium and Holland
Mahommedan

Finally, a section on what can only be collectively termed *Modern* architecture deals with the main lines of the later developments down to the present day in the architectural history of different countries.

(R. P. S.)

EGYPTIAN ARCHITECTURE

Although structures discovered in Chaldaea, at Tello and Nippur, seeming to date back to the fifth millennium B.C., suggest that the earlier settlements of mankind were in the valley of the Tigris and Euphrates, north of the Persian Gulf, it is to Egypt that we must turn for the most ancient records of monumental architecture (see also EGYPT: *Art and Archaeology*). The proximity of the ranges of hills (the Arabian and Libyan chains) to the Nile, and the facilities which that river afforded for the transport of the material quarried in them, enabled the Egyptians at a very early period to reproduce in stone those structures in unburnt brick to which we have already referred.

Although the great founder of the first Egyptian monarchy is reputed to be Menes, the Thinite who traditionally founded the capital at Memphis, he was preceded, according to Flinders Petrie, by an earlier invading race coming from the south, who established a monarchy at This near Abydos, having entered the country by the Kosseir road from the Red Sea; and this may account for the early tradition that it was the Ethiopians who founded the earliest dynastic race, "Ethiopians" being a wide term which may embrace several races.

Egyptian architecture is usually described under the principal periods in which it was developed. They are as follows[1]:— (A) the Memphite kingdom, whose capital was at Memphis, south-west of Cairo, the Royal Domain extending south some 30 to 40 m.; (B) the first Theban kingdom with Thebes as the capital; this covers three dynasties. Then follows an interregnum of five dynasties, when the invasion of the Hyksos took place; this was architecturally unproductive. On the expulsion of the Hyksos there followed (C) the second Theban kingdom, consisting of three dynasties, under whose reign the finest temples were erected throughout the country. After 1102 followed six dynasties (1102-525 B.C.), with capitals at Sais, Tanis and Bubastis, when the decadence of art and power took place. Then followed the Persian invasion, 525-331 B.C., which was destructive instead of being reproductive. On the defeat of the Persians by Alexander the Great, and after his death in 323 B.C., was founded (D) the Ptolemaic kingdom, with Alexandria as the capital. A great revival of art then took place, which to a certain extent was carried on under the Roman occupation from 27 B.C., and lasted about 300 years.

With the exception of a small temple, found by Petrie in front of the temple of Medum, and the so-called "Temple of the Sphinx," the only monuments remaining of the Memphite kingdom are the Pyramids, which were built by the kings as their tombs, and the *mastabas*, in which the members of the royal family and of the priests and chiefs were buried. The mastaba (Arabic for "bench") was a tomb, oblong in plan, with battering side and a flat roof, containing various chambers, of which the principal were (1) the Chapel for offerings, (2) the Serdab, in which the Ka or double of the deceased was deposited, and (3) the well, always excavated in the rock, in which the mummy was placed.

The three best-known pyramids are those situated about 7 m. south-west of Cairo, which were built by the second, third and fourth kings of the fourth dynasty,—Khufu (*c.* 3969-3908 B.C.), Khafra (*c.* 3908-3845 B.C.), and Menkaura (*c.* 3845-3784 B.C.), who are better known as Cheops, Cephren and Mycerinus. The first of these is the largest and most remarkable in its construction and setting out. The pyramid of Cephren was slightly smaller, and that of Mycerinus still more so, compensated for by a casing in granite. The dimensions and other details are given in the article PYRAMIDS. From the purely architectural point of view they are the least impressive of masses, and their immense size is not realized until on a close approach.

The temple of the Sphinx, attributed to Cephren, is T-shaped in plan, with two rows of square piers down the vertical and one row down the cross portion. These carried a flat roof of stone. The temple is remarkable for the splendid finish given to the granite piers, and to the alabaster slabs which cased the rock in which it had been partially excavated (but see EGYPT: *History*, I.).

The Serapeum at Sakkara, in which the sacred bulls were embalmed and buried, the tomb of Ti (a fifth dynasty courtier), and the tombs of the kings and queens of Thebes, have no special architectural features which call for description here.

We pass on to the first Theban kingdom, the eighth king of which, Nebheprē Menthotp III., built the temple lately discovered on the south side of the temple at Deir-el-Bahri, of which it is the prototype. It was a sepulchral temple, and being built on rising ground was approached by flights of steps. In the centre was a solid mass of masonry which, it is thought by some authorities, was crowned by a pyramid. This was surrounded by a double portico with square piers in the outer range, and octagonal piers in the inner range, there being a wall between the two ranges.

The earliest tombs in which the *column* (*q.v.*) appears, as an architectural feature, are those at Beni Hasan, attributed to the period of Senwosri (formerly read Usertesen) I., the second king of the twelfth dynasty. These are carved in the solid rock. There are two types, the Polygonal column, sometimes in error called the Protodoric, which was cut in the rock in imitation of a wooden column, and a second variety known as the Lotus column, which is employed inside, supporting the rock-cut roof, but having such slender proportions as to suggest that it was copied from the posts of a porch, round which the Lotus plant had been tied.

The culminating period of the Egyptian style begins with the kings of the eighteenth dynasty, their principal capital being Thebes, described by Herodotus as the "City with the Hundred Gates"; and although the execution of the masonry is inferior to that of the older dynasties, the grandeur of the conception of their temples, and the wealth displayed in their realization entitle Thebes to the most important position in the history of the Egyptian style, especially as the temples there grouped on both sides of the river exceed in number and dimensions the whole of the other temples throughout Egypt. This to a certain extent may possibly be due to the distance of Thebes from the Mediterranean, which has contributed to their preservation from invaders. We have already referred to the probable origin of the peculiar batter or raking side given to the walls of the pylons and temples, with the Torus moulding surrounding the same and crowned with the cavetto cornice. What, however, is more remarkable is the fact that, once accepted as an important and characteristic feature, it should never have been departed from, and that down to and during the Roman occupation the same batter is found in all the temples, though constructively there was no necessity for it. The strict adherence to tradition may possibly account for this, but it has resulted in a magnificent repose possessed by these structures, which seem built to last till eternity.

An avenue with sphinxes on both sides forms the approach to the temple. These avenues were sometimes of considerable length, as in the case of that reaching from Karnak to Luxor, which is 1½ m. long. The leading features of the temple (see fig. 1) were:—(A) The pylon, consisting of two pyramidal masses of masonry crowned with a cavetto cornice, united in the centre by an immense doorway, in front of which on either side were seated figures of the king and obelisks. (B) A great open court surrounded by peristyles on two or three sides. (C) A great hall with a range of columns down the centre on either side, forming what in European architecture would be known as nave and aisles, with additional aisles on each side; these had columns of less height than those first mentioned, so as to allow of a clerestory, lighting the central avenue. (D)

Smaller halls with their flat roofs carried by columns. And finally (E) the sanctuary, with passage round giving access to the halls occupied by the priest.

Broadly speaking, the temples bear considerable resemblance to one another (see TEMPLE), except in dimensions. There is one important distinction, however, to be drawn between the Theban temples and those built under the Ptolemaic rule. In these latter the halls are not enclosed between pylons, but left open on the side of the entrance court with screens in between the columns, the hall being lighted from above the screens. The temples of Edfu, Esna and Dendera are thus arranged.

The great temple of Karnak (fig. 2) differs from the type just described, in that it was the work of many successive monarchs. Thus the sanctuary, built in granite, and the surrounding chambers, were erected by Senwosri (Usertesen) I. of the twelfth dynasty. In front of this, on the west side, pylons were added by Tethmosis (Thothmes, Tahutmes) I. (1541-1516), enclosing a hall, in the walls of which were Osirid figures. In front of this a third pylon was added, which Seti (Sethos) I. utilized as one of the enclosures of the great hall of columns (fig. 3), measuring 170 ft. deep by 329 ft. wide, having added a fourth pylon on the other side to enclose it. Again in front of this was the great open court with porticoes on two sides, and a great pylon, forming the entrance. In the rear of all these buildings, and some distance beyond the sanctuary, Tethmosis III. (1503-1449) built a great colonnaded hall with other halls round, considered to have been a palace. All these structures form a part only of the great temple, on the right and left of which (*i.e.* to the north-east and south-west) were other temples preceded by pylons and connected one with the other by avenues of sphinxes. Though of small size comparatively, one of the best preserved is the temple of Chons, built by Rameses III. It was from this temple that an avenue of sphinxes led to the temple of Luxor, which was begun by Amenophis III. (1414-1379 B.C.), and completed by Rameses II. (1300-1234).

FIG. 1.—Plan of the Temple of Chons.

A, Pylon.
B, Great court.
C, Hall of columns.
D, Priest's hall.
E, Sanctuary.

On the opposite or west bank of the Nile are the temple of Medinet Abu, the Ramesseum, the temples of Kurna and of Deir-el-Bahri; the last being a sepulchral temple, which, built on rising ground, had flights of steps leading to the higher level (fig. 4), and porticoes with square piers at the foot of each terrace. In the rear on the right-hand side was found an altar, the only example of its kind known in Egypt. The halls behind this and the portico of the right flank had polygonal columns.
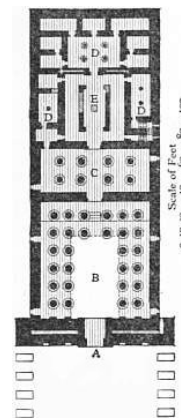

A. First Propylon.
B. Great Court with Colonnades in centre.
C. Second Propylon.
D. Hall of Columns.
E. Third Propylon.
F. Fourth Propylon.
G. Hall with Osirid figures.
H. Granite Sanctuary and adjoining chambers.
I. Open Area
K. Columnar Edifice of Tethmosis III (XVIIIth. Dynasty).
L. Temple of Rameses III. (XXth. Dynasty).
M. Temple of Sethos II. (XIXth. Dynasty).

a. Sculptures of Sethos I. (XIXth. Dynasty).
b. Sculptures of Sheshonk (XXIInd. Dynasty).
c. Sculptures of Rameses II. (XIXth. Dynasty
d. Small Obelisks.
e. Large Obelisks.
f. Pillars of Senwosri I. (XIIth. Dynasty—
g. Hall of Ancestors.

COURT OF TETHMOSIS I.

GREAT COURT

SHESHONK

Temple of Ammon Rameses III.

PLAN OF KARNAK

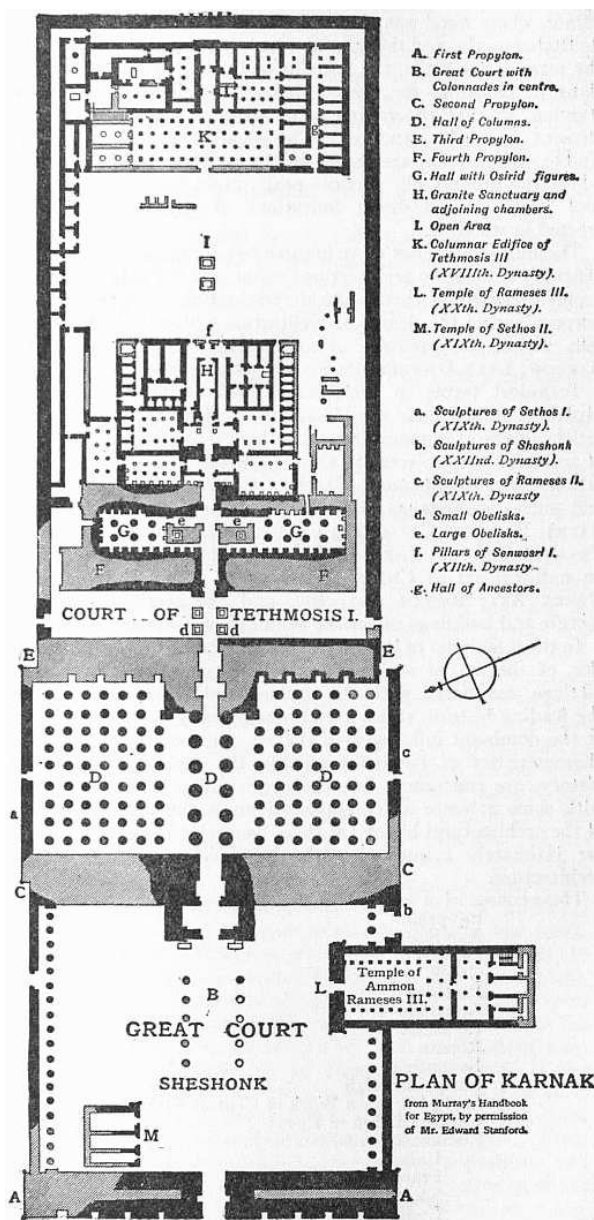from Murray's Handbook for Egypt, by permission of Mr. Edward Stanford.

FIG. 2.

In the palace of Tell el-Amarna, built shortly before 1350 B.C. by the heretic king Akhenaton (whose name was originally Amenophis IV.), and discovered by Petrie, there were no special architectural developments, but the painted decoration of the walls and pavements assumed a literal interpretation of natural forms of plants and foliage and of birds and animals, recalling to some extent that found at Cnossus in Crete.

Ascending the river from Cairo, the first temples of which important remains exist are the two at Abydos. One of these

has an exceptional plan, with seven sanctuaries in the rear. It was built by Seti I., and consists of an outer portico with square piers, a hall with two rows of columns down to the centre, and a second hall with three rows of columns. These halls are placed longitudinally to give access to the seven sanctuaries. The second temple is of the ordinary type, with pylon, court with portico on all four sides, two halls of columns, and three sanctuaries in the rear. The next temple is that of Dendera, commenced under the second Ptolemy but not completed until the reign of Nero. It has been completely excavated, and retains the whole of its external walls. Above Thebes is the temple of Esna, of which the hall of columns only has been cleared out. The capitals of the front belong to the lotus-bud type, and those of the interior are carved with many varieties of river plant. The temple of Edfu is the best preserved in Egypt. Its plan (fig. 5) would seem to have been determined from the first, and it is singular to note that it presents the traditional type of plan, which in the Theban examples was evolved from additions made by successive monarchs. In dimensions it is but little inferior to these. Its pylon (fig. 6) is 250 ft. wide and 150 ft. high; the first court has porticoes on three sides. The great hall of columns, all of which here are of the same height, is lighted from above (fig. 7), the screen facing the court. Then follow the second hall of columns, two vestibules, and the sanctuary, surrounded by a passage giving access to the priest's rooms round. The temple of Kom Ombo, which comes next, was dedicated to two deities, and had therefore two sanctuaries.
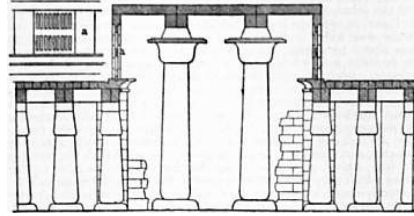
Fig. 3.—Section through Hall of Columns, Karnak. *a*, Clerestory window.
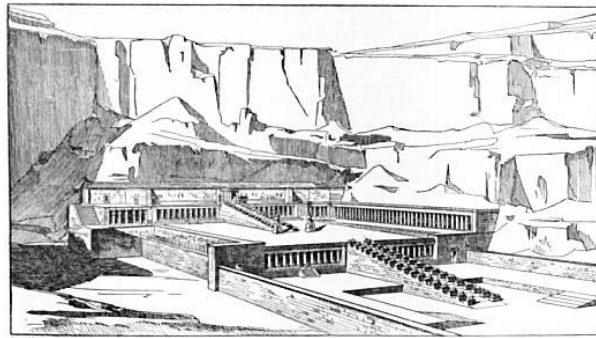
Fig. 4.—Temple of Deir-el-Bahri, conjectural restoration by Prof. E. Brune.

The temples of Philae owe much of their beauty and picturesqueness to the island on which they are situated; their plans, and that of the long porticoes in front of the pylons of the great temple, being fitted to the irregularity of the site. In the first court is a well-preserved example of the Mammeisi temple (see Temple), the sanctuary and other rooms in which are entirely enclosed in a peristyle. It was built by Ptolemy Euergetes (247-222 B.C.). A second monarch of the same name (about 125 B.C.) built the pavilion on the north side of the island, known as "Pharaoh's bed," the roof of which was covered with stone slabs, resting on timber beams. In consequence of the building of the Assuan dam all these temples are submerged for the greater part of the year. The principal temples between Philae and the second cataract are:—Dabōd, of which little remains; Kartassi; Kalābsha, still preserving its pylon and great hall of columns; the Bēt el-Wāli, in which are two ancient polygonal columns; Gerf Husen, partially cut in the rock; Dakka; Wadi es-Sebūʻa; and lastly Abū Simbel. Owing to the proximity of the ranges of hills to the Nile, there was no room for the ordinary type of temple at Abū Simbel, so that those founded here by Rameses the Great (*c.* 1300-1234 B.C.) were excavated in the rock. In the place of the pylon the side of the cliff was worked off, leaving in relief four immense seated figures, 66 ft. high. The first hall had three aisles, divided by four piers on each side, in front of which Osirid figures (18 ft. high) were carved; beyond was a second hall, vestibule and sanctuary. The long rectangular chambers on each side are provided with benches cut in the rock. The depth of the temple is 90 ft. There is a second temple of smaller size which faces the Nile.

We have already referred to the lotus columns at Beni Hasan; these, when employed constructionally to carry stone roofs, assumed a far more solid appearance, and the stems of the lotus plant carved in the earlier examples were omitted in the later, in order to give more surface for intaglio carving. The capital and its neck still retain the lotus buds and the bands which tied them round the column. In the central avenues of the great halls the columns had bell capitals, the decoration of which was based on the flower of the papyrus. There are a few examples of the palm capital, often carved in granite, which date from an early period. Commencing with the Ptolemaic revival the capitals assume a much greater variety of form, their decoration being based on river plants; but here again the lotus plant, which seems still to be the favourite type, predominates, the buds in various degrees of their growth alternating one with the other. All these varieties of form are described in the article Capital, but two or three may be mentioned here, as they depart from the usual type. The Hathor-headed capital, with faces on all four sides, and surmounted with a miniature shrine, is found at Dendera, Philae and other temples of the Ptolemaic or Roman periods; one of the earliest examples, but without the shrine, dates back to Tethmosis III. (1503-1449 B.C.). As a distinct type of pier decoration, the Osirid figures at Medinet Abu, at Karnak, Gerf Husen, Abu Simbel and other temples, constitute important features: the figure is carved in front of the pier and does not serve any constructive function.

With the exception of the great building in the rear of the temple at Karnak, built by Tethmosis III., and the pavilion of Medinet Abū on the west bank of the Nile at Thebes, no palatial residences of any importance have yet been found, from which it might be inferred that the king, being the head of the Egyptian religion, occupied with his family the sacred precincts of the temple; but large as these temple enclosures are, there would have been no room for the immense army of attendants and servants required in an Oriental court. Moreover, the darkness of the halls and the rigid enclosures would have made a residence in them anything but cheerful. There are two instances where, in consequence of the subsequent desertion of the site, remains have been found of ancient towns. At Tell el-Amarna, built by the heretic king, Akhenaton, portions of the houses remain, and at Kahun, in the Fayum, Petrie discovered the walls of a town which, erected for the overseers and workmen employed in the construction of the pyramid of Illahun, built by Senwosri
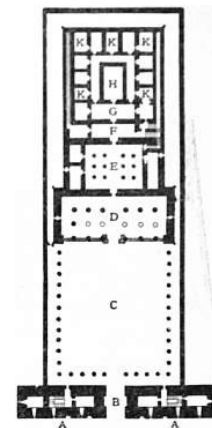

Fig. 5.—Plan of the Temple of Edfu.

AA, Pylon.
B, Entrance door.
C, Great Court.
D, Hall of Columns.
E, Second Hall.
F, Hall of the Altar.
G, Hall of the Centre.
H, Sanctuary.
KK, Storerooms.

(Usertesen) II. (2684-2666 B.C.), was abandoned when the pyramid was completed. The houses were all built in unburnt brick, and in those cases where the rooms exceeded 8 or 9 ft. in width, columns in stone or wood were employed to assist in carrying the roof, which was constructed of beams carrying smaller timbers covered over with a flat roof of mud. The plans of the houses were not unlike those found in Pompeii, with open courts and porticoes and no external windows. The streets ran at right angles to one another, and the houses varied in size from the workman's hut, of one room, to the overseer's house with several rooms and courts; the principal residence, in the centre, occupied by the governor of the town, being of still larger dimensions.
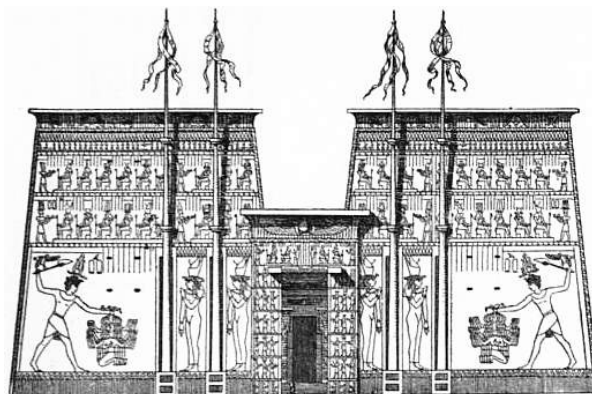
Fig. 6.—Exterior of the Pylon of the Temple of Edfu.

Further knowledge of the Egyptian dwellings is chiefly derived from the "soul-houses" recently discovered by Petrie, and from the paintings in the tombs, which suggest that they corresponded to that class of residence which in Rome was known as a villa, viz. a series of detached buildings built in immense enclosures, with porticoes round, groves of trees, artificial lakes, &c. The walls, gates and buildings were all built probably in unburnt brick, and the whole site, if on the borders of the river, raised on great mounds. In this respect they accord with the houses of the fellah at the present day, which are raised on the accumulation of centuries, for when, owing to the rise of the Nile, the houses succumb to the moisture creeping up, another house is built on the top. The representations in paintings show that the houses were chiefly built in unburnt brick, and they sometimes were of two or three storeys with windows in the upper floors, and a flat roof with a kind of dormer known as the Mulhuf, turned towards the north-west to ventilate the house. The paintings frequently represent the store-rooms, or granaries; and the preservation of those built by Rameses the Great, in the rear of the Ramesseum at Thebes, as granaries to hold corn, enables us to follow their construction. These granaries consist of a series of long cellars, about 12 to 14 ft. wide, placed side by side, and roofed over with elliptical barrel vaults. The reason for the elliptical form and the method of their construction is given in the article VAULT (*q.v.*).

Fig. 7.—Façade of the Great Hall of Columns of the Ptolemaic temple at Edfu.

The pavilion of Medinet Abū was built in stone, and consequently has been preserved more or less complete to our day. It consisted of three storeys with a flat roof and battlement round, said to be in imitation of those on a Syrian fortress, as they are quite unlike anything else in Egypt. The floors were in wood, but there are traces of a stone staircase. The windows, of large size, were filled with thin stone slabs pierced with vertical slits, like those of the hall of columns at Karnak.

(R. P. S.)

ASSYRIAN ARCHITECTURE

About 3800 B.C. the earlier inhabitants of Chaldaea or Babylonia were invaded and absorbed by a Semitic race, whose first monarch was Sargon of Agade (Akkad). 1800 years later, emigrations took place northward, and founded Nineveh on the banks of the Tigris, about 250 m. north of Babylon. 1200 years later, the Assyrians began building the magnificent series of palaces from which were brought the winged man-headed bulls and the sculptured slabs now in the British Museum. The leading characteristics of the style, and the nature of the structures, temples and palaces, evolved by the Chaldaeans (or first Babylonian empire), the Assyrians, and the new Babylonian empire, are similar; they are best known by those which represent a culmination of the style in north Mesopotamia, and are therefore described here.

By a singular coincidence the remains of the oldest building found at Nippur (Niffar), in lower Mesopotamia, bear a close resemblance to the oldest pyramid in Egypt, Medum, before it received its final casing. The latter, however, is known to have been a tomb, whereas the structure at Nippur was a temple, which took the form of a *ziggurat* or stage tower. It consisted of several storeys built one over the other, the upper storey in each case being set back behind the lower, in order to leave a terrace all round. In some cases the terrace was wider in front, to give space for staircases ascending from storey to storey. In consequence of the extreme flatness of the country and its liability to sudden inundations, it became necessary, when erecting buildings of any kind, to raise them on mounds of earth. The more important the structure, the higher was it deemed necessary to raise it, so as to make it the most conspicuous feature in the landscape. The result is that from Abu Shahrain, the most southern town, to Akarkuf (Aqarquf), 220 m. north, there are a series of immense mounds, sometimes nearly a mile in diameter, and rising to a height of 200 ft., crowned with the remains of towns, which, notwithstanding the thirty centuries more or less during which they have been exposed to the torrential rains and the destructive agencies of man, form still the most prominent features in the country. The structures which were raised on the mound, *i.e.* the temples and palaces with their enclosure walls, were all built with bricks made of the alluvial clay of the country, shaped in wooden moulds and dried in the heat of the sun, a heat so intense that they acquired sometimes the hardness of the inferior qualities of stone. The walls of the temples, palaces and enclosures had the same batter as that already referred to in the preceding section on Egypt. In the latter country they were reproduced in stone, of which there were many quarries on either side of the Nile; in Chaldaea they were obliged to content themselves with the preservation of their ziggurats by outer casings of burnt brick and with pavements of burnt brick for their terraces. In order to vary the monotony of their temple walls, and perhaps to give them greater strength, they built vertical bands or buttresses at intervals, or they sank panels in the walls to two depths, a natural decoration to which brick work lends itself; and these two methods, which were employed in early times, were followed by the Assyrians in the palaces of Nimrud, Nineveh and Khorsabad.

The earlier settlements were those founded between the mouths of the Tigris and the Euphrates, on what was then the shore of the Persian Gulf, now some 140 m. farther south. The principal towns where the remains of ziggurats have been found, all on the borders of the Euphrates, beginning with the most southern, are:—Abu Shahrain (Eridu); Mugheir (Ur of the Chaldees); Senkera (? Ellasar or Larsa); Warka (Erech); Tello (Eninnu); Nippur; Birs Nimrud (Borsippa); Babil (Babylon); El Ohemir (Kish); Abu Habba (Sippara); and Akarkuf (Durkurigalsu).

Although the ziggurats at Warka, Nippur and Tello are probably of older foundation, the great temple of Borsippa at Birs

Nimrud is in better preservation, having been restored or rebuilt by Nebuchadrezzar, and may be taken as a typical example. The ground storey was 272 ft. square, and, according to Fergusson, 45 ft. high. The upper storeys or stages receded back, one behind the other, so as to leave a terrace all round. Although it is not possible to trace more than four storeys, it is known from the description on a cylinder found on the site that there were seven storeys, dedicated to the planets, each coloured with the special tint prescribed. The total height was about 160 ft., and on the top was a shrine dedicated to the god Nebo. An invaluable record of the researches which have been made during the last three centuries or more is given in H.V. Hilprecht's *Explorations in Bible Lands during the 19th Century*. Two or three of them might be mentioned here. At Warka Mr Kenneth Loftus uncovered a wall, strengthened by buttresses 15 ft. wide and projecting 18 in., between which were panels filled with a series of semicircular shafts side by side, both buttresses and shafts being decorated with geometrical patterns consisting of small earthenware cones embedded in the wall, the ends of which were enamelled in various colours. The design of these patterns is so unlike anything found in Assyrian work, but bears so close a resemblance to the geometrical designs carved on the columns at Diarbekr ascribed to the Parthians, that this wall may have been built at a much later period; and this becomes the more probable in view of the discoveries made subsequently at Tello and Nippur, where Parthian palaces have been found, crowning the summits of the ancient Chaldaean mounds. In both these towns the researches made in later years have been carried out far more methodically than previously, and, following the example of Schliemann, excavations have been made to great depths, careful notes being taken of the strata shown by the platforms at different levels. At Tello, de Sarzac discovered the magnificent collection of statues of diorite now in the Louvre, one of them (unfortunately headless) of Gudea, priest-king and architect of Lagash, seated and carrying on his lap a tablet, on which is engraved the plan of a fortified enclosure, whilst a divided scale and a stylos are carved in relief near the upper and right-hand side. A silver inlaid vase of Entemena, also priest-king of Lagash (about 3950 B.C.), and other treasures, were found on the same site.

At Nippur (the ancient Calneh) the research undertaken by the university of Pennsylvania resulted in the discovery, under a ziggurat dated from 4000-4500 B.C., of a barrel-vaulted tunnel, in the floor of which were found terra-cotta drain pipes with flanged mouths. At a later date (3750 B.C.) Naram-Sin, the son of Sargon, had built over the older ziggurat a loftier and larger temple, above which was a third built by Ur Gur (2500 B.C.), which still retained its burnt brick casing, 5 ft. thick. Crowning all these was the Parthian palace mentioned in the section on Parthian architecture below. The result of these researches has not only carried back the date of the earlier settlements to a prehistoric period quite unknown, but has suggested that if similar researches are carried out in other well-known mounds, among which the great city of Babylon should be counted as the most important, further revelations may still be made.
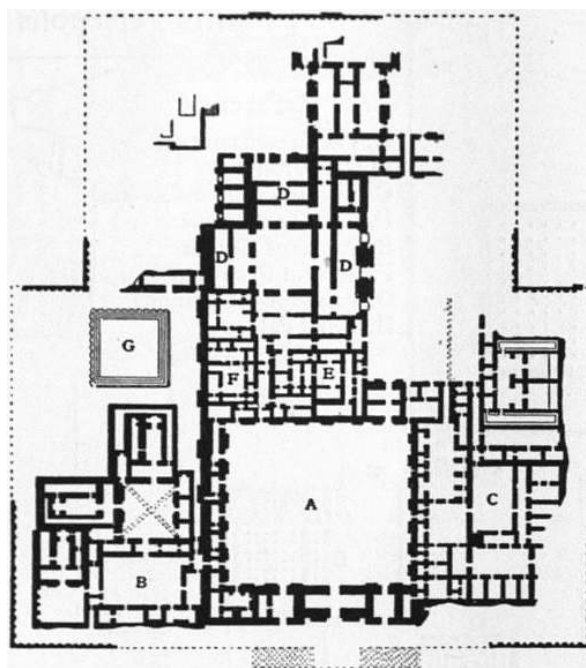
From *The History of Art in Chaldaea and Assyria*, by permission of Chapman & Hill, Ltd.

Fig. 8—Plan of the Palace at Khorsabad.

A, Principal courtyard.	E, Official residences.
B, The harem.	F, The king's residence.
C, The offices.	G, The ziggurat or temple.
DD, The halls of state.	

But we have now to pass to the principal cities of the Assyrian monarchy on the river Tigris. At Nineveh, the capital, which is about 250 m. north of Babylon, the remains of three palaces have been found, those of Sennacherib (705-681 B.C.), Esarhaddon (681-668 B.C.), and Assurbanpal (668-626 B.C.). At Nimrud (the ancient Calah, founded by Assur), 20 m. south of Nineveh, are also three palaces, one (the earliest known) built by Assurnazirpal (885-860 B.C.), the others by Shalmaneser II. (860-825 B.C.) and Esarhaddon. At Balawat, 10 m. east of Niniveh, was a second palace of Shalmaneser II., and at Khorsabad, 10 m. north-east of Nineveh, the palace (fig. 8) built by Sargon (722-705 B.C.), which was situated on the banks of the Khanser, a tributary of the Tigris. As this palace is one of the most extensive of those hitherto explored, its description will best give the general idea of the plan and conception of an Assyrian palace.

The palace was built on an immense platform, made of sun-dried bricks, enclosed in masonry, and covering an area of nearly one million square feet, raised 48 ft. above the town level. The principal front of the palace measured 900 ft., there being a terrace in front. The approach was probably by a double inclined ramp which chariots and horses could mount. A central and two side portals (fig. 9), flanked with winged human-headed bulls (now in the British Museum), led to the principal courtyard (A), measuring 300 ft. by 240 ft. The block (B) on the left of the court, containing smaller courts and rooms, constituted the harem; that on the right the offices (C); those in the rear the halls of state (DDD), the residences of the officers of the court (E), the king's private apartments (F) being on the left, facing the ziggurat or temple (G). In the extreme rear were other state rooms with terraces probably laid out as gardens and commanding a view of the river and country beyond.
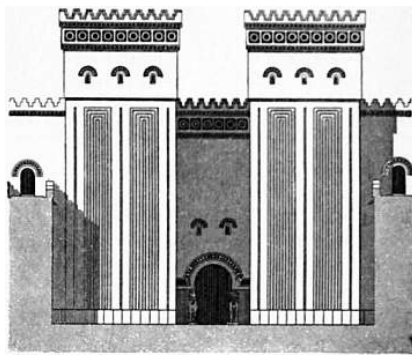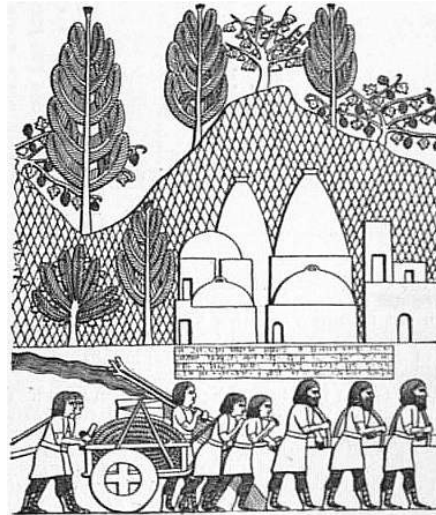
Fig. 9.—Entrance gateway, Palace of Khorsabad.

Fig. 10.—Bas-relief of group of buildings at Kuyunjik. (After Layard.)

As there must have been nearly 700 rooms in the palace, the destination of the greater number of which it would be difficult to determine, it will be sufficient to refer only to those state rooms in which the principal sculptured slabs were found, and which decorated the lower 9 ft. of the walls. The two chief factors to be noted are (1) the great length of the halls compared with their width, the chief hall being 150 ft. long and 30 ft. wide, and (2) the immense thickness of the walls, which measured 28 ft. The only reason for walls of this thickness would be to resist the thrust of a vault, and as La Place, the French explorer, found many blocks of earth of great size, the soffits of which were covered with stucco and had apparently fallen from a height, he was led to the conclusion, now generally accepted, that these halls were vaulted. These discoveries, and the fact that in none of the palaces excavated has a single foundation of the base of any column been found, quite dispose of Fergusson's restoration, which was based on the palaces of Persepolis. Moreover, the two climates are entirely different. In the mountainous country of Persia the breezes might be welcomed, but in Mesopotamia the heat is so intense that every precaution has to be taken to protect the inmates of the house or palace. Thick walls and vaults were a necessity in Nineveh, and even the windows or openings must have been of small dimensions. No windows have been found, nor are any shown on the bas-reliefs, except on the upper parts of towers. It is possible therefore that the light was admitted through terra-cotta pipes or cylinders, of which many were found on the site, and this is the modern system of lighting the dome in the East. Although no remains have ever been found of domes in any of the Assyrian palaces, the representation of many domical forms is given in a bas-relief found at Kuyunjik (fig. 10), suggesting that the dome was often employed to roof over their halls.

Reference has already been made to the bas-reliefs which decorated the lower portion of the great halls; the less important rooms had their walls covered with stucco and painted. Externally the architectural decoration was of the simplest kind; the lower portion of the walls was faced with stone; and the monumental portals, in addition to the winged bulls which flanked them, had deep archivolts in coloured enamels on glazed brick, with figures and rosettes in bright colours. A similar decoration would seem to have been applied to the crenellated battlements, which crowned all the chief exterior walls, as also those of the courts. The buttresses inside the courts, and the towers which flanked the chief entrance, were decorated with vertical semicircular mouldings of brick. This system of decoration is also found in the ziggurats or observatories behind the harem, where the three lower storeys still exist. A winding ramp was carried round this tower, the storeys of which were set back one behind the other, the burnt brick paving of the ramp and the crenellated battlements forming a parapet, portions of which are still *in situ*.

Although not unknown in either Chaldaea or Assyria, the stone column, according to Perrot and Chipiez, found no place in those structures of crude brick of which the real architecture of Mesopotamia consisted. Only one example in stone, in which the shaft and capital together are 3 ft. 4 in. in height, has been found. Two bases of similar design to the capital are supposed to have supported wooden columns carrying an awning. There are representations in the bas-reliefs of kiosks in a garden, the columns in which, with volute capitals, are supposed to have been of wood sheathed in metal, and on the bronze bands of the Balawat gates in the British Museum are representations of the interior of a house with wood columns and bracket capitals, and several awnings carried by posts. Small windows are shown in some of the bas-reliefs, with balustrades of small columns, which were doubtless copied from the ivory plaques found at Nimrud and now in the British Museum.

(R. P. S.)

PERSIAN ARCHITECTURE

The origin of Persian architecture must be sought for in that of the two earlier dynasties,—the Assyrian and Median, to whose empire the Persian monarchy succeeded by conquest in 560 B.C. From the former, it borrowed the raised platform on which their palaces were built, the broad flights of steps leading up to them and the winged human-headed bulls which flank the portals of the propylaea. From Media it would seem to have derived the great halls of columns and the porticoes of the palaces, so clearly described by Polybius (x. 24) as existing at Ecbatana; the principal difference being that the columns of the stoas and peristyle, which there consisted of cedar and cypress covered with silver plates, were in the Persian palaces built of stone. The ephemeral nature of the one material, and the intrinsic value of the other, are sufficient to account for their entire disappearance; but as Ecbatana was occupied by Darius and Xerxes as one of their principal cities,

the stone column, bases and capitals, which still exist there, may be regarded as part of the restoration and rebuilding of the palace; and as they are similar to those found at Persepolis and Susa, it is fair to assume that the source of the first inspiration of Persian architecture came from the Medians, especially as Cyrus, the first king, was brought up at the court of Astyages, the last Median monarch.

The earliest Persian palace, of which but scanty remains have been found, was built at Pasargadae by Cyrus. There is sufficient, however, to show that it was of the simplest kind, and consisted of a central hall, the roof of which was carried by two rows of stone columns, 30 ft. high, and porticoes *in antis* on two if not on three sides.

The great platform, also at Pasargadae, known as the Takht-i-Suleiman, or throne of Solomon, covered an area of about 40,000 sq. ft., and is remarkable for the beauty of its masonry and the large stones of which it is built. These are all sunk round the edge, being the earliest example of what is known as "drafted masonry," which at Jerusalem and Hebron gives so magnificent an effect to the great walls of the temple enclosures. No remains have ever been traced on this platform of the palace which it was probably built to support.
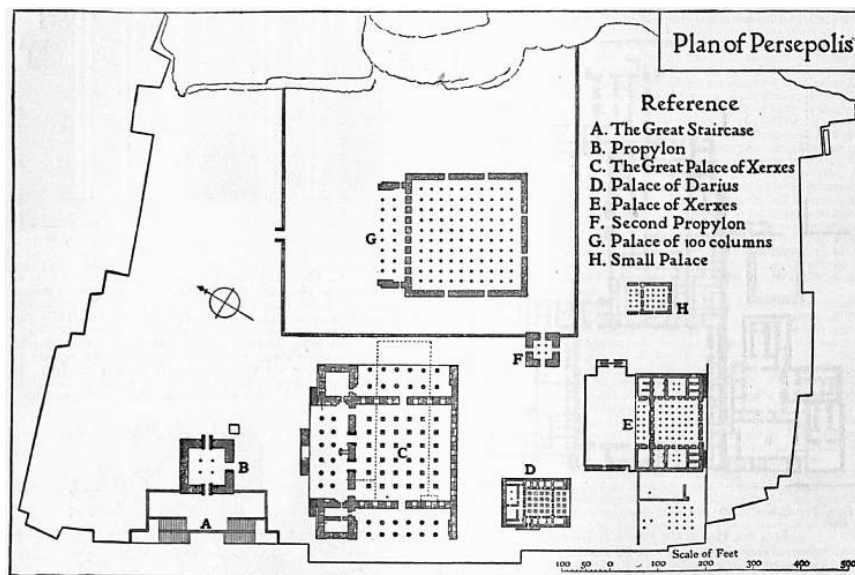
FIG. 11.

We pass on therefore to Persepolis, the most important of the Persian cities, if we may judge by the remains still existing there. Here, as at Pasargadae, builders availed themselves of a natural rocky platform, at the foot of a range of hills, which they raised in parts and enclosed with a stone wall. Here the masonry is not drafted, and the stones are not always laid in horizontal courses, but they are shaped and fitted to one another with the greatest accuracy, and are secured by metal clamps. The plan (fig. 11) shows the general configuration of the platform on which the palaces of Persepolis are built, which covered an area of about 1,600,000 sq. ft. The principal approach to it was at the north-west end, up a magnificent flight of steps (A) with a double ramp, the steps being 22 ft. wide, with a tread of 15 in. and a rise of 4, so that they could be ascended by horses. The first building opposite this staircase was the entrance gateway or propylaea (B), a square hall, with four columns carrying the roof and with portals in the front and rear flanked by winged bulls. The earliest palace on the platform (D) is that which was built by Darius, 521 B.C. It was rectangular on plan, raised on a platform approached by two flights of steps, and consisted of an entrance portico of eight columns, in two rows of four placed *in antis*, between square chambers, in which were probably staircases leading to the roof. This portico led to the great hall, square on plan, whose roof was carried by sixteen columns in four rows. This hall was lighted by two windows on each side of the central doorway, all of which, being in stone, still exist, the lintels and jambs of both doors and windows being monolithic. The walls between these features, having been built in unburnt brick, or in rubble masonry with clay mortar, have long since disappeared. There were other rooms on each side of the hall and an open court in the rear. The bases of the columns of the portico still remain *in situ*, as also one of the antae in solid masonry; and as these in their relative position and height are in exact accordance with those represented on the tomb of Darius (fig. 12) and other tombs carved in the rock near Persepolis (*q.v.*), there is no difficulty in forming a fairly accurate conjectural restoration of the same. In the representation of this palace, as shown on the tomb, and above the portico, has been sculptured the great throne of Darius, on which he sat, rendering adoration to the Sun god.
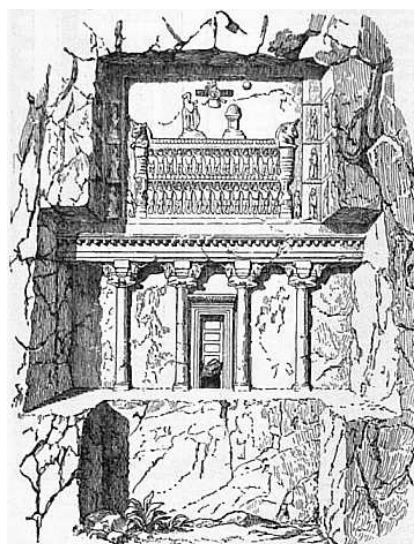

FIG. 12.—The Tomb of Darius, cut in the cliff at Nakshi Rustam, near Persepolis.

All the other palaces on the site, built or added to by various monarchs and at different periods, preserve very much the same plan, consisting always of a great square hall, the roof of which was carried by columns, with one or more porticoes

round, and smaller rooms and courts in the rear. In one of the palaces (G) the roof was carried by 100 columns in ten rows of ten each. The most important building, however, and one which from its extent, height and magnificence, is one of the most stupendous works of antiquity, is the great palace of Xerxes (C), which, though it consists only of a great central hall and three porticoes, covered an area of over 100,000 sq. ft., greater than any European cathedral, those of Milan and St Peter's at Rome alone excepted.

It was built on a platform raised 10 ft. above the terrace and approached by four flights of steps on the north side, the principal entrance. The columns of the porticoes and of the great hall were 65 ft. high, including base and capital. In the east and west porticoes the capitals consist only of the double bull or griffin; the cross corbels on their backs, similar to those shown on the tomb of Darius, have disappeared, being probably in wood. In the north or entrance portico, and in the great hall, the capitals are of a much more elaborated nature, as under the double capital was a composition of Ionic capitals set on end, and below that the calix and pendant leaves of the lotus plant. It can only be supposed that Xerxes, thinking the columns of the east portico required more decoration, instructed his architects to add some to those of the entrance portico and hall, and that they copied some of the spoils brought from Branchidae and others from Egypt.

Fig. 13 shows the plan of the palace according to the researches of Mr Weld Blundell, who found the traces of the walls surrounding the great hall and of the square chambers at the angles, and also proved that the lines of the drains as shown in Coste's and Texier's plans were incorrect. M. Dieulafoy also traced the existence of walls enclosing the Apadana at Susa from the paving of the hall and the portico which stopped on the lines of the wall. The plan of the palace at Susa was similar to that of the palace of Xerxes, except that on the side facing the garden facing south the apadana or throne room was left open. M. Dieulafoy's discoveries at Susa of the frieze of archers, the frieze of the lions, and other decorations of the walls flanking the staircase, all executed in bright coloured enamels on concrete blocks, revealed the exceptional beauty of the decoration both externally and internally applied to the Persian palaces.
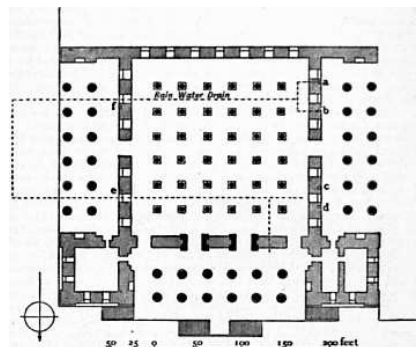
From R.P. Spier's *Architecture, East and West.*

Fɪɢ. 13.—Plan of the Hall of Xerxes.

The only other monumental works of Persian architecture are the tombs; to those cut in the solid rock, of which there are some examples, we have already referred. The most ancient tomb is that erected to Cyrus the Elder at Pasargadae, and consists of a small shrine or cella in masonry raised on a series of steps, inspired (according to Fergusson) by the ziggurat or terrace-temples of Assyria, but on a small scale. The tomb was surrounded on three sides by porticoes of columns. There are two other tombs, one at Persepolis and one at Pasargadae—small square towers with an entrance opening high up on one side, sunk panels in the stone, and a dentil cornice, copied from early Ionian buildings.

(R. P. S.)

Gʀᴇᴇᴋ Aʀᴄʜɪᴛᴇᴄᴛᴜʀᴇ

Prehistoric Period.—We have now to retrace our steps and go back to the prehistoric period of Greek architecture, to the origin and early development of that style which sowed the seed and determined the future form and growth of all subsequent European art.

The discoveries in Crete and Argolis have shown that Greek architecture owes much less than was at one time supposed to Egyptian and Chaldaean architecture; and although from very early times there may have been a commercial exchange between the several countries, the objects imported suggested only new and various schemes of decorative design, and exercised no influence on the development of architectural style. The remains of the palace at Cnossus in Crete, together with the representations in fresco painting and other decorative objects, show that whilst the lower part of the walls under the level of the ground and up to a height of 5 ft. above were all built in well-worked masonry, the upper portions were constructed in unburnt brick with timber framing, which not only gave strength and solidity to the walls, but carried the cross beams and timbers of intermediate floors and the roof, and further, that the walls were always vertical, which was not the case in Egypt or Chaldaea.

The principal remains discovered by Dr Arthur J. Evans (see Cʀᴇᴛᴇ) are described by him as belonging to the later Minoan age, from which it may be inferred they are the result of same centuries of previous development. What, however, is most remarkable is the admirable planning of the whole palace, the bringing together, under one roof and in proper and regular intercommunication, of the numerous services, which in a palace are somewhat complicated. The palace measured about 400 ft. square, and was built round an open court, nearly 200 ft. long by 90 ft. wide; as the same arrangement was found at Phaestus, excavated by the Italian archaeologists, it may be assumed to have been the Cretan plan. It was built on the crest of a hill, and in the western or highest portion was the court entrance from the agora to the megaron or throne-room, and the halls of the officers of the state. In the lower portion facing the east (the rooms in which were two storeys below the level of the court on account of the slope of the hill) was the private suite of apartments of the king and queen. All the services of the palace were at the north end of the palace, where the entrance gateway to the central court was situated. This northern entrance, Dr Evans points out, "represents the main point of intercourse between the palace and the city on the one hand and the port on the other." This is the only part of the palace in which there is evidence of some kind of fortification, as the road of access is dominated by a tower or bastion. Other provisions also in the plan of the western entrance suggest that its passage was guarded to some extent. In this respect the palace of Tiryns, excavated by Dr Schliemann, presents an entirely different aspect; the whole stronghold bears a singular resemblance to a fortified castle of the middle ages; a high wall from 24 to 50 ft. thick surrounded the acropolis, and the inclined paths of approach and the double gateways gave that protection at Tiryns which at Cnossus was assured, as Dr Evans remarks, by the bulwarks of the Minoan navy. The area on the spur of the hill, on which the citadel of Tiryns was placed, was very much smaller, but if we accept the forecourt at Tiryns as equivalent to the great central court at Cnossus, there are great similarities in the plans of the two palaces. The propylaea, the altar court, the portico, and the megaron are found in both, and those details which are missing in the one are found in the other. The discoveries at Cnossus have enabled Dr Evans to reconstitute the timber columns, of which the bases only were found at Tiryns, and the spur walls of the portico of the megaron and the sills of the doorways at Tiryns give some clue to the restoration of similar features at Cnossus; and if in the latter palace we find the origin of the Doric column, at Tiryns is found that of the antae and of the door linings, further substantiated by the careful analysis made by Dr Dörpfeld of the Heraeum at Olympia.

The reconstruction by Dr Evans of the timber columns at Cnossus, which tapered from the top downwards, the lower diameter being about six-sevenths of the upper, has little historical importance (see ORDER), so that we may now pass on to the next early monument of importance, the tomb of Agamemnon, the principal and the best preserved of the beehive tombs found at Mycenae and in other parts of Greece. This tomb consists of three parts, the *dromos* or open entrance passage, the *tholos* or circular portion domed over, and a smaller chamber excavated in the rock and entered from the larger one. The tomb was subterranean, the masonry being concealed beneath a large mound of earth. The domed part, 48 ft. 6 in. in diameter and 45 ft. high, is built in horizontal courses of stone, which project one over the other till they meet at the top. Subsequently the projecting edges were dressed down, so that the section through the dome is nearly that of an equilateral triangle. Notwithstanding the great thickness of the lintel (3 ft.) over the entrance doorway, the Mycenaeans left a triangular void over, to take off the superincumbent weight, subsequently (it is supposed) filled with sculpture, as in the Lions' Gate at Mycenae. The doorway was flanked by semi-detached columns 20 ft. high, the shafts of which tapered downwards like those reconstituted at Cnossus; the shafts rested on a base of three steps, and carried a capital with echinus and abacus. These shafts carried a lintel which has now disappeared; the wall above was set back, and was at one time faced with stone slabs carved with spiral and other patterns, of which there are fragments in various museums, the most important remains being those of the shafts, of which the greater part, which was brought over to England in the beginning of the 19th century by the 2nd marquess of Sligo, was presented by the 5th marquess to the British Museum in 1905. These shafts, as also the echinus moulding of the capitals, are richly carved with the chevron and spirals, probably copied from the brass sheathing of wood columns and doorways referred to by Homer.

The Archaic Period.—The buildings just referred to belong to what is known as the prehistoric age in Greece; the dispersion of the tribes by invaders from the north about 1100 B.C. destroyed the Mycenaean civilization, and some centuries have to pass before we reach the results of the new development. Among the invaders the Dorians would seem to have been the chief leaders, who eventually became supreme. They brought with them from Olympus the worship of Apollo, so that henceforth the sanctuary of the god takes the place of the megaron of the king. From Greece the Dorians spread their colonies through the Greek islands and southern Italy. Later they passed on to Sicily and founded Syracuse, and subsequently Selinus and Agrigentum (Acragas). The prosperity of all these colonies is shown in the splendid temples which they built in stone, the remains of many of which have lasted to our day.

The earliest Greek temple of which remains have been discovered[2] is that of the Heraeum at Olympia, ascribed to about 1000 B.C. Its plan (fig. 14) shows that the enclosure of the sanctuary and its porticoes in a peristyle had already been found necessary, if only to protect the walls of the cella, built in unburnt brick on a stone plinth; further, that the antae of the portico and the dressings of the entrance were in wood; and, following Pausanias' statement relative to the wood column in the opisthodomos, all the columns of the peristyle were in that material, gradually replaced by stone columns as they decayed, evidenced by the character of their capitals, which in style date from the 6th century B.C. to Roman times. The ephemeral nature of the materials employed in this and other early temples, and the risk of fire, must have naturally led to the desire to render the Greek sanctuaries more permanent by the employment of stone. But the Greeks were always timid as regards the bearing value of that material, and would seem to have imagined that unless the blocks were of megalithic dimensions it was impossible to build in stone. This may be gathered from the remains of the earliest example found, the temple of Apollo in the island of Ortygia, Syracuse, where the monolith columns had widely projecting capitals, the abaci of which were set so close together that the intercolumniation was less than one diameter of the column.

Following the temple of Apollo at Syracuse is the temple of Corinth, ascribed to 650 B.C., of which seven columns remain *in situ*, all monoliths, and the Olympieum at Syracuse. Nearly contemporary with the latter is one of the temples at Selinus in Sicily, 630 B.C., remarkable for the archaic nature of its sculptured metopes. Of later date there are five or six other temples in Selinus, all overthrown by earthquakes; the temple of Athena at Syracuse, which having been converted into a church is in fair preservation; an unfinished temple at Segesta; and six at Agrigentum, built on the brow of a hill facing the sea, one of which was so large that it was necessary to build in walls between the columns.

In Magna Graecia, in the acropolis at Tarentum, are the remains of a 7th century temple and three at Paestum about a century later in date. In one of these, the temple of Poseidon (figs. 15 and 16) the columns which carried the ceiling and roof over the cella are still standing; these are in two stages superimposed with an architrave between them, and although there are no traces in this instance of a gallery, they serve to render more intelligible Pausanias' description of that which existed in the temple of Zeus at Olympia.

The temple of Assus in Asia Minor is an early example remarkable for its sculptured architrave, the only one known, and in the temple of Aphaea in Aegina (*q.v.*) we find the immediate predecessor of the Parthenon, if we may judge by its sculpture and the proportions of its columns.

From Curtius and Adler's *Olympia*, by permission of Behrend & Co.

FIG. 14.—Plan of the Heraeum. A, Peristyle; B, Pronaos; C, Naos; D, Opisthodomus; E, Base of statue of Hermes.

So far we have only referred to the early temples of the Doric order; of the origin and development of those of the Ionic order far less is known. The earliest examples are those of the temple of Apollo at Naucratis in Egypt, and of the archaic temple of Diana at Ephesus, both about 560 B.C. The remains of the latter, discovered by Wood, are now in the British Museum; they consist of two capitals, one with a portion of a shaft in good preservation; the sculptured drum and the base of one of the columns, inscribed with the name of Croesus, who is known to have contributed to it; two other bases, and the cornice or cymatium. The treasury of the Cnidians at Delphi was Ionic, judging by the carved ornament enriching the cornice and architraves, and in the Naxian votive column we have another early example of an early voluted capital.

The tombs of Tantalais, near Smyrna, and of Alyattes, near Sardis, belong to the same date as those we shall find in Etruria. The Harpy tomb, now in the British Museum, built after 547 B.C., is the predecessor of many other Lycian tombs of the 5th and 4th centuries, to which we return.

As already pointed out, in the temple of Hera at Olympia (10th century B.C.), we find the complete plan of an hexastyle peripteral Greek temple, where columns originally in wood supported a wood architrave and superstructure protected by terra-cotta plaques and roofed over with tiles. The temple of Apollo at Syracuse, and the temple at Corinth (7th century B.C.) represent the earliest examples in stone, and in the temple of Poseidon at Paestum (6th century) are preserved the columns of the cella which carried the ceiling and roof. The structural development therefore of the temple was completed, and no great constructional improvements reveal themselves after 550 B.C. The next century would seem to have been
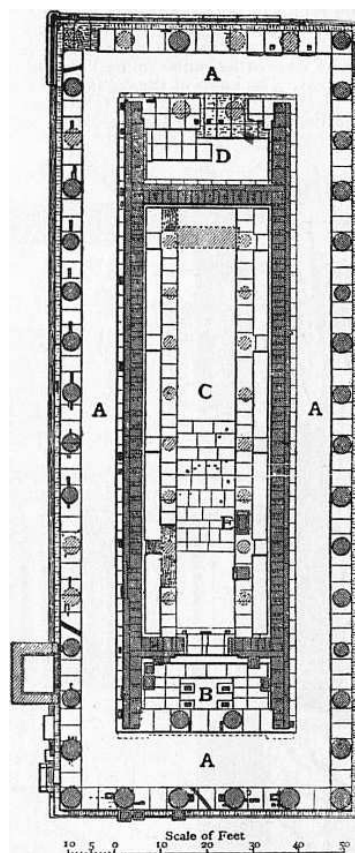
chiefly directed to the beautifying and refining of the features already prescribed, and it was the traditional respect for, and the conservative adherence to, the older type, which led the architects to the production of such masterpieces as the Parthenon and the Erechtheum, which would have been impossible but for the careful and logical progression of preceding centuries.

The Parthenon (*q.v.*) at Athens represents the highest type of perfection, not only in its conception but in its realization. It is only necessary here to give a general description. It was designed by Ictinus in collaboration with Callicrates, and built on the south side of the Acropolis on a foundation carried down to the solid rock. The temple, commenced in 454 B.C. and completed in 438 B.C., was of the Doric order and raised on a stylobate of three steps; it had eight columns in front and rear and was surrounded by a peristyle, there being twenty columns on the flanks. It contained two divisions; the eastern chamber was originally known as the Hekatompedos (temple of 100 ft.), that being the dimension of the cella of the ancient temple which it was built to replace. The chamber on the western side was called the Parthenon (*i.e.* chamber of the virgin). All the principal lines of the building had delicate curves. The entablature rose about 3 in. in the middle to correct an optical illusion caused by the sloping lines of the pediment, which gave to the horizontal cornice the appearance of having sunk in the centre. The stylobate had therefore to be similarly curved so that the columns should be all of the same height. The columns are not all equidistant, those nearer the angle being closer together than the others, which gave a greater appearance of strength to the temple; this was increased by a slight inclination inwards of all the columns. In order to correct another optical illusion, which causes the shaft of a column, when it diminishes as it rises, and is formed with absolute straight lines, to appear hollow or concave, an increment known as the entasis was given to the column, about one-third up the shaft. The columns were not monoliths, like those of the earliest stone temples mentioned above; they were built in several drums, so closely fitted together that the joint would be imperceptible but for the slight discoloration of the marble. The setting of the lowest drum of these columns on the curved stylobate, with the slight inclination of the column, must have been a work of an extraordinary nature, only possible with such a material as Pentelic marble. The cella or naos was built to enshrine the chryselephantine statue of Athena by Pheidias. In order to carry the ceiling and roof there was a range of columns on each side of the cella returning round the end. These columns probably carried an upper range as in the temple of Poseidon at Paestum. The tympana of the two pediments and all the metopes were enriched with the finest sculpture, and were realized, designed, and executed by Pheidias and his pupils. On the upper part of the cella wall and under the peristyle was the Panathenaic frieze, of which, as also of the other sculptures, the British Museum possesses the finest examples.
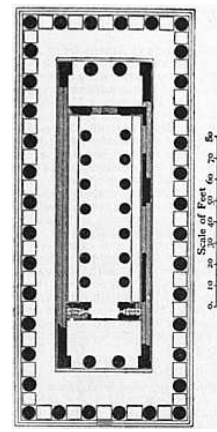
The Propylaea (*q.v.*), designed by Mnesicles and built 437-432 B.C., was the only entrance to the Acropolis. It was of the Doric order, and consisted of a portico of six columns, the two centre ones being wider apart, to allow of the road through, up which the chariots and beasts for sacrifices ascended. The columns carrying the marble ceiling of the vestibule were of the Ionic order; beyond them the wall was pierced by three doorways, and on the other side and facing east was another portico of six columns. The front entrance was flanked on the left hand by a chamber known as the Pinacotheca, and on the right by a chamber intended probably to be a replica but subsequently curtailed in size in consequence of the proximity of another temple.

The Erechtheum on the north side of the Acropolis occupied the site of three older shrines, which may account for its irregular plan. The eastern portion was the temple of Athena Polias, with a portico of six columns of the Ionic order. At a lower level on the north side was a portico of six columns (four in front and two at the sides) leading to the shrine of Erechtheus; the west front of this shrine had originally a frontispiece of four columns *in antis* raised on a podium; subsequently during the Roman occupation these columns were taken down and reproduced as semi-detached columns with windows between. On the west side was a court in which was the olive tree and the shrine of Pandrosus (Pandroseion). At the south-west angle was the well-known portico or tribune of the Caryatides. There was a small entrance through the podium at the side, and stairs leading down to the shrine of Erechtheus.
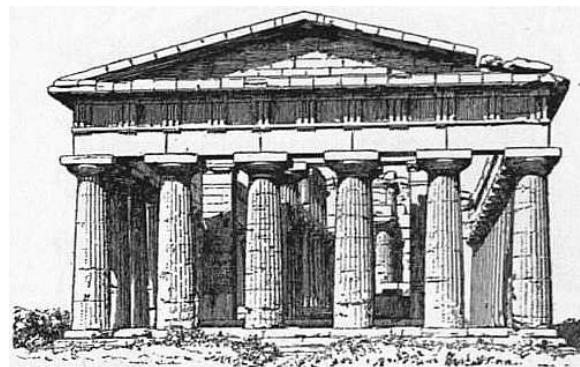
From a photo by Brogi.

Fig. 16.—Temple of Poseidon at Paestum.

The only other building remaining on the Acropolis is the temple of Niké Apteros, raised on a lofty substructure south-west of the propylaea. It also was of the Ionic order, and belonged to the type known as "amphiprostyle," with a portico of four columns in the front and rear but no peristyle. The term "apteros" applied to the temple and not to the goddess of victory.

In 430 B.C., shortly after the completion of the Parthenon, Ictinus was employed to design the temple of Apollo Epicurius, at Bassae, in Arcadia. This temple externally was of the Doric order, but, being built in local stone, no attempt was made to introduce those refinements which are found in the Parthenon. In the rear of the cella is a second sanctuary with a doorway facing east; it was probably the site of an ancient temple which had to be preserved, and this may account for the fact that the temple runs north and south. The cella is flanked by five columns of the Ionic order which are conntected by spur walls to the cella wall. These columns carry an architrave, frieze richly sculptured with figure subjects, cornice and wall above rising to the roof. There was no ceiling therefore, and the interior was probably lighted through pierced Parian marble tiles, of which three examples were found. The Corinthian capital found on the site is supposed by Cockerell to have belonged to the shaft between the two cellas.

The same architect, Ictinus, was employed in 420 B.C. to rebuild the hall of the mysteries at Eleusis on a larger scale. The hall was 185 ft. square, and its ceiling and roof were carried by seven rows of columns with six in each row. The propylaea, which gave access to the sacred enclosure at Eleusis, was copied from the propylaea at Athens. The so-called lesser propylaea had some connexion with the mysteries.

The temple of Zeus at Olympia had much in common with the Parthenon, being nearly contemporaneous, built to enshrine

a second chryselephantine statue by Pheidias, and in plan having a similar arrangement of columns inside the cella; the lower range of columns (according to Pausanias) supported a gallery round, so that privileged visitors could approach nearer to the statue. The temple, however, was built in the local conglomerate stone covered with a thin coat of stucco and painted.

Of circular temples there are two examples known, the Philippeion at Olympia and the Tholos at Epidaurus. The latter had, inside the cella, a peristyle of Corinthian columns, the capitals of which are of great beauty and represent in their design the transition between those of the monument of Lysicrates and the temple of Zeus Olympius at Athens.

In the sacred enclosures of the Greek sanctuaries were other smaller temples or shrines, altars, statues and treasuries, the latter being built by the various cities, from which pilgrimages were made, to contain their treasures. At Olympia there were ten or eleven, the remains of some of which are of great interest. Of the treasury of the Cnidians at Delphi, discovered by the French, so much has been found that it has been possible to evolve a complete conjectural restoration in plaster, now in the Louvre. Its sculpture and the rich carving of its architectural features show that it was Ionian in character. In front was a portico-in-antis, in which the caryatide figures standing on pedestals took the place of columns. These are the earliest examples known of caryatide figures, and they precede those of the Erechtheum by about a century.
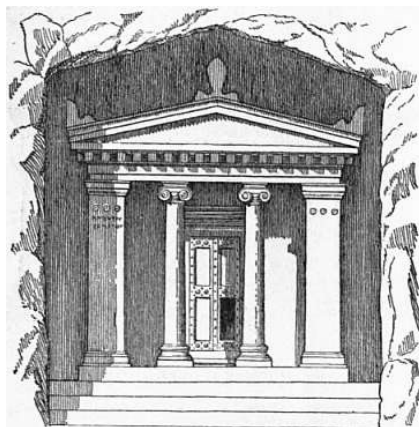

Fig. 17.—Lycian Tomb of Telmessus.

The most important temple in Asia Minor was the temple of Diana (Artemis) at Ephesus (356-334 B.C.). The archaic temple was burnt in 356, and was immediately rebuilt with greater splendour from the designs of Paeonius. The site of the temple was discovered by Wood in 1869, and the remains brought over to the British Museum in 1875. There were 100 columns, 36 of which (according to Pliny) were sculptured, and it was probably on account of the magnificence of the sculpture that this temple was included among the seven wonders of the world. The sculptured bases are of two kinds, square and circular, in the latter case being the lower drums of the columns. Examples of both are in the British Museum, and several conjectural restorations have been made, among which that of Dr A.S. Murray has been generally accepted, but recent researches (1905) suggest that it remains still an unsolved problem.

The temple of Apollo Didymaeus, near Miletus, was the largest temple in Asia Minor, and its erection followed that of the temple at Ephesus, Paeonius and Daphnis of Miletus being the architects. The temple was decastyle, dipteral, with pronaos and vestibule, but no opisthodomos. The cella was so wide (75 ft.) that it remained open to the sky. The bases of the columns were elaborately carved with ornament, as if in rivalry with the temple of Diana. Both these temples were of the Ionic order, as also were those of Athena Polias at Priene (340 B.C.), many of the capitals of which are in the British Museum, and the temples of Aphrodite at Aphrodisias and Cybele at Sardis.

The mausoleum at Halicarnassus, also of the Ionic order, built by Queen Artemisia in memory of her husband Mausolus, who died in 353 B.C., was, according to Pliny, recorded as one of the seven wonders of the world, probably on account of the eminence of the sculptors employed, Bryaxis, Leochares, Timotheus, Scopas and Pythius. Pliny's description is somewhat vague, so that its actual design is a problem not yet solved. Professor Cockerell's restoration is in accord with the description, but does not quite agree with the actual remains brought over by Newton and deposited in the British Museum. If the Nereid monument and the tombs at Cnidus and Mylasa be taken as suggesting the design, the peristyle (pteron) of thirty-six columns of the Ionic order with entablature stood on a lofty podium, richly decorated with bands of sculpture, and was crowned by a pyramid which, according to Pliny, "contracted itself by twenty-four steps into the summit of a meta." The steps found are not high enough to constitute a meta, and it is possible therefore that, according to Mr J.J. Stevenson, these steps were over the peristyle only, and that the lofty steps which constituted the meta were in the centre, carried by the inner row of columns. The magnificent sculpture of the Macedonian period has in recent times been demonstrated by the discovery of the marble sarcophagi found at Sidon by Hamdi Bey and now in the museum at Constantinople.

The Lycian tombs, of which there are many hundreds carved in the rock in the south of Asia Minor, are copies of timber structures, based on the stone architecture of the neighbouring Greek cities (fig. 17). The Paiafaor Payava tomb (375-362 B.C.), found at Xanthus and now in the British Museum, is apparently a copy, cut in the solid rock, of a portable shrine, in which the wood construction is clearly defined.

Capitals of the Greek Corinthian order have been found at Bassae, Epidaurus, Olympia and Miletus, but the earliest example of the complete order is represented in the Choragic monument of Lysicrates at Athens.

The most important example of the Greek Corinthian order is that of the temple of Jupiter Olympius at Athens, begun in 174 B.C., but not completed till the time of Hadrian, A.D. 117. The temple was 135 ft. wide and 354 ft. long, built entirely in Pentelic marble, the columns being 56 ft. high. There were eight columns in front and a double peristyle round.

The two porches of the Tower of the Winds at Athens (c. 75 B.C.) had Corinthian capitals. The upper part of the tower, which was octagonal in plan, was sculptured with figures representing the winds.

The Greek houses discovered at Delosand Priene were very simple and unpretentious, but the palace near Palatitza in Macedonia, discovered by Messrs Heuzey and Daumet, would seem to have been of a very sumptuous character. The front of the palace measured 250 ft. In the centre was a vestibule flanked with Ionic columns on either side, leading to a throne room at one time richly decorated with marble, and with numerous other halls on either side. The date is ascribed to the middle of the 4th century B.C.

In selecting the sites for their theatres, the Greeks always utilized the slope of a hill, in which they could cut out the cavea, and thus save the expense of raising a structure to carry the seats, at the same time obtaining a beautiful prospect for the background. The theatre of Dionysus at Athens was discovered and excavated in 1864, and has fortunately preserved all the seats round the orchestra, sixty-seven in number, all in Pentelic marble, with the names inscribed thereon of the priests and dignitaries who occupied them. The largest theatre was at Megalopolis, with an auditorium 474 ft. in diameter. The most perfect, so far as the seats are concerned, is the theatre at Epidaurus, with a diameter of 415 ft. Other theatres are known at Dodona in Greece, Pergamum and Tralles in Asia Minor, and Syracuse and Segesta in Sicily.

PARTHIAN ARCHITECTURE

The architecture of the Parthian dynasty, who from 250 B.C. to A.D. 226 occupied the greater part of Mesopotamia, their empire in 160 B.C. extending over 480,000 sq. m., was quite unknown until Sir A.H. Layard, following in the steps of Ross and Ainsworth, visited and measured the plan of the palace at Hatra (el Hadr) about 30 m. south of Mosul; the architecture of this palace shows that, on the one hand, the Parthians carried on the traditions of the barrel vault of the Assyrian palace, and on the other, from their contact with Hellenistic methods of building, had acquired considerable knowledge in the working of ashlar masonry.

El Hadr is first mentioned in history as having been unsuccessfully besieged by Trajan in A.D. 116, and it is recorded to have been a walled town containing a temple of the sun, celebrated for the value of its offerings. The temple referred to is probably the large square building at the back of the palace, as above the doorway is a rich frieze carved with griffins, similar to those found at Warka by Loftus, together with large quantities of Parthian coins. The remains (fig. 18) consist of a block of 380 ft. frontage, facing east, and 128 ft. deep, subdivided by walls of great thickness, running at right angles to the main front, and built in an immense court, divided down the centre by a wall, separating that portion on the south side, where the temple was situated, from that on the north side, which constituted the king's palace. The seven subdivisions of the different widths were all covered with semi-circular barrel vaults which, being built side by side, mutually resisted the thrust, the outer walls being of greater thickness, with the same object. In the centre of the south block was an immense hall 49 ft. wide and 98 ft. deep, which formed the vestibule to the temple in the rear; this vestibule was flanked by a series of three smaller halls on either side, over which there was probably a second floor. On the palace or north side were two great aiwans or reception halls. The main front (fig. 19) was built in finely jointed ashlar masonry with semicircular attached shafts between the entrance doorways, which had semicircular heads, every third voussoir of the three larger doors being decorated by busts in strong relief with a headgear similar to that shown on Parthian coins; other carvings, with the acanthus leaf, belonged to that type of Syrio-Greek work, of which Loftus found so many examples at Warka (Loftus, *Chaldaea, Susiana*, p. 225). In the great mosque of Diarbekr are two wings at the north and south ends respectively, which are said to have been Parthian palaces built by Tigranes, 74 B.C.; they have evidently been rearranged or rebuilt at various times, the columns with their capitals and the entablature having been utilized again. The shafts of the columns of the upper storey are richly carved with geometrical patterns similar to those found by Loftus at Warka.
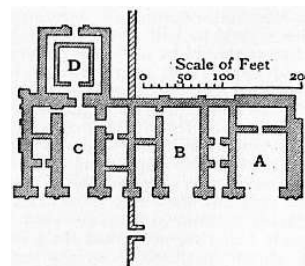

FIG. 18.—Plan of Palace of el Hadr.

A, Throne or reception room.
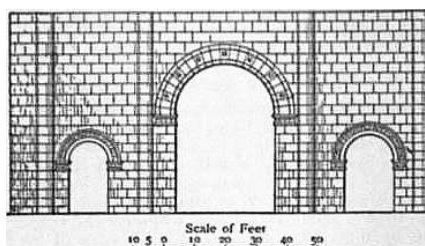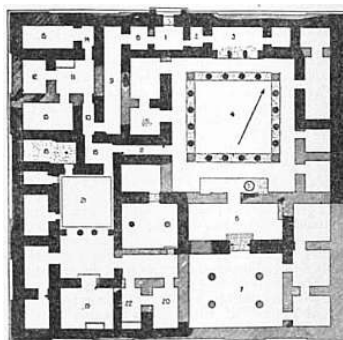B, Large hall, or
C, Entrance hall of temple.
D, Temple.

FIG. 19.—Portion of front of Palace of el Hadr.

From Prof H V. Hilprecht's *Exploration in Bible Lands*, by permission of A.J. Holman & Co. and T. & T. Clark.

FIG. 20.—Plan of the Parthian Palace at Nippur.

The American researches at Nippur have resulted in the discovery on the top of the mounds of the remains of a Parthian palace; and the disposition of its plan (fig. 20), and the style of the columns of the peristylar court, show so strong a resemblance to Greek work as to suggest the same Hellenistic influence as in the palace of el Hadr. Having no stone, however, they were obliged to build up these columns at Nippur with sections in brick, covered afterwards with stucco. The columns diminished at the top to about one-fifth of the lower diameter, and would seem to have had an entasis, as the lower portion up to one-third of the height is nearly vertical. A similar palace was discovered at Tello by the French archaeologists, and the bases of some of the brick columns are in the Louvre.
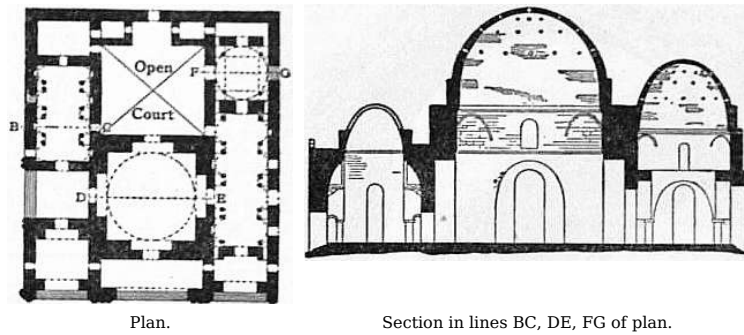
(R. P. S.)

SASSANIAN ARCHITECTURE

Plan.   Section in lines BC, DE, FG of plan.

Fɪɢ. 21 and Fɪɢ. 22.—The Palace of Serbistan.

Although, on the overthrow of the Parthian dynasty in A.D. 226, the monarchs of the Sassanian dynasty succeeded to the immense Parthian empire, the earliest building found, according to Fergusson, is that at Serbistan, to which he ascribes the date A.D. 380. The palace (fig. 21), which measures 130 ft. frontage and 143 ft. deep, with an internal court, shows so great an advance in the arrangements of its plan as to suggest considerable acquaintance with Roman work. The fine ashlar work of el-Hadr is no longer adhered to, and in its place we find rubble masonry with thick mortar joints, the walls being covered afterwards, both externally and internally, with stucco. While the barrel vault is still retained for the chief entrance porches, it is of elliptical section, and the central hall is covered with a dome, a feature probably handed down from the Assyrians, such as is shown in the bas-relief (fig. 10) from Kuyunjik, now in the British Museum. In order to carry a dome, circular on plan, over a square hall, it was necessary to arch across the angles, and here to a certain extent the Sassanians were at fault, as they did not know how to build pendentives, and the construction of these are of the most irregular kind. As, however, their mortar had excellent tenacious properties, these pendentives still remain *in situ* (fig. 22), and their defects were probably hidden under the stucco. In the halls which flank the building on either side, however, they displayed considerable knowledge of construction. Instead of having enormously thick walls to resist the thrust of their vaults, to which we have already drawn attention in the Assyrian work and at el Hadr, they built piers at intervals,

Fɪɢ. 23.—Plan of the Palace at Firuzabad.

covering over the spaces between them, with semi-domes on which the walls carrying the vaults are supported, so that they lessened the span of the vault and brought the thrust well within the wall. This, however, lessened the width of the hall, so they replaced the lower portions of the piers by the columns, leaving a passage round. It is possible that this idea was partly derived from the great Roman halls of the thermae (baths), where the vault is brought forward on columns; but it was an improvement to leave a passage behind. The elliptical sections given to all the barrel vaults may have been the traditional method derived from Assyria, of which, however, no remains exist. In the article Vᴀᴜʟᴛ there will be found a reason why these elliptical sections were adopted (see also below in the description of the great hall at Ctesiphon). In the palace of Firuzabad, attributed by Fergusson to Peroz (Firuz) (A.D. 459-485), the plan (fig. 23) follows more closely the disposition of the Assyrian palaces, and we return again to the thick walls, which might incline us to give a later date to Serbistan, except that in the pendentives carrying the three great domes in the centre of the palace at Firuzabad they show greater knowledge in their construction. The angles of the square hall are vaulted, with a series of concentric arches, each ring as it rises being brought forward, the object being to save centreing, because each ring rested on the ring beneath it. The plan is a rectangular parallelogram with a frontage of 180 ft. and a depth of 333 ft., more than double, therefore, of the size of Serbistan. An immense entrance hall in the centre of the main front is flanked on each side by two halls placed at right angles to it, so as to resist the thrust of the elliptical barrel vaults of the entrance hall. This hall leads to a series of three square halls, side by side, each surmounted by a dome carried on pendentives. Beyond is an open court, the smaller rooms round all covered with barrel vaults. Here, as in Serbistan, the material employed is rubble masonry with thick joints of mortar, and fortunately portions of the stucco with which this Sassanian masonry was covered remain both externally and internally. As there are no windows of any sort, the wall surface of the exterior has been decorated with semi-circular attached shafts and panelling between, which recall the primitive decorations found in the early Chaldaean temples, except that arches are carried at the top across the sunk panels. Internally an attempt has been made to copy the decoration of the Persian doorway, which represents a kind of renaissance of the ancient style. But instead of the lintel the arch has been introduced, and the ornament in stucco representing the Persian cavetto cornice shows imperfect knowledge of the original and is clumsily worked. The niches also, in the main front, have been copied from the windows which flank the doorway in the Persian palace. But they are decorative only, and are too shallow to serve any purpose.
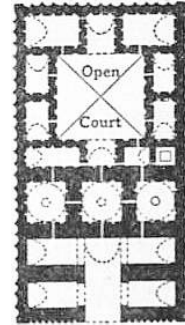
382

From Dieulafoy's *L'Art Antique* by permission of Morel et Cie.

Fɪɢ. 24.—The Great Hall at Ctesiphon.

If there has been some difficulty in determining the exact date of Firuzabad, that of the third great palace, at Ctesiphon, on the borders of the Tigris, is known to have been built by Chosroes I. in A.D. 550. Owing probably to its proximity to Bagdad, from which it lies about 25 m. distant, it is much better known than the other examples we have quoted; but while

they are constructed in rubble masonry, Ctesiphon is built of brick, because we have now returned to the alluvial plain where no stone could be procured. The only portion of the palace which still exists is that which was built in burnt brick, and this far exceeds in dimensions Serbistan and Firuzabad. Its main front measured 312 ft.; its height was about 115 ft.; and its depth 175 ft. The plan is very simple, and consisted of an *aiwan* or immense hall, 86 ft. in width and 163 ft. long, covered with an elliptical barrel vault, the thrust of which is counteracted by five long halls on each side, also covered with barrel vaults and probably used as guard chambers or stores. The great hall was open in the front, and constituted an immense portal, 83 ft. wide and 95 ft. to the crown of the arch. The springing of the vault is 40 ft. from the ground, but up to about 26 ft. above the springing the walls are built in horizontal courses projecting inwards as they rise, so that the actual width of the vaulted portion (fig. 24) has been diminished one-sixth and measures only about 71 ft. The crown of the vault is 9 ft. thick, the walls at the base being 23 ft. The bricks or tiles of which the vault is built are, like those at Thebes, laid flat-wise, and there is also a similar inclination of the rings of brick-work, which are about 10° out of the vertical. This leads to the conclusion that this immense vault was built without centreing, as the tenacious quality of the mortar would probably be sufficient to hold each tile in its position until the ring was complete. In the building of the arch of the great portal other precautions were taken; bond timbers 23 ft. long and in five rows, one above the other, were carried through the wall from front to back. The lower portion of the arch (5 ft. in height) was built with bricks placed flat-wise; the upper portion (4 ft. in height) in the usual way, viz. right angles to the face. The reason for this change was probably that the upper portions might be carved, as they have been, with a series of semi-circular cusps.

The decoration of the flanks of this great central portal is of the most bewildering description. There has evidently been a desire to give a monumental character to the main front. With this idea in view they would seem to have attempted to reproduce Roman features, such as are found decorating the fronts of the various amphitheatres of the Empire. But the semi-circular shafts which form the decoration do not come one over the other on the several storeys, and there is a reckless employment of blank arcades distributed over the surface.

There are remains of two other palaces at Imamzade and Tag Iran, and in Moab a small example, the Hall of Rabboth Ammon, supposed to have been erected for Chosroes II. during the subjugation of Palestine, which is richly decorated with carving, probably by Syrio-Greek artists, with a mixture of Greek, Jewish and Sassanian details. At Takibostan and Behistun (Bisutun), some 200 m. north-east of Ctesiphon, are some remarkable Sassanian capitals and panels (published in Flandin and Coste's *Voyage en Perse,* 1851, Paris).

<div align="right">(R. P. S.)</div>

ETRUSCAN ARCHITECTURE

Although our acquaintance with Etruscan architecture is confined chiefly to the entrance gateways and the walls of towns, and to tombs, it forms a very important link between the East and the West. Though little is known of the history of Etruria (*q.v.*), the influence which her people exerted on Roman architecture, lasting down to the period when Greece was overrun and plundered of her treasures, was so great that it would be difficult to follow the origin of Roman architecture without some inquiry into the work of its immediate predecessor. The theory put forward by Fergusson, as to the migration of the Etruscans from Asia Minor in the 12th or 11th century B.C., is substantiated by the resemblance of the tumuli in the latter country, such as those at Tantalais, on the northern shore of the gulf of Smyrna, and that of Alyattes near Sardis, as compared with the Regulini Galeassi tomb at Cervetri and the Cucumella tomb at Vulci, in all cases consisting of a sepulchral chamber buried under an immense mound surrounded by a podium in stone. The chamber was covered over with masonry, laid in horizontal courses, each stone projecting slightly over the one below. The same system of construction prevailed in the bee-hive tombs of Greece, except that the latter were always circular on plan, whilst these cited above were rectangular. Similar methods of construction are found at Tusculum and in a gateway at Arpino. In all these cases the projecting courses were worked off on the completion of the tomb, in Greece and at Tusculum and Arpino following a curve, and in the Regulini Galeassi tomb a raking line.

The earliest example known of the arched vault, with regular voussoirs in stone, is found in the canal of the Marta near Graviscae, ascribed to the 7th century. The vault is 14 ft. in span, with voussoirs from 5 to 6 ft. in depth. In the tomb of Pythagoras near Cortona, with a span of about 10 ft., only four voussoirs were employed. In the Cloaca Maxima at Rome the vault (now ascribed by Commendatore Boni to the 1st century B.C.) is built with three concentric rings of voussoirs. In all these cases the thrust of the arch was amply resisted as they were constructed under ground, and in the entrance gateways at Volterra, Perugia and Falerii a similar resistance was given by the immense walls in which they were built.

We have already referred to one class of tomb in which the sepulchral chamber, built above the ground, was covered over with a mound of earth; there is a second class, carved out of the solid rock, in which we find the same treatment as that described in connexion with Egypt. The tomb represents, in its internal arrangements and in its decorations, the earthly dwelling of the defunct (compare the Egyptian "soul-houses"). The ceilings are carved in imitation of the horizontal beams and slanting rafters of the roof, the former carried by square piers with capitals; one well-known tomb at Corneto (fig. 25) represents the atrium of an Etruscan house, which corresponds with the description given by Vitruvius of the *cavaedia displuviata*, in which there was a small opening at the top, known as the compluvium, the roof sloping down on all four sides.

The paintings which decorate these tombs have very much the same character as those which are found on what were thought to have been Etruscan, but are now generally considered as Greek vases, the principal difference being that instead of allegorical subjects, domestic scenes recalling the life of the deceased are represented. In a tomb at Cervetri the walls and piers were carved with representations of the helmets, swords and other accoutrements of a soldier, and also the mirrors and jewelry of his wife, even the kitchen utensils being included, so as to give the complete fittings of the house they occupied. In two examples at Castel D'Asso the rock has been cut away on all sides, leaving a rectangular block, crowned with reverse mouldings.

Scarcely any remains *in situ* of Etruscan temples have been found, and the description given by Vitruvius is very scanty. Of late years, however, in the British Museum and in the museums at Florence and Rome, a large amount of material has been brought together, from which it is possible to make some kind of conjectural restoration. This has been facilitated by the discoveries made at Olympia, Delphi and elsewhere in Greece, showing the important function which terra-cotta served in the protection and decoration of the timber roofs of the Greek temples and treasuries. The cornices, antefixae, pendant slabs and other decorative features in terra-cotta, found on the sites of the Etruscan temples, show that the timber construction of their roofs was protected in the same way; and although Vitruvius (bk. iii. ch. 2) considered the temple of Ceres at Rome to be clumsy and heavy, and its roofs low and wide, in comparison with the purer examples of Greek architecture, the remains of terra-cotta found at Civita Castellana (the ancient Falerii), at Luna, Telamon and Lanuvium (the latter in the British Museum), show that in their modelling and colour they must have possessed considerable decorative effect, and when raised on an eminence, as in the case of the temple of Jupiter on the Capitol, formed striking features of importance, enriched as they were with gilding. There is one feature in the Etruscan examples which seems to have been peculiar to their temples, viz. the pendant slabs hung round the eaves to protect the walls; these latter were probably covered with stucco and decorated with paintings. The lower portions of many of these slabs were decorated in relief and in colour at the back, showing that they were exposed to view below the soffit of the projecting eaves.
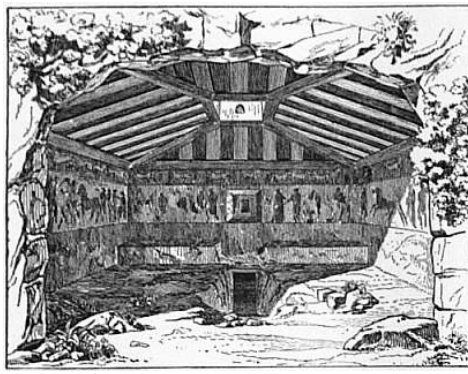
F‍IG. 25.—The Corneto Tomb.

Owing to the ephemeral nature of the materials employed in the building of the walls of Etruscan temples, viz. unburned brick or rubble masonry with clay mortar, the roofs being in timber, little is known of their general design; the terra-cotta decorations are, however, fortunately in good preservation, and suggest that although the Etruscan temple, architecturally speaking, was not of a very monumental character, its external decoration and colour added considerably to its effect.

<div align="right">(R. P. S.)</div>

ROMAN ARCHITECTURE

The rebuilding of Rome, which began in the reign of Augustus, and was carried on by his successors to a much greater extent, has caused the destruction of nearly all those examples of early work to which the student, working out the history of a style, would turn. There are, however, a few early buildings still existing, and these are of value as showing the extremely simple nature of their design. The temple of Fortuna Virilis (so-called) in the Forum Boarium, attributed to the beginning of the 1st century B.C., shows the great difference between Greek and Roman temples. Like the Etruscan temple, it is raised on a podium, and approached by a flight of steps. The Etruscan cella is dispensed with; and what may be looked upon as the semblance of a Greek peristyle is retained in the semi-detached columns which are carried round the walls of the cella. To the entrance portico, however, the Roman architect attached great importance, and we find here that one-third of the whole length of the temple is given up to the portico. The Tabularium built by Lutatius Catulas (78 B.C.) is a second example of early work. On a lofty substructure, built of peperino stone, was raised an arcade, which formed a passage from one side of the capitol to the other, and here we find the earliest example of the use of the Classic order, as a decorative feature only, applied to the face of a wall. The arcade consists of a series of arches with intermediate semi-detached Doric columns carrying an entablature. The architectural design of the substructure is of the simplest kind, depending for its effect only on the size of the stones employed and the finish given to the masonry. The same remark applies to the few remains left of the Forum Julium (47 B.C.), where an additional decorative effect was produced by the bevelled edge worked round all the stones, producing the effect of rusticated masonry.

If, however, the remains are few, the records of classical writers show that already before the beginning of the 1st century B.C. the influence of Greece had been shown in the transformation of the Forum, the embanking of the river Tiber, the erection of numerous porticoes throughout the Campus Martius, and of basilicas, one of which, rebuilt by Paulus Aemilius in 50 B.C., was remarkable for its monolithic columns of pavonazetto marble; and further that on the Palatine hill were various mansions, the courts and peristyles of which were richly decorated with marble.

The boast of Augustus that he found Reme built of brick and left it in marble is true in a sense, but not in the way it is usually interpreted. He greatly encouraged the use of marble—the temple of Venus in the forum of Julius Caesar is said to have been built entirely of that material—but as a rule marble was only used as a facing. This, however, led to the substitution of solid concrete for the core of walls, in place of the unburnt brick which up to that time had been employed. On this subject the writings of Vitruvius, the Roman architect, are of the greatest value, as they describe clearly not only the materials used at this time (about 30 B.C.), but the different methods of building walls (see R‍OME). The material which contributed more than any other to the magnificent conceptions of the Roman Imperial style was that known as pozzolana, a volcanic earth which, mixed with lime, formed an hydraulic cement of great cohesion and strength. Not only the walls but the vaults were built in this pozzolana concrete, and formed one solid mass. Bricks were employed in arches, on the quoins of walls, occasionally in bond courses, and in the constructional vaults as ribs, in order to relieve the centreing of the weight until the pozzolana concrete had been poured in and had consolidated. The bricks employed in these ribs, and for the voussoirs of arches, were of the kind we should describe as tiles, being about 2 ft. square and 2 in. thick. Bricks also of smaller size and triangular in shape were used for the facing of walls, the triangular portions being embedded into the concrete walls.

The Romans themselves do not seem to have realized the tenacious properties of this pozzolana cement which, when employed for the foundation of temples, formed a solid mass capable of bearing as much weight as the rock itself. They feared also the thrust of the immense vaults over their halls, and always provided crosswalls to counteract the same, as shown in the plan of all the thermae; when, however, they had discovered the secret of covering over large spaces with a permanent casing indestructible by fire, it not only gave an impetus to the great works in Rome, but led to a new type of plan, which spread all through the Empire, varied only by the difference in materials and in labour. In this respect the Romans always availed themselves of the resources of the country, which they turned to the best account. As pozzolana was not to be found in North Africa or Syria, they had to trust to the excellent qualities of the Roman mortar, but even in Syria, where stone was plentiful and could be obtained in great dimensions, when they attempted to erect vaults of great span similar to those in Rome, these probably collapsed before the building was finished, and were replaced by roofs in wood.

In the styles hitherto described the gradual development has been traced to their primitive, culminating and decadent periods. This is not called for in a description of the Roman style of architecture, which to a certain extent appeared phoenix-like in its highest development under Augustus. Roman orders in the Augustan age had reached their culminating development. The capitals of the portico of the Pantheon (27 B.C.), or of the temple of Mars Ultor (2 B.C.), constitute the finest examples of the Corinthian order, whilst those of later temples show a falling off in style. It was only in the application of the orders that new combinations presented themselves, and this can be better understood when we refer to the monuments themselves. The description of the Roman orders, with the subsequent modifications, is given in the article O‍RDER. It is necessary, however, here to draw attention to two very important developments which the Roman architect introduced as regards the orders: firstly, their employment as decorative features in combination with the arcade, known as composite arcades, and secondly, their superposition one above the other in storeys. The earliest example of the first class is that found in the Tabularium as it now exists; of the second class the Colosseum and the theatre of Marcellus are the best known examples. In principle the practice must be condemned, for the employment of the column and entablature, which was designed by the Greek architect as an independent constructive feature, in a purely decorative sense stuck on the face of a wall, is contrary to good taste, but it is impossible not to recognize in its application to the Colosseum the value of the scale which it has given to the whole structure, a scale which would have been entirely lost if the building had been treated as one storey. The superposition of the orders as exemplified in the Roman theatres and amphitheatres throughout the Empire constitutes the greatest development made in the style, and it is one which, from the Italian revivalists down to our

time, has had more influence in the design of monumental work than any other Roman innovation.

In the preceding sections it has been necessary to confine our descriptions, in the case of Egypt and Greece, more or less to temples and tombs, and in that of Assyria to palaces, but in Roman architecture the monuments are not only of the most extensive and varied kinds, but in some parts of the Empire they become modified by the requirements of the country, so that a tabulated list alone would occupy a considerable space. The following are the principal subdivisions: The Roman forum (see ROME); the colonnaded streets in Syria and elsewhere, and temple enclosures; temples (*q.v.*), rectangular and circular; basilicas (*q.v.*); theatres (*q.v.*) and amphitheatres (*q.v.*); thermae or baths (*q.v.*); entrance gateways and triumph arches (see TRIUMPHAL ARCH); memorial buildings and tombs, aqueducts (*q.v.*) and bridges (*q.v.*), palatial architecture (see PALACE); domestic architecture (see HOUSE).

The *Forum Romanum* under the Republic would seem to have served several purposes. The principal temples and important public buildings occupied sites round it, and up to the time of Julius Caesar there were shops on both sides: it was also used as a hippodrome and served for combats and other displays. Under the Empire, however, these were relegated to the amphitheatre and the theatre, markets were provided for elsewhere, and the forum became the chief centre for the temples, basilicas, courts of law and exchanges. But already in the time of Julius Caesar the Forum Romanum had become too small, and others were built by succeeding emperors. In order to find room for these, not only were numerous crowded sites cleared, but vast portions of the Quirinal hill were cut away to make place for them. The Fora added were those of Julius Caesar, Augustus, Trajan, Nerva and Vespasian. Outside Rome, in provincial towns and in Africa and Syria, the Forum was generally built on the intersection of the two main streets, and was surrounded by porticoes, temples and civic monuments.

Colonnaded Streets.—We gather from some Roman authors that in early days the Campus Martius was laid out with porticoes. All these features have disappeared, but there are still some existing in Syria, North Africa and Asia Minor, which are known as colonnaded streets. The most important of these are found in Palmyra, where the street was 70 ft. wide with a central avenue open to the sky and side avenues roofed over with stone. The columns employed were of the Corinthian order, 31 ft. high, and formed a peristyle on each side of the street, which was nearly a mile in length. The triple archway in this street is still one of the finest examples of Roman architecture. At Gerasa, the colonnaded streets had columns of the Ionic order, the street being 1800 ft. long, with other streets at right angles to it; similar streets are found at Amman, Bosra, Kanawat, &c. At Pompeiopolis, in Asia Minor, are still many streets of columns, and in North Africa the French archaeologists have traced numerous others.

Temple Enclosures.—In Rome the great cost, and the difficulty of obtaining large sites, restricted the size of the enclosures of the temples; this was to a certain extent compensated for by the magnificence of the porticoes surrounding them. The most important was that built by Hadrian, measuring 480 ft. by 330 ft., to enclose the double temples of Venus and Rome. The portico of Octavia measures 400 ft. by 370 ft., enclosing two temples, and the portico of the Argonauts, which enclosed the temple of Neptune, was about 300 ft. square. These dimensions, however, are far exceeded by those of the enclosures in Syria and Asia Minor. The court of the temple of the Sun at Palmyra was raised on an artificial platform 16 ft. high, and measured 735 ft. by 725 ft., with an enclosure wall of 74 ft. on the west and 67 ft. high on the other three sides.

At Baalbek the platform was raised 25 ft. above the ground, the dimensions being 400 ft. wide and 900 ft. deep. At Damascus the enclosure of the temple of the Sun has been traced, and it extended to about 1000 ft. square. Similar enclosures are found at Gerasa, Amman and other Syrian towns. In Asia Minor, at Aizani the platform was 520 by 480 ft., raised about 20 ft., and in Africa the French have found the remains of similar enclosures.

Roman Temples.—The Romans, following the Etruscan custom, invariably raised their temples on a podium with a flight of steps on the main front. Their temples were not orientated, and being regarded more as monuments than religious structures occupied prominent sites facing the Forum or some great avenue. Much importance was attached to the entrance portico, which was deeper than those in Greek temples, and the peristyle when it existed was rarely carried round the back. On the other hand the cella exceeded in span those of the Greek temples, as the Roman, being acquainted with the principle of trussing timbers, could roof over wider spaces. The principal temples in Rome, of which remains still exist, are those of Fortuna Virilis, Mars Ultor, Castor, Neptune, Antoninus and Faustina, Concord, Vespasian, Saturn and portions of the double temples of Venus and Rome. At Pompeii are the temples of Jupiter and Apollo, at Cora the temple of Mercury, and in France, the Maison Carrée at Nîmes and the temple at Vienne. In Syria are the temples of Jupiter at Baalbek, of the Sun at Palmyra and Gerasa, and in Spalato the temple of Aesculapius.

Of circular temples the chief are the Pantheon at Rome, the temple of Vesta on the Forum, of Mater Matuta, so-called, on the Forum Boarium, the temple of Vesta at Tivoli, of Jupiter at Spalato and of Venus at Baalbek.

Of the rectangular temples the Maison Carrée at Nîmes is the most perfect example existing (fig. 26). It was built by Antoninus Pius, and dedicated to his adopted sons Lucius and Martius. This temple, 59 ft. by 117 ft., is of the Corinthian order, hexastyle, pseudoperipteral, with a portico three columns deep, and is raised on a podium 12 ft. high. The next best preserved example is the temple of Jupiter at Baalbek, also of the Corinthian order, octastyle, peripteral, with a deep portico, and a cella richly decorated with three-quarter detached shafts of the Corinthian order.

Of the circular temples the Pantheon is the most remarkable. It was built by Hadrian, and consists of an immense rotunda 142 ft. in diameter, covered with a hemispherical dome 140 ft. high. Its walls are 20 ft. thick, and have alternately semicircular and rectangular recesses in them. In the centre of the dome is a circular opening 30 ft. in diameter open to the sky, the only source from which the light is obtained. The rotunda is preceded by a portico, originally built by Agrippa as the front of the rectangular temple erected by him, taken down and re-erected after the completion of the rotunda, with the omission of the two outer columns. In other words Agrippa's portico was decastyle; the actual portico is octastyle.

Basilicas.—The earliest example of which remains exist is that of the Basilica Julia on the Forum, the complete plan of which is now exposed to view. It consisted of a central hall measuring 255 ft. by 60 ft., surrounded by a double aisle of arches carried on piers, which were covered with groined vaults. The Basilica Ulpia built by Trajan was similar in plan, but in the place of the piers were monolith columns, with Corinthian capitals carrying an entablature, with an upper storey forming a gallery round.
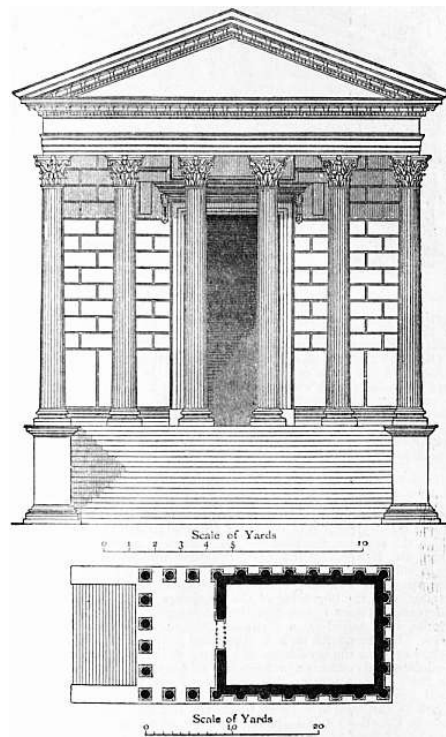
<small>FIG. 26.—Elevation and plan of the Maison Carrée, Nîmes.</small>

The third great basilica, commenced by Maxentius and completed by Constantine, differs entirely from the two above mentioned. It followed the design and construction of the Tepidarium of the Roman thermae, and consisted of a hall 275 ft. long by 82 ft. wide and 114 ft. high, covered with an intersecting barrel vault with deep recesses on each side which communicated one with the other by arched openings and constituted the aisles.

Theatres.—The only example in Rome is the theatre of Marcellus, built by Augustus 13 B.C., and one of the purest examples of Roman architecture. Amongst the best preserved examples is the theatre of Orange in the south of France, the stage of which was 203 ft. long. In the theatre at Taormina in Sicily are still preserved some of the columns which decorated the rear wall of the stage. The theatre of Herodes Atticus at Athens (A.D. 160) retains portions of its enclosure walls and some of the marble seats. There are two theatres in Pompeii where the seats and the stage are in fair preservation. Other examples in Asia Minor are at Aizani, Side, Telmessus, Alinda, and in Syria at Amman, Gerasa, Shuhba and Beisan.

Amphitheatres.—The largest amphitheatre is that known as the Colosseum, commenced by Vespasian in A.D. 72, continued by Titus and dedicated by the latter in A.D. 80. This refers to the three lower storeys, for the topmost storey was not erected until the first part of the 3rd century, when it was completed by Severus Alexander and Gordianus. The building is elliptical in plan and measures 620 ft. for the major axis and 513 ft. for the minor axis. There were eighty entrances, two of which were reserved for the emperor and his suite. The Cavea (*q.v.*) was divided into four ranges of seats; the whole of the exterior and the principal corridors were built in travertine stone, and all other corridors, staircases and substructures in concrete. Externally the wall was divided into four storeys, the three lower ones with arcades divided by semi-detached columns of the Tuscan, the Ionic and the Corinthian orders respectively. The walls of the topmost storey were decorated with pilasters of the Corinthian order, the only openings there being small windows, to light the corridors and the upper range of seats. Among other amphitheatres the best preserved are those found at Capua, Verona, and Pompeii in Italy; at El Jem in North Africa; at Pola in Istria, and at Aries and Nîmes in France.

The Thermae or *Imperial Baths.*—The term thermae is given to the immense bathing establishments which were built by the emperors to ingratiate themselves with the people. Of the ordinary baths (*Balneae*) there were numerous examples not only in Rome but at Pompeii and throughout the Empire. The thermae were devoted not only to baths but to gymnastic pursuits of every kind, and being the resorts of the poets, philosophers and statesmen of the day, contained numerous halls where discussions and orations could take place. The plans of these thermae were measured by Palladio about 1560, at a time when they were in far better preservation and more extensive than they are to-day. They have, however, been measured since by some of the French Grand Prix students; and Blouet's work on the *Thermae of Caracalla*(1828) and Paulin's on the *Thermae of Diocletian*(1890) give accurate drawings as well as conjectural restorations which are of the greatest value. The earliest thermae were those built by Agrippa (20 B.C.) in the Campus Martius, and of others those of Titus and Trajan are the best preserved; plans can be found in Cameron's *Baths*(1775).

Entrance Gateways and *Arches of Triumph.*—As the entrance gateways were sometimes erected to commemorate some important event, we have grouped these together, the real difference being that the arch of triumph was an isolated feature and served no utilitarian purpose, whereas the entrance gateway constituted part of the external walls of the city and could be opened and closed at will. Of the latter those at Verona, Susa, Perugia and Aosta in Italy, Autun in France, and the Porta Nigra at Trèves (Trier) are the best known, but there are also numerous examples throughout Syria and North Africa. The arches of triumph offered a fine scope for decoration with bas-reliefs setting forth the principal events of the campaign; the representation on coins also suggests that they were looked upon as pedestals to carry large groups of sculpture. The best known examples are those of Titus, Septimius Severus and Constantine at Rome, of Trajan at Ancona, and, in France, at Orange, St Remi and Reims. There were numerous examples throughout North Africa and Syria, of which the arch of Caracalla at Tebessa in the former and the great gateway of Palmyra in Syria are the best preserved.

Memorial Buildings and Tombs.—Columns of victory constituted another type of memorial, and the shafts of the columns of Trajan and Marcus Aurelius in Rome lent themselves to a better representation of the records of victory than those which could be obtained in the panels of a triumphal arch. Other columns erected are those of Antoninus Pius in Rome, a column at Alexandria, and others in France and Italy.

If the Romans derived from the Etruscans a custom of erecting tombs in memory of the dead, they did not follow on the same lines, for whilst the Etruscans always excavated the tomb in the solid rock, constituting a more lasting memorial, the Romans regarded them as monumental features and lined the routes of the *via sacra* of their towns with them. The earliest example remaining is that of Caecilia Metella (58 B.C.), of which the upper portion, consisting of a circular drum 93 ft. in diameter, remains. Of the tomb of Hadrian the core only exists in the castle of Sant' Angelo. From the descriptions given it must have been a work of great magnificence. The tombs known as Columbaria (*q.v.*) were always below ground, but in some cases an upper storey was built above them consisting of a small temple, and these flanked the Via Appia in large numbers. At Pompeii outside the Herculaneum Gate the Via Appia was lined on both sides with tombs of varied design, and

with exedrae or circular seats in marble, provided for the use of those visiting the tombs. The tombs in Syria form a very large and important series, the earliest perhaps being those in Palmyra, where they took the form of lofty towers, from 70 to 90 ft. high, externally simple as regards their design, but in the several storeys inside profusely decorated with Corinthian pilasters and coffered ceilings in stone. The tombs in Jerusalem built in the 1st century of our era are partly excavated in the rock and partly erected. The most important were those known as the tomb of Absalom, the tomb of St James, and the tombs of the judges and the kings, all cut in the solid rock. In central Syria some of the tombs are excavated in the rock, and over them are built a group of two or more columns held together by their entablatures. The most important series are the tombs at Petra, all cut in the side of cliffs and of elaborate design. The sculptor, being free from the restriction of construction, realized his conception much in the same way as a scene-painter produces a theatrical background.

Aqueducts and *Bridges*.—Although at the present day aqueducts and bridges would be classed under the head of engineering works, those built by the Romans are so fine in their conception and design that they take their place as monuments. The Pont-du-Gard near Nimes, and the aqueducts of Segovia, Tarragona and Merida in Spain, and some of those in or near Rome, are of the simplest design, depending for their effect on their magnificent construction, their dimensions both in length and height, and the scale given in the ranges of arches one above the other. Few of the Roman bridges have lasted to our day; the bridges of Augustus at Rimini and of Alcantara in Spain may be taken as types of the design, in which we note that there are no architectural superfluities; the quality of the design depends on the graceful proportion of the arches and the fine masonry in which they are built.

Palatial Architecture.—By far the most magnificent group of palaces are those which were erected by the Caesars on the Palatine hill at Rome. Commenced by Augustus and added to by his successors down to the reign of Severus, they cover an area considerably over 1,000,000 sq. ft., and comprise an immense series of great halls, throne room, banqueting hall, basilicas, peristylar courts, temple, libraries, schools, barracks, a stadium and separate suites for princes and courtiers. The service of the palace would seem to have been carried on in vaulted corridors in several storeys, some of which on the north side, overlooking the Circus Maximus, must have been over 100 ft. in height. Except under the Villa Mills, the greater part of the plan has been traced; and large remains of mosaic pavements have been found *in situ*, and in the approaches, vaulted halls, some still retaining their stucco decoration.

A similar variety of groups of every description of structure is found at Tivoli, but spread over a very much larger area. The villa of Hadrian extended over 7 m.; the works there were probably begun about A.D. 123, the first portion being his own residential palace. In addition to the numerous halls, courts, libraries, &c., Hadrian attempted to reproduce some of the most remarkable monuments which he had seen during his long travels; the Stadium, Palaestra, Odeum, the two theatres, the artificial lake, Canopus and other features were, however, constructed in the Roman style. Built on a ridge between two valleys, the several buildings occupied various levels, so that immense terraces and flights of stairs existed throughout the site and, combined with the natural scenery, must have been of extraordinary beauty.

The palace of Diocletian at Spalato, to which he retired after his abdication, constituted a fortress, three of its walls being protected by towers, the fourth on the south by the sea. For an account of its well-preserved remains see Spalato. The emperor's own residence was on the south side, and had a gallery 520 ft. long overlooking the sea. The two main streets, with arcades on each side and crossing one another, divided the whole palace into four sections. One of these streets crossed from gate to gate, the other from the north gate led to the entrance into the palace of the emperor.

Private Houses.-The entire absence of the remains of the private houses of Rome, with the single exception of the house of Livia on the Palatine, would have left us with a very poor insight into their design were it not for the discovery of Pompeii (*q.v.*) and Herculaneum (*q.v.*). The descriptions given by Pliny of the lavish extravagance in the Roman houses, and the employment of various Greek marbles in the shape of monolith columns and panelling of walls, are substantiated by those which are found in the Pantheon, in the palaces on the Palatine, and in Hadrian's villa at Tivoli; and these compared with what is found at Pompeii show that the latter was only a provincial town of second or third-rate importance, where painted imitations took the place of real marbles, and where the wall paintings were very inferior to those which have been discovered in Rome.

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Byzantine Architecture

The term "Byzantine" is applied to the style of architecture which was developed in Byzantium after Constantine had transferred the capital of the Roman empire to that city in A.D. 324.

It is not possible, in the early ages of any style which is based on preceding or contemporaneous styles, to draw any hard and fast line of demarcation; and already before the Peace of the Church, a gradual transformation in the Roman style had been taking place, even in Rome itself. Thus the arch had gradually been taking the place of the lintel, either frankly as a relieving arch above it (portico of Pantheon), or introduced in the frieze just above the architrave (San Lorenzo), or by the conversion of the architrave into a flat arch by dividing it into voussoirs, as in the Forum Julium at Rome or in the temple of Jupiter at Baalbek. In the palace built by Diocletian at Spalato, the architrave or lintel of the Golden Gate is built with several voussoirs, and the pressure is further relieved by an arch thrown across above it. Long before this, however, and already in the 2nd century A.D. in Syria, this relieving arch had been moulded and decorated, with the result of emphasizing it as a new architectural feature. In this same palace at Spalato, in order to obtain a wider opening in the centre of the portico, leading to the throne room, it was spanned by an arch, round which were carried the mouldings of the whole entablature, viz. architrave, frieze and cornice. At a still earlier date in Syria the same had been done in the Propylaea of the temple at Damascus (A.D. 151) and other examples are found in North Africa.

Now when Constantine transferred the capital to Byzantium, he is said to have imported immense quantities of monolith columns from Rome, and also workmen to carry out the embellishments of the new capital; for his work there was not confined to churches, but included amphitheatres, palaces, thermae and other public buildings. Owing to the haste with which these were built, and in some cases probably to the ephemeral materials employed, for the roofs of the churches were only in timber, all these early works have been swept away; but there remain two structures at least, which are said to date from Constantine's time, viz. the Binbirderek or cistern of a thousand columns, and the Yeri-Batan-Serai, both in Constantinople. As one of the first tasks a Roman emperor set himself to perform was the provision of an ample supply of water, of which Byzantium was much in need, there is every reason to suppose that they are correctly attributed to Constantine's time. If so, as the construction of their vaults is quite different from that employed by the Romans, it suggests that there already existed in the East a traditional method of building vaults of which the emperor availed himself; and, although it is not possible to trace all the earlier developments, the traditional art of the East, found throughout Syria and Asia Minor, must from the first have wrought great changes in the architectural style, and in some measure this would account for the comparatively short period of two centuries which elapsed between the foundation of the new empire and the culminating period of the style under Justinian in AD. 532-558.

Constantine is said to have built three churches in Palestine, but these have either disappeared or have been reconstructed since; an early basilican church is that of St John Studius (the Baptist) in Constantinople, dating from A.D. 463, and though it shows but little deviation from classic examples, in the design and vigorous execution of the carving in the capitals and the entablature we find the germ of the new style. The next typical example is that found in the church of St Demetrius at Salonica, a basilican church with atrium in front, a narthex, nave and double aisles, with capacious galleries on the first floor for women, and an apsidal termination to the nave. Instead of the classic entablature, the monolithic columns of the nave carry arches both on the ground and upper storeys; above the capitals, however, we find a new feature known as the *dosseret,* already employed in the two cisterns referred to, a cubical block projecting beyond the

capital on each side and enabling it to carry a thicker wall above. In later examples, when the aisles were vaulted, the dosseret served a still more important purpose, in carrying the springing of the vaults. The nave and aisles of this church of St Demetrius were covered with timber roofs, as the architects had neither the knowledge, the skill, nor perhaps the materials to build vaults, so as to render the whole church indestructible by fire.

One of the first attempts at this (though the early date given is disputed) would seem to have been made at Hierapolis, on the borders of Phrygia in Asia Minor, where there are two churches covered with barrel vaults carried on transverse ribs across the nave, the thrust of which was met by carrying up solid walls on each side, these walls being pierced with openings so as to form aisles on the ground floor and galleries above. The same system was carried out a century earlier in central Syria, where, in consequence of the absence of timber, the buildings had to be roofed with slabs of stone carried on arches across the nave. It is probable that in course of time other examples will be found in Asia Minor, giving a more definite clue to the next development, which we find in the work of Justinian, who would seem to have recognized that the employment of timber or combustible materials was fatal to the long duration of such buildings. Accordingly in the first church which he built (fig. 27), that of SS. Sergius and Bacchus (A.D. 527), the whole building is vaulted; the church is about 100 ft. square, with a narthex on one side. The central portion of the church is octagonal (52 ft. wide), and is covered by a dome, carried on arches across the eight sides, which are filled in with columns on two storeys. These are recessed on the diagonal lines, forming apses. The vault is divided into thirty-two zones, the zones being alternately flat and concave.
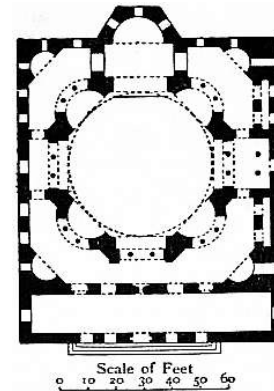
Fig. 27.—Plan of SS. Sergius and Bacchus.

We now pass to Justinian's greatest work, the church of St Sophia (fig. 28), begun in 532 and dedicated in 537, which marks the highest development of the Byzantine style and became the model on which all Greek churches, and even the mosques built by the Mahommedans in Constantinople, from the 15th century onwards, were based. The architects employed were Anthemius of Tralles and Isidorus of Miletus, and the problem they had to solve was that of carrying a dome 107 ft. in diameter on four arches. The four arches formed a square on plan, and between them were built spherical pendentives, which, overhanging the angles, reduced the centre to a circle on which the dome was built. This dome fell down in 555, and when rebuilt was raised higher and pierced round its lower part with forty circular-headed windows, which give an extraordinary lightness to the structure. At the east and west ends are immense apses, the full width of the dome, which are again subdivided into three smaller apses. The north and south arches are filled with lofty columns carrying arches opening into the aisle on the ground storey and a gallery on the upper storey, the walls above being pierced with windows of immense size. The church was built in brick, and internally the walls were encased with thin slabs of precious marble up to a great height (fig. 29). The walls and vault above were covered with mosaics on a gold ground, which, as they represented Christian subjects, were all covered over with stucco by the Turks after the taking of Constantinople. During the restoration in the middle of the 19th century, when it became necessary to strip off the stucco, these mosaics were all drawn and published by Salzenburg, and they were covered again with plaster to prevent their destruction by the Turks. The columns of the whole church on the ground floor are of porphyry, and on the upper storey of verd antique. The length of the church from entrance door to eastern apse is 260 ft.; in width, including the aisles, it measures 238 ft., and it measures 175 ft. to the apex of the dome. The columns and arches give scale to the small apses, the small apses to the larger ones, and the latter to the dome, so that its immense size is grasped from the first. The lighting is admirably distributed, and the rich decoration of the marble slabs, the monolith columns, the elaborate carving of the capitals, the beautiful marble inlays of the spandrils above the arches, and the glimpse here and there of some of the mosaic, which shows through the stucco, give to this church an effect which is unparalleled by any other interior in the world. The narthex or entrance vestibule forms a magnificent hall 240 ft. in length, equally richly decorated. Externally the building has little pretensions to architectural beauty, but its dimensions and varied outline, with the groups of smaller and larger apses and domes, make it an impressive structure, to which the Turkish minarets, though ungainly, add picturesqueness.
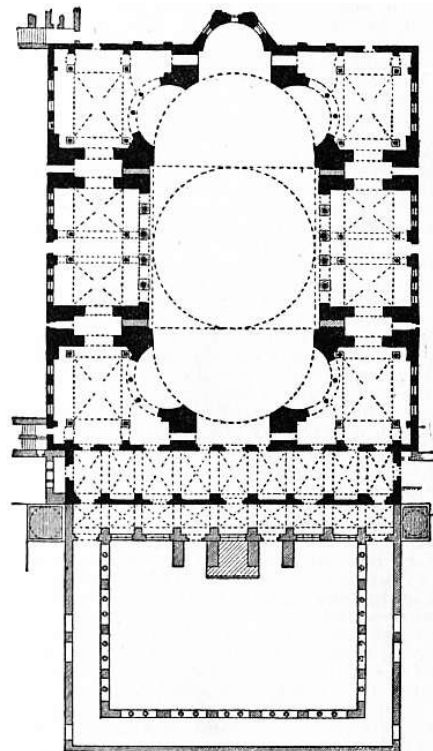
Fig. 28.—Plan of St Sophia.

In A.D. 536 a second important church was begun by Theodora, the church of the Holy Apostles, which was destroyed in 1454 by order of Mahommed II. to build his mosque. The design of this church is known only from the clear description given by Procopius, the historian who has transmitted to us the record of Justinian's work, and its chief interest to us now is that it forms the model on which the church of St Mark at Venice was based, when it was restored, added to, and almost rebuilt about 1063.

The church of St Sophia was not only the finest of its kind at the time of its erection, but no building approaching it has ever been built since in the Byzantine style, nor does much seem to have been done for two or three centuries afterwards. At the same time the erection of new churches must have been going on, because there are certain changes in design, the results probably of many trials. The difficulty of obtaining sufficient light in domes of small diameter led to the windows being placed in vertical drums, of which the earliest example is that of the western dome of St Irene at Constantinople, rebuilt A.D. 718-740. This simplified the construction and externally added to the effect of the church. The greatest change, however, which took place, arose in consequence of the comparatively small dimensions given to the central dome, which rendered it necessary to provide more space in another way, by increasing the area on each side, so that the plan developed into what is known as the Greek cross, in which the four arms are almost equal in dimensions to the central dome, and were covered with barrel vaults which amply resisted its thrust. In front of the church a narthex and sometimes an exonarthex was added, which was of greater width than the church itself, as in the churches (both in Constantinople) of the Theotokos and of Chora (A.D. 1080). The latter, better known as the "mosaic mosque," on account of its splendid decoration in that material, is of special interest, because in the five arches of its façade we find the same design as that which originally constituted the front of the lower part of St Mark's at Venice, before it was encrusted with the marble casing and the plethora of marble columns and capitals brought over from Constantinople.
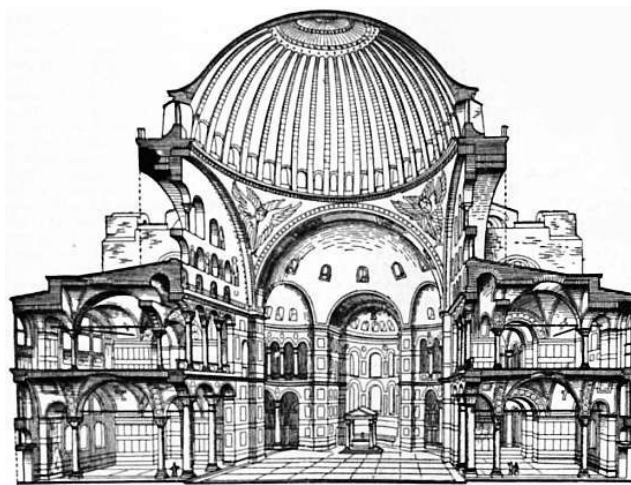

Fig. 29.—Cross section of the interior of St Sophia.

Sometimes an additional church was built adjoining the first church and dedicated to the immaculate Virgin, as in the church of St Mary Panachrantos, Constantinople, the church of St Luke of Stiris, Phocis, and the church in the island of Paros. In the last-named church the apse still retains its marble seats, rising one above the other, with the bishop's throne in the centre. In addition to the churches already mentioned in Constantinople, there are still some which have been appropriated by the Turks and utilized as mosques. At Mount Athos there are a large number of Greek churches, ranging from the 10th to the 16th centuries, which are attached to the monasteries. At Athens one of the most beautiful examples is preserved in the Catholicon or cathedral, the materials of which were taken from older classical buildings. This cathedral measures only 40 ft. by 25 ft., and is now overpowered by the new cathedral erected close by.

The external design of the Byzantine churches, as a rule, is extremely simple, but it owes its quality to the fact that its features are those which arise out of the natural construction of the church. The domes, the semi-domes over the apses, and the barrel vaults over other parts of the church, appear externally as well as internally, and as they are all covered with lead or with tiles, laid direct on the vaults, they give character to the design and an extremely picturesque effect. The same principle is observed in the doorways and windows, to which importance is given by accentuating their constructive features. The arches, always in brick, are of two orders or rings of arches set one behind the other, and the voussoirs, alternately in brick and stone, have the most pleasing effect. The same simple treatment is given to the walls by the horizontal courses of bricks or tiles, alternating with the stone courses. In the apse of the church of the Apostles at Salonica, variety is given by the interlacing of brick patterns. This elaboration of the surface decoration is carried still further in the palace of Hebdomon at Blachernae, in Constantinople, built by Constantine Porphyrogenitus (913-949), where the spandrils of the arches are inlaid with a mosaic of bricks in various colours arranged in various patterns.

There would seem to have been a revival in the 11th century, possibly a reflex of that which was taking place in Europe, and it is to this period we owe the churches of St Luke in Phocis, the church at Daphne, and the churches of St Nicodemus and St Theodore in Athens. The finest example of brick patterns is that which is found in the church of St Luke of Stiris, attached to the monastery in the province of Phocis, north of the Gulf of Corinth, of which an admirable monograph was published in 1901 by the committee of the British School at Athens, illustrated by measured drawings of the plans, elevations, sections and mosaics by Messrs Schultz and Barnsley, with a detailed description. The church of St Luke of Stiris is one of those already referred to, where a second church dedicated to the Holy Virgin has been added, but in this case, according to Messrs Schultz and Barnsley, on the site of a more ancient church of which the narthex alone was retained. The plan of the great church differs from the ordinary Greek cross in that the arms of the cross are of much less width than the central domed square, and arches being thrown across the angles carry eight pendentives instead of four. On the east side the Diaconicon and Prothesis are included in the width of the domed portion instead of forming the eastern termination of the aisles. The churches at Daphne in Attica and of St Nicodemus at Athens have a similar plan.

The decoration of the smaller church of St Luke of Stiris is of the most elaborate character, bright patterns of infinite variety alternating with the brick courses, and as blocks of marble, removed from the site of the old city near, were available, they have been utilized in various parts of the structure and richly carved. The church at Mistra in the Peloponnesus, 13th century, built in the side of a hill, is one of the most picturesque examples, and is almost the only example in which a tower is to be found.

Armenia.—One other phase of the Byzantine style has still to be mentioned, the development of church architecture in Armenia, which follows very much on the same lines as that of the Greek church, with a central dome on the crossing, a narthex at the west end and a triapsal east end. In two churches at Echmiadzin and Kutais there are transeptal apses in addition to those at the east end. One of the differences to be noted is that the domes and roofs are generally in stone externally, and this has led to another change; the domes, though hemispherical inside, have conical roofs over them. There is also a greater admixture of styles, the Persian, Byzantine and Romanesque phases entering into the design; the last was probably derived from the churches of central Syria, as the Armenians were the only race who seem to have penetrated there, and the finest example, at Kalat Seman, was at one time in their possession. The church at Dighur near Ani, of the 7th century, also probably owes its classical details to the work in central Syria. The most important example of the Armenian style is found in the cathedral at Ani, the capital of Armenia, dating from A.D. 1010. In this church pointed arches and coupled piers are found, with all the characteristics of a complete pointed-arch style, which, as Fergusson remarks, "might be found in Italy or Sicily in the 12th or 14th century." Externally the walls are decorated with lofty blind arcades similar to those in the cathedral at Pisa and other churches in the same town, which are probably fifty years later. The

elaborate fret carving of the window dressings and hood moulds are probably borrowed from the tile decoration found in Persia.

Russia.—The architecture of Russia is only a somewhat degraded version of the style of the Byzantine empire. The earliest buildings of importance are the cathedrals of Kiev and Novgorod, 1019-1054. The original church of Kiev consisted of nave, with triple aisles each side, the piers in which are of enormous size, a transept and square bays of the choir beyond, each with deep apsidal chapels. Externally, the chief features are the bulbous domes adopted from the Tatars, which sometimes assume great dimensions. Internally, the chief feature is the Iconostasis, which corresponds to the English rood screen, except that in Russia it forms a complete separation between the church and the sanctuary with its altar.

One of the most remarkable churches is that of St Basil at Moscow (1534-1584), which in plan looks like a central hall, surrounded by eight other halls of smaller dimensions, all separated one from the other by vaulted corridors; this arrangement is not intelligible until one sees the exterior view, which accounts for the plan; each one of these halls is crowned by lofty towers with bulbous domes, the centre one rising above all the others and terminated with an octagonal roof, probably derived from the Armenian conical roof. The oldest and most interesting church in Moscow is the church of the Assumption (1479), where the tsars are always crowned; but as it measures only 74 ft. by 50 ft., it is virtually little more than a chapel; the plan is that of a Greek cross with central dome and four others over the angles. One other church deserves mention—at Curtea de Argesh, in Rumania. It was built in 1517-1526, and though small (90 by 50 ft.), is built entirely of stone, instead of brick covered with stucco, as is the case with the churches in Moscow. The interior has been entirely sacrificed to the exterior, the domes being raised to an extravagant height. The relative proportion of width of nave to height of dome in St Sophia at Constantinople is about one to two; in the church at Curtea de Argesh it is about one to five; and yet there can be little doubt the design was made by one of those Armenian architects who seem to have been always employed at Constantinople, and who presumably based their designs there on St Sophia as regards its principal features. Here, however, he was working for Tatar employers who attached more importance to display than to good proportion. In general design the church is based on Armenian work. The elaborately carved panels and disks are copied from the inlays in the mosques in Damascus and of Sultan Hassan at Cairo, and the stalactite cornices and capitals of the columns are transcripts of the Mahommedan style of Constantinople, which was derived from the style developed by the Seljuks.

We were only able to point to a single example of a tower in the Byzantine style, but in Russia the towers not only constitute the principal accessory to the church but were necessary adjuncts, in order to provide accommodation for bells, the casting of which has at all times formed one of the most important crafts in Russia. The chief examples, all in Moscow, are the tower attached to the church of the Assumption; the tower of Boris, inside the Kremlin; and that erected over the sacred gate of the same. But they abound throughout Russia and in some cases form important features in the principal elevations on either side of the narthex.

(R. P. S.)

Early Christian Architecture

Of the earliest examples of the housing of the Christian church few remains exist, owing partly to their destruction from time to time by imperial edicts, and partly to the fact that in most cases they were only oratories of a small and unpretending nature, which, immediately after the Peace of the Church, were rebuilt of greater size and with increased magnificence. In Rome itself, the principal religious centre was that which was found in the catacombs (*q.v.*), almost the only resort in times of persecution. In the houses of the wealthy Romans who had been converted, rooms were set apart for the reception of the faithful, and these may have been increased in size by the addition of side aisles. At all events, either in Rome or in the East, where greater freedom of worship was observed, the requirements of the religious had already resulted in a traditional type of plan, which may account for the similarity of all the great churches built by Constantine. It has often been assumed that the great Roman basilicas, if not actually utilized by the Christians, were copied so far as their design is concerned. This, however, is not borne out by the facts, there being very little similarity between the first churches built and the two great Roman basilicas, the Ulpian basilica and that built by Constantine; the latter was roofed with an immense vault, an imperishable covering, not attempted till two centuries later in Byzantium, and the former had its entrance in the centre of the longer side, and the tribunes at either end were divided off from the basilica by a double aisle of columns. The basilica plan was adopted because it was the simplest and most economical building of large size which could be erected, having an immense central area or nave well lighted by clerestory windows, and single or double aisles to divide the two sexes, and further because the immense supply of columns which could be taken from existing temples or porticoes enabled the architect to provide at small cost the colonnades or arcades between the nave and the aisles. On the other hand, there is no doubt that the temples, for which there was no further use, were largely appropriated, not only in Italy but in Greece, Sicily and elsewhere, and it is to this appropriation that we owe the preservation of the Parthenon, the Erechtheum and the temple of Theseus at Athens. There are some cases in which it is interesting to note the changes which were made to convert the temple into a church. In the temple of Athena at Syracuse, walls were built in between the columns of the peristyle, the cella was appropriated for the nave, and arcades were cut through the cella walls to communicate with the peristyle, so as to constitute the aisles. In the temple of Aphrodisias, in Asia Minor, a further development occurred. The walls of the cella were taken down, a wall was built outside the columns of the peristyle to form aisles, and the columns of the east and west end were taken down and placed in line with the others, in order to increase the length of the church.

The earliest Christian basilica built in Rome was the Lateran, which has, however, been so completely transformed in subsequent rebuildings as to have lost its original character. The next in date was that of the old St Peter's, which was taken down in 1506, in consequence of its ruinous condition, in order to make way for the present cathedral, begun by Pope Julius II. It was of considerable size, covering an area of 73,000 ft. Its plan consisted of an atrium, or open court, having a fountain in the centre, and arcades round; a nave, 275 ft. long and 77 ft. wide, with double aisles on each side; a transept, 270 ft. long by 54 ft. wide; and a semi-circular apse or tribune with a radius of 27 ft.; the high altar being in the centre of its choir, and ranges of marble seats and the papal throne in the middle, corresponding to the benches and the judge's seat of the Roman tribune. The nave, therefore, with its double aisles, was similar to that of the Ulpian basilica, but the aisles were not returned across the east end, and at the west end, in their place, was the great triumphal arch opening into the transept. The monolith columns of the nave and their capitals (together 40 ft. high) were all taken from ancient buildings, as also were those of the aisle arcades and in the atrium.

The basilica of St Paul, outside the walls, was originally of comparatively small dimensions, with its apse at the west end; in A.D. 386 the church was rebuilt on a plan similar to St Peter's, with nave and double aisles, divided by columns carrying arches, transept and apse. In the Lateran basilica, St Peter's, Santa Maria Maggiore, and St Lawrence (outside the walls), the columns of the nave were close-set (*i.e.* with narrow intercolumniations) and supported architraves, but in St Paul (outside the walls) the columns of the second church (A.D. 386) were wider apart and carried arches. The same feature is found in the church of St Agnes, founded A.D. 324, but rebuilt 620-640; here the arcade is carried across the west end and there are galleries above, the arches being carried on dosseret blocks above the capitals; these are also found in the galleries over the western end of St Lawrence, added by Honorius (A.D. 620-640); the dosseret, a Byzantine feature, being derived either from Ravenna or from the East. In the church of Santa Maria-in-Cosmedin (A.D. 772-795) another Byzantine feature appears in the triple apse at the east end, the earliest example in Europe. In this church, as also in those of San Clemente and San Prassede, piers are built at intervals to carry the arcades separating the nave and aisles. Those in the latter, however, were probably added when the great arches were thrown across the nave. The church of San Clemente was built in 1108, above a much older church dating from 385 and restored later; it is almost the only church in Rome which has preserved its atrium intact; the internal arrangement of the church also is different from that found elsewhere, the choir,

enclosed with marble piers and screens removed from the lower church and erected in front of the tribune, dating from A.D. 514-523. The mosaics executed in 1112 are in fine preservation.

Other early churches in Rome are those of Santa Pudenziana (335); San Pietro-in-Vincoli (442), with Doric columns in the nave; SS. Quattro Coronati (450); Santa Sabina (450), an interesting church on account of the marble inlaid decoration in the arch spandrils of the nave, which date from 824; San Prassede (817), with arches thrown across the nave later; San Vincenzo ed Anastasio alle Tre Fontane (626); and Santa Maria in Domnica, where there are galleries over the aisles and across the east end as in St Agnes.

Hitherto we have said little about the architectural design, the fact being that externally these churches had the appearance of barns; it is only in a few cases, notably in St Peter's, that the principal fronts were decorated with mosaics. The magnificent materials employed internally, the monolith marble columns, the enrichment of the apse and the triumphal arch with mosaics, and probably the painting and gilding of the ceiling or roof, gave to the early basilican churches in Rome that splendour which characterizes those in Byzantium and in Ravenna.

With the exception of the baptistery attached to St John Lateran, and the so-called tomb of Santa Constantia, both erected by Constantine, the circular form of church was not adopted in Rome; there is one remarkable circular building of great size, San Stefano Rotondo, at one time thought to have been a Roman market, but now known to have been erected by Pope Simplicius (468-482). It consisted of a central circular nave, 44 ft. in diameter, and double aisles round. In the arcade dividing the aisles the arches are carried on dosserets, the earliest known example of this feature in Rome.

Although inferior in size, the two churches of S. Appollinare Nuovo, built by Theodoric (493-525) and Sant' Apollinare-in-Classe (538-549), both in Ravenna, have the special advantage that they were constructed in new materials, there being no ancient Roman temples there to pull down. The ordinary basilican plan was adhered to, but as the architects and workmen came from Constantinople, they incorporated in the building various details of the Byzantine style, with which they were best acquainted. Thus the contour of the mouldings, the carrying of the capitals and imposts, the dosseret above the capital, and the scheme of decoration of the interior with marble casing on the lower portion of the walls and mosaic above, are all Byzantine. Externally the churches are extremely plain, the wall surfaces of the nave and aisle walls being varied by blind arcades.

The earliest building in Ravenna is the tomb of Galla Placidia, built 450, a small cruciform structure with a dome on pendentives over the centre, perhaps the earliest example known. The baptistery of St John, which was attached to the cathedral built by Archbishop Ursus (380), now destroyed, is a plain octagonal building, 40 ft. in diameter, originally with a timber roof; when in 451 it was determined to replace this by a vault, in order to resist the thrust, the upper part of the walls was brought forward on arches and corbels, and the interior richly decorated with paintings, stucco reliefs and mosaics in the dome. The most interesting building in Ravenna, however, from many points of view, is the church of San Vitale (fig. 30), built 539-547, its plan and design being based on the church of SS. Sergius and Bacchus at Constantinople. The proportions of the interior of St Sergius are much finer than those in San Vitale, where the dome is raised too high; the timber roofs also of San Vitale have deprived the church externally of that fine architectural effect found in Byzantine churches. In order to lighten the dome, its shell was built with hollow pots, the end of one fitted into the mouth of the other. The interior of the church is of great beauty, owing to the alternating of the piers carrying the eight arches with the columns set back in apsidal recesses. Unfortunately the church has been much restored, but the magnificent mosaics in the choir and the variety of design shown in the capitals and dosserets render this church, though small, one of the most attractive in Italy. One other Ravenna building must be mentioned, though it would be difficult to know under what style to class it. The tomb of Theodoric, having a decagonal plan in two storeys, the lower one vaulted at the upper storey, set back to allow of a "terrace" round, once sheltered by a small arcade, and covered by a single stone 35 ft. in diameter, belongs to no definite style; the mouldings of the upper portion have some resemblance to the mouldings of some of the Etruscan tombs at Castel d'Asso, which was probably known to Theodoric.
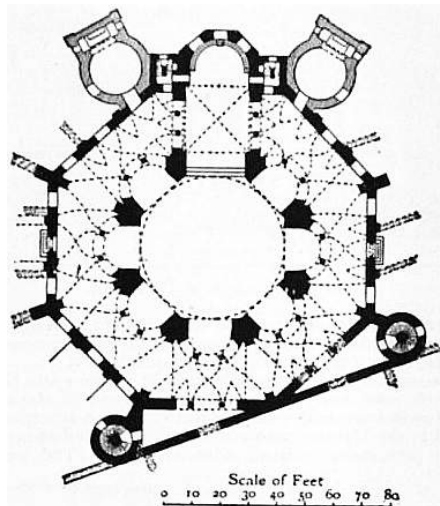

FIG. 30.—Plan of S. Vitale, Ravenna.

As Dalmatia and Istria both formed part of Theodoric's kingdom, we find there the same Byzantine influence as that which was asserted in Ravenna, in both cases the work being done by artists and masons from Constantinople. There is not much left in Dalmatia, but in Istria are two important examples,—the churches at Parenzo (535-543) and Grado (571-586). Like the two churches in Ravenna, they are basilican in plan, with apses, semi-circular internally and polygonal externally, the latter being a characteristic found in all the churches in Europe which were influenced directly by Byzantine custom. Although the monolith columns were derived from ancient Roman buildings, all the capitals were specially carved for the two churches, and they have the same variety of design and in many cases are identical with those in San Vitale, Sant' Apollinare Nuovo, Sant' Apollinare-in-Classe, and those brought over from Constantinople, which now decorate St Mark's at Venice internally as well as externally. The decoration of the lower part of the walls internally with marble slabs, and the upper portion and apsidal vaults with mosaic, follows on the same lines as those at Ravenna and Constantinople. The church at Parenzo still retains its baptistery and atrium, from which fragments of the mosaics which originally decorated the west front can be seen. The church at Aquileia was rebuilt in the 11th century, and the Duomo of Trieste has been so altered as to lose its original Byzantine character.

(R. P. S.)

EARLY CHRISTIAN WORK IN CENTRAL SYRIA

Contemporaneously with the early developments of the Christian churches just described, another line of treatment was being evolved in central Syria, which would seem to have been quite independent of the others, though at first sight it bears

considerable resemblance to the Byzantine style, and for that reason was probably classed and described under that head by Fergusson. But the leading characteristic of the Byzantine style is the dome over the centre of the church round which all other features are grouped, whereas in central Syria, with the exception of two examples—one a circular, the other a polygonal church—there are no domes. There is considerable Greek feeling in the mouldings and carvings of the capitals, but that is probably due to the fact that the masons were originally of Greek extraction. A comparison, for instance, of the design and carving of the largest church in central Syria, the famous building erected round the column of St Simeon Stylites at Kalat-Seman, dating from the 6th century, with any Byzantine church of the same date, shows very little resemblance, because the former was inspired more or less directly by the Roman remains in the country. A similar inspiration is found in the churches of St Trophime at Arles and St Gilles in the south of France, and at Autun and Langres in Burgundy. Both were founded on Roman work, and the mouldings of the pediments and archivolts and the fluting of the pilasters at Kalat-Seman, of the 6th century, are identical with what is found, quite independently, in Provence and Burgundy in the 11th and 12th centuries. There is, however, another special characteristic found in the masonry of the churches in central Syria, which is peculiar to the whole of Palestine, and is found in the earliest remains there, as also in Roman work, and to a certain extent in much of the Mahommedan construction and in that of the Crusaders, viz. its megalithic qualities. Instead of building an arch in several voussoirs, they preferred to do it in three or five only, and sometimes would cut the whole arch out of a single vertical slab. If they employed voussoirs, they were not content with ordinary depth, shown by the archivolt mouldings, but made them three or four times as deep.

The masons, in fact, would seem to have retained the traditional Phoenician custom of the country to employ the largest stones they were able to quarry, transport and raise on the building. Subsequently, in working down the masonry, they reproduced the architectural features they found in Roman buildings; this was done, however, without any knowledge as to their constructional origin or meaning; thus, in copying a Roman pilaster, the capital and part of the shaft would be worked out of one stone, and the lower part of the shaft and the base out of another. It is only from this point of view that we can account for the peculiar development given to the decoration of their later work, where archivolts, wood mouldings and window dressings are looked upon as simply surface decoration to be applied round doorways and windows, without any reference to the jointing of the masonry.

The immense series of monuments, civil as well as religious existing throughout central Syria, were almost entirely unknown before the publication of the marquis of Vogüé's work, *La Syrie centrale*, in 1865-1867. This work, illustrated with measured plans, sections and elevations, with perspective views, and accompanied by detailed descriptions of the various buildings, forms an invaluable record of an architectural style, more or less completely developed, which flourished from the 3rd to the beginning of the 7th century. An American archaeological expedition made further investigations in 1899-1900, and its report, written by Mr H.C. Butler, contains additional plans and a large number of photogravures, which bear testimony to the truth and accuracy of the engraved plates of the marquis de Vogüé. The preservation of these central Syrian remains, more or less intact, is considered to have been due either to the desertion of all the towns in which they were situated by the inhabitants at the time of the Mahommedan invasion, or, according to Mr H.C. Butler, to the deforesting of the whole country about the commencement of the 7th century.

The monuments and buildings illustrated may be divided into three classes,—ecclesiastical, including monasteries; civil and domestic; and tombs. It is in the two first that the principal interest is centred.

Churches.—The earliest of these date from the end of the 4th century, and the latest inscription on a church is 609, so that a little over 200 years includes the whole series. With one or two small exceptions all the churches follow the basilican plan, with nave and aisles separated by arcades, the arches of which are carried by columns, four arches on each side in the smaller churches, ten in the largest. The churches are all orientated, and have generally a semi-circular apse, and occasionally a square or rectangular sanctuary at the east end, on either side of which are square chambers,—the *diaconicon*, reserved for the priests, on the south side, and the *prothesis*, on the north side, in which the offerings of the faithful were deposited. Except in the earliest churches, the entrance was generally at the west end, and was sometimes preceded by a porch. In addition to the west entrance, there were sometimes doorways leading direct into the north and south aisles, with projecting porticoes. About the middle of the 6th century a change was made in the design of the arcades in the nave, and rectangular piers with arches of wide span were substituted for the ordinary arcade with columns. The effect as shown in the engravings and photogravures is so fine that it is strange that the scheme was never adopted in the earlier Romanesque churches of Europe. The two more important examples are at Kalb-Lauzeh (fig. 31) and Ruweiha, but three or four others are known, and this plan was adopted in the basilica erected in the great court of the temple at Baalbek. All the churches are built in fine ashlar masonry, with moulded archivolts and architraves to doorways and windows, and moulded string courses and cornices of simple design. The principal decoration externally is found in the hood-mould or label round the windows, continued as a string-course and carried round other windows, and sometimes

Fig. 31.—Plan of Church of Kalb-Lauzeh.

terminating in a disk with cross in centre. These hood-moulds are occasionally richly carved. All the churches in central Syria had open timber roofs which have now disappeared; this is proved by the sinkings in the end walls to receive the purlins, and the corbels provided to carry the tie beams. The apses were always covered with semi-domes. The three most important churches were those of Turmanin, Kalb-Lauzeh and Kalat-Seman. The plans of the two first are similar, except that in Turmanin the nave arcade is of the ordinary type, with seven arches carried on columns, while in Kalb-Lauzeh (fig. 32) there are three wide arches on each side carried on two rectangular piers and responds. Both have entrance porches (fig. 33), which are flanked by angle buildings carried up as towers in three storeys; these probably contained wooden staircases to ascend to an open gallery, which consisted of four columns in-antis between the angle towers above the porch. The north and south walls were quite plain, except for window and door dressings and string courses; the apse was richly decorated, with wall shafts superimposed between the windows, and carrying a projecting cornice with alternate corbels. The church at Ruweiha has a similar plan to that at Kalb-Lauzeh, but two transverse arches in stone are thrown across the nave, resting on abutments attached to the nave piers.
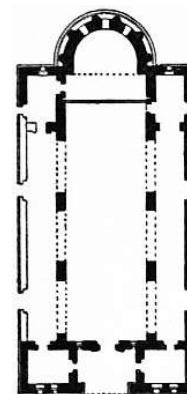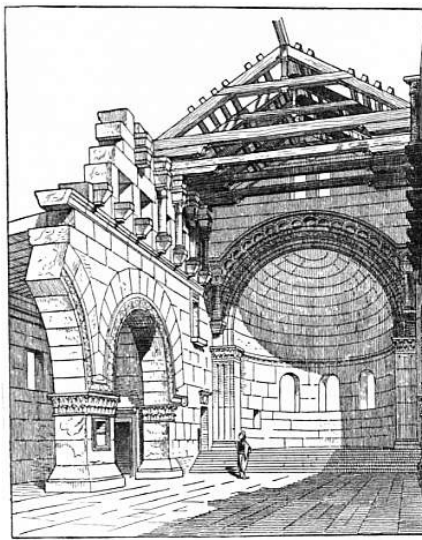
FIG. 32.—Interior of the Church of Kalb-Lauzeh.

The most remarkable example and by far the largest is the great basilica at Kalat-Seman (fig. 34), which was erected round the pillar on which St. Simeon Stylites spent thirty years of his life. The base of the pillar stands in the centre of an immense octagonal court open to the sky. The plan consists of nave, transept and choir, all with side aisles, separated in the centre by the octagonal court which constitutes the crossing. The nave built on the side of a hill is raised on a crypt, and the principal entrance would seem to have been through the porch of the north transept, which occupies the full width of transept and aisles. There were, however, in addition two doorways with porches to each aisle, as well as portico and doors to the north transept. At the eastern end were three apses, the two outer ones, facing the aisles, being additions in the second half of the 6th century. St. Simeon died in 459, and the church was probably begun shortly afterwards, but not completed till the 6th century. The archivolts of the great arches on each side of the octagonal court consist of architrave, frieze and cornice, copied from the arch of the propylaca at Baalbek or other Roman work. Here, as in the great southern porch, the classic nature of the details is remarkable, the pilasters are all fluted, and the modillion and dentil, derived from Roman models, exist throughout. On the other hand, the carving of the foliage was certainly executed by Greek artists, and the well-known Byzantine capital, with the leaves bending under the influence of the wind, is here reproduced. The great apse externally retains its decoration with superimposed shafts and cornice, as in Turmanin and Kalb-Lauzeh.
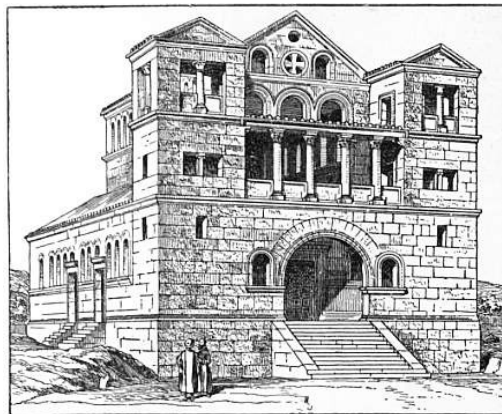

FIG. 33.—Church of Turmanin.

The monastery of Kalat-Seman was built on the south side of the great church, and many of the rooms had roofs of slabs of stone carried on arches across the room, a method of construction universally found in the Hauran, where the absence of timber necessitated this more permanent method of construction. The monasteries differ from the domestic work in being much plainer, and, instead of columns in the porticoes, having invariably square piers of stone.
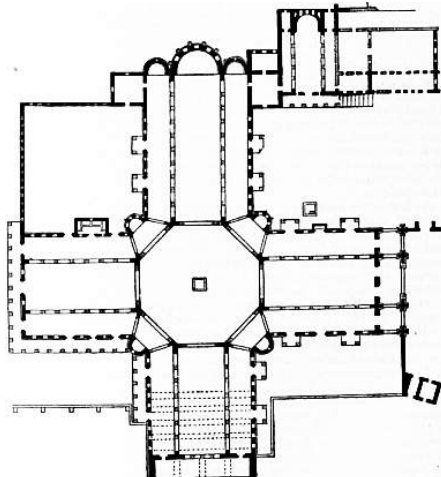

FIG. 34.—Plan of Church of Kalat-Seman.

Among circular churches, the walls of the cathedral at Bozra are gone, so that the conjectural restoration shown in de Vogué's work is purely speculative, but in the church at Ezra (510) the central octagon is covered by a high dome of

elliptical section. An aisle is carried round the octagon with similar recesses on the diagonal lines, the whole being enclosed in a square; in the apse at the east end the seats of the tribune are still preserved.

Domestic Work.—The domestic work in central Syria is, in a way, even more remarkable than the ecclesiastical. Broadly speaking, there are two types of plan—those found in the towns and grouped together, and those which, with increased area, constituted a villa. At El Barah the average house occupied a site of about 80 ft. by 60 ft., of which about 30 ft. in width was occupied by an open court; facing this court, which was enclosed with high walls, is an open colonnade on two floors, which always faces south, occupies the whole front (80 ft.) of the house, and is the only means of approach to the rooms in the rear, three on each floor, side by side. In the centre of these rooms, 14 ft. wide each, an arch is thrown across on each floor, which carries slabs of stone covering the first floor and the roof; the upper storey was reached probably by a timber staircase, now gone, but in poorer dwellings an external flight of steps in stone led to an upper floor. All the houses face the same way. The colonnade of the house consisted of about fifteen columns on each storey. Each column, including its capital and base, was cut out of a single stone; on the upper storey, between the columns, are stone vertical slabs forming a balustrade; the houses are all built in fine ashlar masonry with architraves and cornices to doors and windows, a luxury which in England could rarely be indulged in for ordinary houses. At El Barah, in an area of about 250 ft. by 150 ft. as shown by de Vogüé, there are about 100 monolith columns, 12 ft. high, on the ground storey alone. In a villa at El Barah the open court is surrounded on three sides by buildings, those at the east end of considerable extent and in three storeys. A smaller example at Mujeleia has two courts, one of them being for stables and other services; otherwise the residence of the proprietor is similar to the one above described. Here and there the fantasy of the artist has been allowed to revel in the carving of the balustrades, door lintels, &c. The capitals are of endless design, and show interpretations of Ionic and Corinthian capitals, in some cases not dissimilar to the Byzantine versions in St Mark's at Venice.

Hostelries and public baths are amongst other civil buildings which are recognizable, the hostelries in some cases being attached to the monasteries.

Tombs.—The principal tombs are either excavated in the rock, with an open court in front and an entrance portico, like the tombs of the kings at Jerusalem, and sometimes a superstructure of columns or a podium raised above them; or again they are built in masonry, and take the form of sepulchral chapels; in the latter case, if many sarcophagi have to be deposited, and the chapel is of great length, arches are thrown across, about 6 ft. centre to centre, to support the slabs of stone with which they are covered. This carries on the traditional custom of the Roman temples in Syria, the roofs of which, in stone, were similarly supported. Sometimes there will be two storeys, the upper one covered with a dome. Those which are peculiar to the country are square tombs, with a pyramidal stone roof all built in horizontal courses, and either enclosed with a peristyle all round, on one or two storeys, or having a portico in front with flat stone roof. The cornices, string courses and lintels of the doors of these tombs of the 4th and 5th centuries, are enriched with carving, showing strong Byzantine influence, though probably due to the employment of Greek artists.

(R. P. S.)

THE COPTIC CHURCH IN EGYPT

The earliest places of Christian worship in Egypt were probably only chapels or oratories of small dimensions attached to the monasteries, which were spread throughout the country; a wholesale destruction of these took place at various times, more especially by the order of Severus, about 200 B.C., so that no remains have come down to us. The most ancient examples known are those which are attributed to the empress Helena, of which there are important portions preserved in the churches of the White and Red monasteries at the foot of the Libyan hills near Suhag.

Although the plan of the Coptic church is generally basilican, *i.e.* consists of nave and aisles, it is probable that they were not copied from Roman examples, but were based on expansions of the first oratories built, to which aisles had afterwards been added. There are no long transepts, as in the early Christian basilicas of St Peter's at Rome, and of St Paul outside the walls, and there is only one example of a cruciform church with a dome in the centre following the Byzantine plan. Even at an early period the nave and aisles were covered sometimes with barrel vaults, either semicircular or elliptical. The Coptic church was always orientated with the sanctuaries at the east end. The aisles were returned round the west end and had galleries above for women. Sometimes the western aisle has been walled up to form a narthex; in many cases a narthex was built, but, in consequence of the persecution to which the Copts were subject at the hands of the Moslems, its three doors have been blocked up and a separate small entrance provided. The narthex was the place for penitents, but was sometimes used for baptism by total immersion, there being epiphany tanks sunk in the floor of the churches at Old Cairo, known as Abu Serga, Abu-s-Sifain (Abu Sefen) and El Adra; these are now boarded over, as total immersion is no longer practised.

There are a few exceptions to the basilican plan; and in four examples (two in Cairo and two at Deir-Mar-Antonios in the eastern desert by the Gulf of Suez) there are three aisles of equal widths, divided one from the other by two rows of columns with three in each row, thus dividing the roof into twelve square compartments, each of which is covered with a dome.

The sanctuaries at the east end, as developed in the Coptic church, differ in some particulars from those of any other religious structures. There are always three chapels or sanctuaries, with an altar in each, the central chapel being known as the Haikal. The chapels are more often square than apsidal, and are always surmounted by a complete dome, a peculiarity not found out of Egypt. The seats of the tribune are still preserved in a large number of the sanctuaries, and there are probably more examples in Egypt than in all Europe, if Russia and Mount Athos be excepted. Those of Abu-Serga, El Adra and Abu-s-Sifain, with three concentric rows of seats and a throne in the centre, are the most important; but even in the square sanctuaries the tradition is retained, and seats are ranged against the east wall, and in one case (at Anba-Bishôi) three steps are carried across, and behind them is a segmental tribune of three steps, with throne in the centre.

The most remarkable Coptic churches in Egypt are those of the Deir-el-Abiad (the White monastery) and the Deir-el-Akhmar (the Red monastery) at Suhag. These were of great size, measuring about 240 ft. by 130 ft. with vaulted narthex, nave and aisles separated by two rows of monolith columns taken from ancient buildings, twelve in each row and probably roofed over in timber, and three apses, directed respectively towards the east, north and south. These apses are unusually deep and have five niches in each, in two storeys separated by superimposed columns. In the church of St John at Antinoe there are seven niches. A similar arrangement is found in the three apses, placed side by side, in the more ancient portion of St Mark's, Venice, built A.D. 820, and said to have been copied from St Mark's at Alexandria. There is no external architecture in the Coptic churches; they are all masked with immense enclosure walls, so as to escape attention. The walls of the interior still preserve a great portion of the paintings of scriptural subjects; the screens dividing off the Haikal and other chapels from the choir are of great beauty, and evidently formed the models from which the panelled woodwork, doors and pulpits of the Mahommedan mosques have been copied and reproduced by Copts.

Illustrations are given in A.J. Butler's *Ancient Coptic Churches of Egypt*(1884); Wladimir de Bock's *Matériaux archéologiques de l'Égypte chrétienne*(1901); and A. Gayet's *L'art coptique*.

(R. P. S.)

ROMANESQUE AND GOTHIC ARCHITECTURE IN ITALY

"Romanesque" is the broad generic term adopted about the beginning of the 19th century by French archaeologists in order to bring under one head all the various phases of the round-arched Christian style, hitherto known as Lombard and Byzantine Romanesque in Italy, Rhenish in Germany, "Romane" and Norman in France, Saxon and Norman in England, &c. In character, as well as in time, the Romanesque lies between the Roman and the Gothic or Pointed style, but its first

manifestation in Italy has already been described in the section on "Early Christian Architecture," and it only remains to deal with the subsequent development from the age of Charlemagne, which marks an epoch in the history of architecture, and from which period examples are to be found in every country.

In consequence of the lack of homogeneousness in the Romanesque style as developed in Italy, owing to the mixture of styles, and the difficulty of tracing the precise influence of any one race in buildings frequently added to, restored or rebuilt, their description will be more easily followed if a geographical subdivision be made, the simplest being Northern or Lombard Romanesque, Central Romanesque and Southern Romanesque; after the latter would follow the Sicilian Romanesque, which, owing to the Saracenic craftsman, constitutes a type by itself. This leaves still one other phase to be noted, the influence recognized in northern Italy of the architectural style of the Eastern Empire at Byzantium, either direct or through Istria and Dalmatia. In the churches at Ravenna, this influence has already been referred to in the section on "Early Christian Architecture," but it appears again in the church of St. Mark at Venice, and in much of its domestic architecture, so that it is necessary to recognize another term,, that of "Byzantine Romanesque."

Northern or Lombard Romanesque.—Although the materials for forming an adequate notion of the earlier work of the Lombards are very scanty, after their conversion to the Catholic faith the Church probably exercised a powerful influence in their architectural work. Under Liutprand, towards the close of the 8th century, an order known as the Magistri Commacini was established, to whom were given the privileges of freemen in the Lombard State. These Commacini, so named from the island in the lake of Como whence they sprang, were trained masons and builders, who in the 9th and 10th century would seem to have carried the Lombard style through north and south Italy, Germany and portions of France. It was at one time assumed that they had influenced the church architecture throughout Europe, but this is not borne out by the evidence of the buildings themselves, except in the Rhenish provinces and in the districts on the slope of the Harz Mountains, where in sculpture a strange mixture is found of monstrous animals with Scandinavian interlaced patterns and Byzantine foliage, bearing a close resemblance to the early sculpture in Sant Ambrogio at Milan and San Michele at Pavia (Plate V, fig. 72). Although the earliest Lombard buildings in Italy (such as those of San Salvatore in Brescia, San Vincenzo in Prato at Milan the church of Agliate and Santa Maria delle Caccie at Pavia) were basilican in plan with nave and aisles, there are some instances in which the adoption of a transept has produced the Latin cross plan (*e.g.* San Michele at Pavia, Sant' Antonino at Piacenza, San Nazaro-Grande at Milan, and the cathedrals of Parma and Modena), though to what extent this is due to subsequent rebuilding is not known. In the early basilicas above mentioned the columns, carrying the arcades between nave and aisles, were taken from earlier buildings, while the capitals, where not Roman, were either rude imitations of Roman, or Byzantine in style. The roofs were always in wood, and the exteriors of the simplest description. In the external decoration, however, of the apses of the churches of San Vincenzo in Prato, Santa Maria delle Caccie, the church at Agliate and the ancient portion of S. Ambrogio at Milan, we find the germ of that decorative feature which (afterwards developed into the eaves gallery) became throughout Italy and on the Rhine the most beautiful and characteristic element of the Lombard style. In order to lighten the wall above the hemispherical vault of the apse, a series of niches was sunk within the arches of the corbel table, which gave to the cornice that deep shadow where it was most wanted for effect. In addition to the churches above named, similar niches are found in the baptisteries of Novara and Arsago, the Duomo Vecchio at Brescia and the church of San Nazaro Grande at Milan. Towards the close of the 11th century, the imposts of these niches take the form of isolated piers, with a narrow gallery behind, and eventually small shafts with capitals are substituted for the piers, producing the eaves-galleries of the apses, which in Santa Maria Maggiore at Bergamo (1137) and the cathedral of Piacenza are the forerunners of numerous others in Italy, and in the churches of Cologne, Bonn, Bacharach and other examples on the Rhine, constitute their most important external decoration.

In the apses of San Vincenzo in Prato and of the church at Agliate (both of the 9th century) there is another decorative feature, destined afterwards to become one of the most important methods of breaking up or subdividing the wall surface, *i.e.* the thin pilaster strips, which, at regular intervals, rise from the lower part of the wall to the corbel table of the cornice.

The two most important churches of the Lombard Romanesque style are those of Sant' Ambrogio at Milan and S. Michele at Pavia, their importance being increased by the fact that they probably represent the earliest examples of the solution of the great problem which was exercising the minds of the church builders towards the end of the 11th century, the vaulting of the nave. In the original church, of the 9th century, the nave and aisles of Sant' Ambrogio were divided in the usual way with arcades, and were covered with open timber roofs. In the rebuilding of the church (fig. 35) the nave (38 ft. wide) was divided into four square bays, and compound piers of large dimensions were built, to carry the transverse and diagonal ribs of the new vault. To resist the thrust, the walls across the aisles were built up to the roof, and had external buttresses, the diagonal ribs instead of following the elliptical curve which the intersection of the Roman semicircular barrel vault gave to the groin, were made semicircular, so that the web or vaulting surface which rested on these ribs rose upwards towards the centre of the bay, giving a distinct domical form to the vault. The aisles, being half the width of the nave, were divided into eight compartments, two to each bay of the nave, and were covered both in the ground storey and the triforium with intersecting groin vaults. When this rebuilding took place, the front of the church was brought forward, bearing a narthex, and the arcades of the atrium were rebuilt in the first years of the 12th century. The triple apse, to the external decoration of which we have called attention, the crypt underneath, and the south campanile, are the only remains of the 9th century church. The campanile on the north side was built 1125-1149, and the decoration with pilaster strips, semi-detached shafts, and arched corbel table, is repeated on the façade of the church and on the arcade round the atrium. In the rebuilding, portions of the sculptural decoration of the 9th century church were utilized, this would appear to have been a Lombard custom, as in the

Fig. 35.—Plan of S. Ambrogio.

church of San Michele the lower part of the main front is encrusted with sculptured decoration taken from the earlier churches built on the site. These ancient sculptures are of special interest, as they constitute the best records of the rude Lombard work of the 8th and 9th centuries, and are intermingled with Byzantine scroll work and interlaced patterns. If the plan of Sant' Ambrogio, with its comparatively thin enclosure walls suggests its original construction as an ordinary basilica, this is not the case with San Michele (fig. 36), where all the external walls are of great thickness, showing that from the first it was intended to vault the whole structure The church is much smaller than Sant Ambrogio, there being originally only two square bays to the nave (in the 15th century the vaults were rebuilt with four bays), the transept, however projects widely beyond the aisles, and as there is another bay given to the choir in front of the apse, the area of the two churches is about the same. The existing church was probably begun shortly after the destructive earthquake of 1117, and was consecrated in 1132. In Sant' Ambrogio the transverse and diagonal arches spring from just above the triforium floor, so that there was no room for clerestory windows, and consequently the interior is dark. In San Michele the ribs rise from the level of the top of the triforium arcades and two clerestory windows are provided to each bay. The crossing of the nave and transept is covered with a dome carried on squinches, which dates from the first building. The dome over the fourth bay of Sant' Ambrogio replaced the original vault about the beginning of the 13th century.
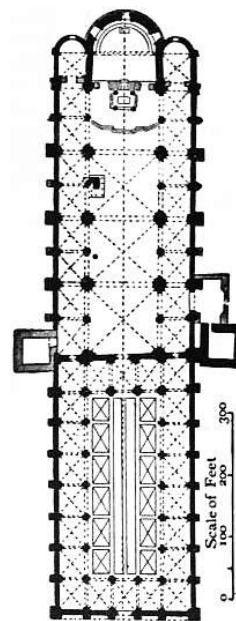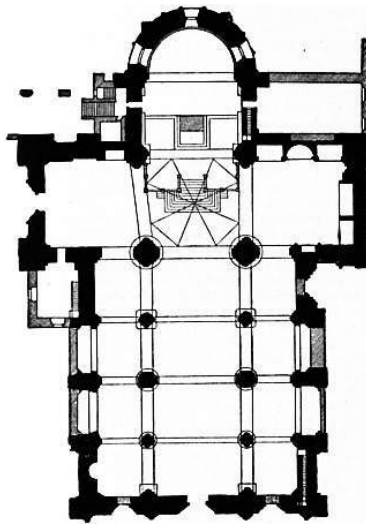
Fig. 36.—Plan of San Michele Pavia.

The cathedral of Novara, originally of the ordinary basilica type of the 10th century with timber roofs, was reconstructed in the 11th century, compound piers being built to carry the transverse and diagonal ribs and walls built across the outer aisles to resist the thrust, on the other hand SS. Pietro and Paolo at Bologna is a 12th century church which was designed from the first to be vaulted. To these, and still belonging to the basilican plan, must be added San Pietro in Cielo d'oro (1136) and San Teodoro, both in Pavia; S. Evasio at Casale Monferrato, having a comparatively narrow nave with double aisles on either side and a very remarkable narthex or porch. S. Lorenzo at Verona (lately restored), which in the 12th century was rebuilt with compound piers to carry a vault (the apse and the two remarkable circular towers in the west front belong to the ancient church), and Sant' Abbondio at Como often restored and partly rebuilt, retaining however, some of the original sculpture of the early Lombard period.

Of churches built on the plan of the Latin cross, examples are Sant' Antonino at Piacenza, with an octagonal lantern tower over the crossing, Parma cathedral (*c.* 1175), with an octagonal pointed dome over the crossing, Modena cathedral, rebuilt and consecrated in 1184; San Nazaro-Grande at Milan; and San Lanfranco at Pavia, the two latter without aisles.
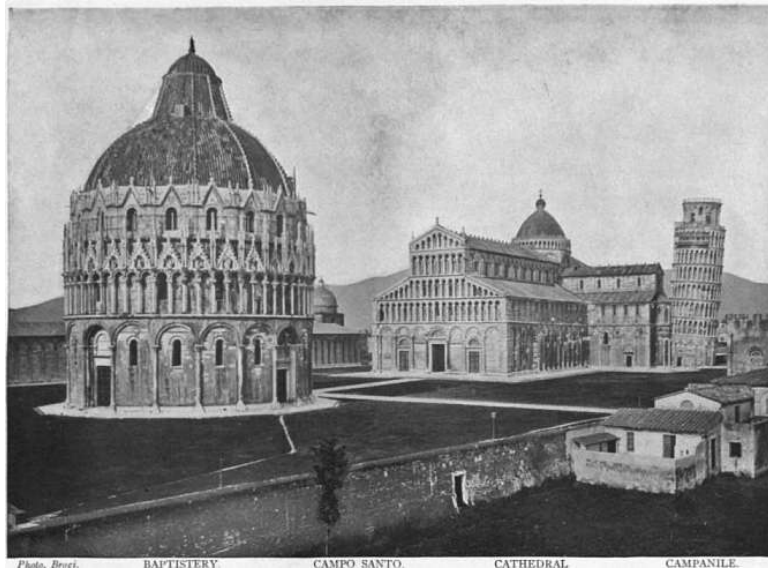
Plate I.
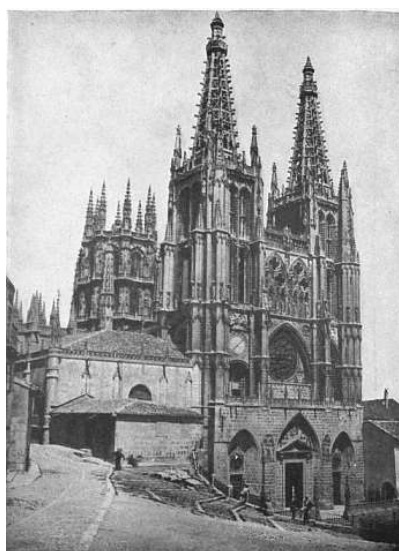

Fig. 62.—PISA.

Plate II.

Photo, Neurdean.
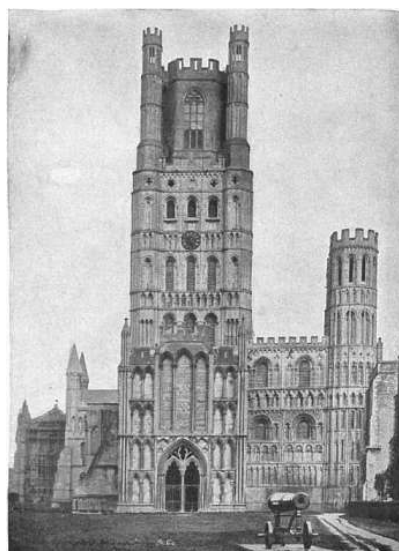Fig. 64.—AMIENS CATHEDRAL.

Photo, F. Frith & Co.
Fig. 65.—BURGOS CATHEDRAL.

Photo, F. Frith & Co.
Fig. 66.—ST PAUL'S, LONDON.

*Photo, F. Frith & Co.*
Fig. 67.—ELY CATHEDRAL.

Reference has already been made to the eaves-galleries of the apses of the Lombard churches. A similar gallery was carried across the main front, rising with the slope of the roof, as in San Michele, Pavia; also on the west fronts of San Pietro in Cielo d'oro and San Lanfranco, at Pavia; and in the cathedrals of Parma and Piacenza. In all these cases the galleries are not quite continuous, vertical buttresses or groups of shafts or single shafts being carried up through them to the corbel tables. In S. Ambrogio at Milan the central original lantern is surrounded with two tiers of galleries. The finest example of their employment, however, is in the magnificent central tower of the Cistercian church at Chiaravalle, near Milan, where the two lower storeys form the drum of the internal dome, the two storeys above are set back, and the upper storey consists of a lofty octagonal tower with conical spire.

One of the serious defects in the front of the church of San Michele at Pavia is that it forms a mask, and takes no cognizance of the aisle roofs, which are at a lower level, and the same is found in San Pietro-in-Cielo d'oro at Pavia. This mask is carried to an absurd extent in the church of Santa Maria della Pieve at Arezzo, in which, above the ground storey of the arcades, are three galleries forming strong horizontal lines, which suggest the numerous floors of a civic building instead of the vertical subdivisions of a church. This defect is not found in the church of San Zeno at Verona, which is one of the finest of the Lombard churches; the church is basilican in plan, the nave being divided into five bays with compound piers, as in Sant' Ambrogio, as if it were intended to vault it; this, however, was never done, but stone arches arc thrown across the two westernmost bays of the nave as if to carry the roof (now concealed by a wooden ceiling). The façade is of marble and sandstone, with pilaster-strips rising from the base to the arched corbel table, and the outline of the nave and aisles is preserved in the front, in which all the mouldings and carving arc of the utmost delicacy. Both here and in the cathedral are fine examples of those projecting porches, the columns of which are carried on the backs of lions or other beasts. At Piacenza, Parma, Mantua, Bergamo and Modena are porches of a similar kind, and in the cathedral of Modena the columns which support the balcony on the entrance to the crypt are all carried on the backs of lions. The cathedral of Verona has suffered so much from rebuilding and restoration that little remains of the earlier structure, but the apse of the choir, decorated with a close set range of pilaster-strips, with bases and Corinthian capitals and crowned with a highly enriched entablature, is quite unique in its design.

Among circular buildings, the Rotonda at Brescia was at one time considered to date from the 8th century, owing to its massive construction and the simplicity and plainness of its external design. Later discoveries, however, have shown that the early date can only be given to the crypt of San Filasterio situated to the eastward of the Rotonda. The church of Santo Sepolcro at Bologna, as its name implies, is one of those reproductions of the church of the Holy Sepulchre at Jerusalem which were built by the Templars during the crusades. Of much earlier date is the circular church of San Tommaso-in-

Limine, an early Lombard work of the 9th century, to which period belong also the baptisteries of Albenga, Arsago, Biella, Galliano and Asti. One of the most beautiful examples is the baptistery of Santa Maria at Gravedona, at the northern end of the lake of Como, built in black and white marble. The plan is unusual, and consists of a square with circular apses on three sides.

Byzantine Romanesque.—Although in the first basilican church of St Mark at Venice, erected in 929 to receive the relics of the saint recovered from St Mark's in Alexandria, the capitals of the columns and other decorative accessories showed Greek influence, its transformation into a five-domed Byzantine structure was not begun till about the middle of the 11th century. The date given by Cattanco is 1063, the same year in which the cathedral of Pisa was begun; it is probable, however, that the scheme had already been in contemplation for some years, as the problem was not an easy one to solve, owing to the restrictions of the site, and to the desire to reproduce in some way the leading features of the church of the Holy Apostles at Constantinople. This church was destroyed in 1464, but its description by Procopius is so clear, and corresponds so closely with St Mark's, completed towards the end of the 11th century, as to leave little doubt about the source of its inspiration. From what has already been said with reference to the great changes made when it was proposed to vault the early Lombard basilican churches, those of equal importance which were carried out in St Mark's will be better understood. The nave was divided into three square bays (fig. 37), with additional bays on the north and south to form transepts; the five square bays thus obtained were covered with domes carried on pendentives, as in St Sophia at Constantinople, and on wide transverse barrel vaults; the domes over the north and south transepts and the choir were of slightly less dimensions than those over the nave and crossing, in consequence of the limitations in area caused by the chapel of St Theodore on the north, the ducal palace on the south, and the ancient apse of the original basilica which it was desired to retain. In the reconstruction, many of the old columns, capitals and parapets were utilized again in the arcades carrying the galleries and in the balustrades over them. Externally the brick walls were decorated with blind arcades and niches of Lombard style, and all the roof vaults were covered with lead as in Constantinople. The subsequent decoration of the exterior took two centuries to carry out, not including the florid work of later date. There is no precedent in the East for the superimposed columns and capitals exported from Constantinople and Syria which now decorate the north, south and west fronts (Plate I., fig. 63), though the materials were all of the finest Byzantine type. Internally, the mosaic decoration of the domes, vaults and the upper part of the walls, was carried out by Greek artists from Constantinople, who probably also were employed for the marble panelling of the lower part of the walls. The marble casing of the front was certainly executed by Constantinopolitan artists, since the moulded string known as the "Venetian dentil" is a direct reproduction of that in St Sophia. At a later date the domes were all surmounted by lanterns in wood, covered with lead, and the roofs were all raised. So far, therefore, the building departs from its prototype, the church of the Apostles. A similar transformation took place in the church of Santa Fosca at Torcello, where a single large dome was contemplated over the centre of the original basilican church, but was never built. The cathedral of Torcello and the church at Murano are richly decorated with carved panels, capitals, choir screens and other features, either imported from the East or reproduced by Greek artists or Italians trained in the style. The influence of St Mark's in this respect extended far and wide on the east coast of Italy; and at Pomposa, Ancona, and as far south as Brindisi, Byzantine details can be traced everywhere. The designs of the churches of San Ciriaco at Ancona and of Sant' Antonio at Padua were both based on St Mark's. Sant' Antonio's had six domes, there being two over the nave; and in all cases the domes were surmounted by domes in timber like those of St Mark's.
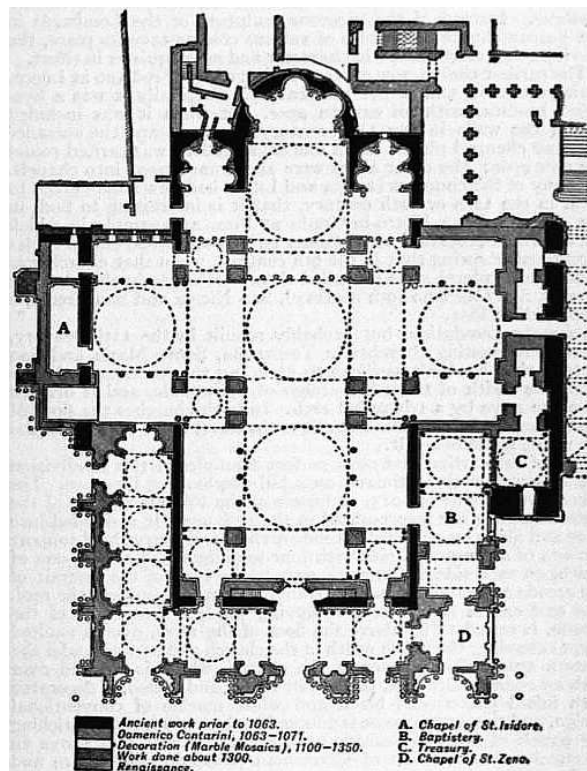
From R.P. Spiers's *Architecture, East and West.*

Fɪɢ. 37.—Plan of St Mark's, Venice.

In domestic work, Venice is richer in Byzantine architecture than Constantinople, for with the exception of the Hebdomon palace the continual fires there have destroyed all the earlier palaces and houses. The Fondaco-dei-Turchi, built probably in the 11th century, is one of the most remarkable; the front on the great canal is 160 ft. long, having a lofty arcade with ten stilted arches on the ground storey and an arcade of eighteen arches above; the pavilion wings at the east end are in three storeys, with blind arcades and windows pierced in the central arcade. The whole was built in brick encased with marble, with panels or disks enriched with bas-reliefs or coloured marbles. A second example is found in the Palazzo Loredan, having similar arcades, stilted arches and marble panelling; and there are two others, one on the Grand Canal and the other on the Rio-Cà-Foscari. Throughout Venice the decoration of these Byzantine palaces would seem to have influenced those of later date; for the Venetian dentil, interlaced scroll-work and string courses, with the Byzantine pendant leaf, are found intermingled with Gothic work, even down to the 15th century, and the same to a certain extent is found at Padua, Verona and Vicenza.

Central Romanesque.—The builders in the centre of Italy would seem to have followed more closely the Roman basilican plan, for in two of the earliest churches, Santa Maria Fuorcivitas at Lucca and San Paolo a Ripa d'Arno at Pisa, the T-shaped plan of St Peter's and St Paul's, with widely projecting transepts, was adopted; the difference also between the north and central developments is very marked, as in the place of the massive stone walls, compound piers, and internal

and external buttresses deemed necessary to resist the thrusts of the great vaults, and the low clerestory of the northern churches, those in the south retain the light arcades with classic columns, the wooden roofs, and the high clerestory of the Roman basilicas. Instead of the vigorous sculpture of the Lombards in the Tuscan churches, marbles of various colours take its place, the carving being more refined in character and much quieter in effect.

The earliest church now existing is that of San Frediano at Lucca, dating from the end of the 7th century. Originally it was a five-aisled basilica, with an eastern apse, but when it was included within the walls in the 11th century the apse and the entrance doorway changed places, and a fine eaves-gallery was carried round the new apse; the outer aisles were also transformed into chapels. So many of the churches in Pisa and Lucca had new fronts given to them in the 11th or 12th century, that it is interesting to find, in the church of San Pietro-in-Grado at Pisa, an example in which the external decoration with pilaster strips and arched corbel tables is retained, showing that in the 9th century, when that church was built, the Lombard style prevailed there. Other early churches are those of San Casciano (9th century), San Nicola and San Frediano (1007), all in Pisa.

Of early foundation, but probably rebuilt in the 11th century, are two interesting churches in Toscanella, Santa Maria and San Pietro; they are both basilican on plan, but the easternmost bay is twice the width of the other arches of the arcade, and is divided from the nave by a triumphal arch. In both churches the floor of the transept is raised some feet above the nave, and a crypt occupies the whole space below it.

One of the earliest and most perfect examples of this subdivision is the church of San Miniato, on a hill overlooking Florence. The church was rebuilt in 1013, and some of the Roman capitals of the earlier building are incorporated in the new one. It is divided into nave and aisles by an arcade of nine arches, and every third support consists of a compound pier with four semi-detached shafts, one of which, on each side of the nave, rises to the level of the summit of the arcade and carries a massive transverse arch to support the roof. The east end of the church, occupying the last three bays of the arcade, is raised 11 ft. above the floor of the nave, over a vaulted crypt extending the whole width of the church and carried under the eastern apse. The interior of the church, which is covered over with an open timber roof, painted in colour and gilded, is decorated with inlaid patterns of black and white marble of conventional design, and the same scheme is adopted in the main façade, enriching the panels of the blind arcade on the lower storey, and above an extremely classic design of Corinthian pilasters, entablature and pediment.

As none of the façades of the Pisan churches was built before the middle of the 11th century, it is possible that Buschetto, the architect of the cathedral of Pisa, may have profited by the scheme suggested in the lower storey of San Miniato; if so he departed from its classic proportions. There are seven blind arcades in the lower storey of the Pisan cathedral, the arcades are loftier, and the position of the side doors which open into the inner aisle on each side is of much better effect. The cathedral was begun in 1063, the year following the brilliant capture of Palermo by the Pisans, when they returned in triumph with immense spoils. In plan it consists of a Latin cross, with double aisles on either side of the nave extending to the east end, a central apse, transepts with single aisles on each side, and north and south transepted apses (fig. 38). The nave arcade, with its Corinthian capitals and monolith stone columns, is of exceptional boldness, and as it is carried across the transept up to the east end (a length of 320 ft.) it forms a continuous line greater than that in any other cathedral. The crossing is covered by a dome, elliptical on plan, being from east to west the length of the transept and aisles. The result is unfortunate, and detracts both externally and internally from its beauty, otherwise the exterior decoration, which must have been schemed out in its entirety from the beginning (with the exception of the dome, which is of later design), has the most satisfactory and pleasing effect. The lofty blind arcade of the lower storey and the open gallery above on the façade (the latter represented by a blind arcade), are carried round the whole building, and the horizontal lines of the galleries of the upper storeys accord with the roofs of the aisles and nave respectively and the blind arcade of the clerestory. The walls are faced within and without with white and grey marble, and the combination of sculpture and inlay which enriches the arcades of the façades gives an additional attraction to the building. The cathedral is sometimes quoted as Byzantine in style, but its plan and design are of widely different character from those of any building found in the East, and the mosaics, which constitute the finest decorative element in that style, were not added till the 14th century, and formed no part of the architect Buschetto's scheme.

The Baptistery, begun in 1153, was not completed till towards the close of the 13th century, when important alterations were made in the design to bring it into accordance with the new Gothic style. The crocketed gables, and the upper gallery, substituted for the arcades, which followed on the lines of those in the cathedral, have taken away the quiet repose found in the latter; the lower storey, however, with its lofty blind arcades, similar to those of the cathedral, and the principal doorway, are of great beauty. The central area of the baptistery, which is surrounded by aisles and triforium gallery, is covered by a conical dome; internally as well as externally this can never have been a beautiful feature, and the additions of the 13th century have made it one of the ugliest roofs in existence.
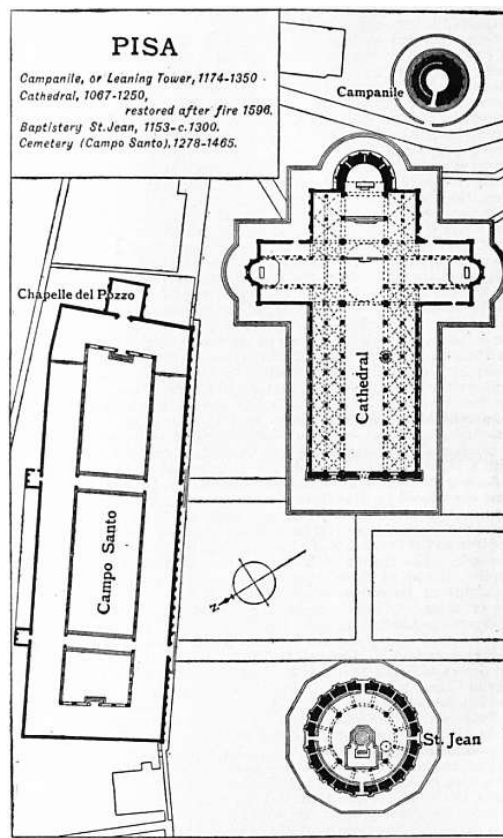
FIG. 38. PISA.

The Campanile or leaning tower was begun in 1174. Owing, however, to the treacherous nature of the ground, the piles driven in to support the tower gave way on the south side, so that, when only 35 ft. above the ground, a settlement was noticed, and slight additions in height were made from time to time in order to obtain a horizontal level for the stone courses; but this was without avail, and on the completion of the third gallery above the ground storey the work was suspended for many years. In 1350 it was recommenced, three more gallery storeys were added, and the upper or belfry stage was set back in the inner wall. The tower is now 178 ft. high, and overhangs nearly 14 ft. on the south side; its design is made to harmonize with the cathedral, but shows much less refinement and grace.

The Campo Santo, an immense rectangular court 350 ft. long by 70 ft. wide, surrounded by a cloister 35 ft. wide, was begun in 1280; the details are refined, but the poverty in the design of the tracery with which the arcades were fitted in at a much later date detracts from its interest, which is now mainly concerned with the beautiful frescoes which decorate its walls.

As might have been expected, the cathedral of Pisa set the model not only for the restoration of existing churches but also for new ones, in Pisa itself and also at Lucca, Pistoia and Prato. In Pisa, the church of San Paolo a Ripa d'Arno was rebuilt about 1060, possibly by the architect of the cathedral; San Pietro-in-Vincoli and San Nicola date from the early years of the 12th century. At Lucca the churches of Santa Giuha, San Giusto, San Martino, San Michele, and the restored front of Santa Maria Fuorcivitas, are the principal examples in which the Pisan cathedral has suggested the design, and at Pistoia we can point to the cathedral, Sant' Andrea, San Pietro and San Giovanni Fuorcivitas, the latter with a south wall decorated with three stages of blind arcades of great richness. The cathedral of Lucca was either restored or rebuilt at the beginning of the 14th century, and has a distinctly Gothic effect. The lower storey of the façade presents the unusual feature of an open porch across the whole front with three great archways. This porch with the three galleries above was added to the cathedral at the beginning of the 13th century.

Southern Romanesque.—The influences exerted in the early development of the Romanesque style in the south of Italy are much more complicated than in the north, since two new elements come into the field, the Norman and Saracenic. Of early work very little remains, owing to the general rebuilding in the 11th century; what is more remarkable, there is scarcely any trace of the result of the Byzantine occupation for so many centuries; the only exception being the church of San Gregorio at Bari, a small basilican structure in which the arches of the arcades separating the nave from the aisles are stilted like those of the Fondaco-dei-Turchi at Venice.

One of the chief characteristics noticeable in the plan is the almost universal adoption of a transept projecting north and south slightly beyond the aisle walls, and in some cases raised over a crypt, as in the churches at Toscanella. Since, however, there is no choir bay, and the central apse opens direct into the transept, the plan is not that of the Latin cross. The most complete development of this arrangement is found in the cathedral and in the church of San Nicola at Bari (fig. 39); both being basilican churches with a triumphal arch opening into the transept,—in this respect similar to the churches of St Peter and St Paul at Rome, except that the transepts project only slightly, beyond the aisles. There is one peculiarity in both these churches, as also in that of the cathedral at Molfetta. East of the transept, and at the north and south sides, are towers, between which is carried a wall which hides the apse, the only indication of its existence being the round arched window which lights it. A similar arrangement exists in the cathedrals of Giovenazzo, Bitetto and Bitonto. The central bay of the transept of the cathedral at Bari is surmounted by an octagonal drum, the dome within which is carried on squinches; a similar dome was projected in San Nicola, but never built. In the cathedral at Bari, as also in San Nicola, the lofty nave is covered with a timber roof, and has an arcade on the ground storey and a fine triforium and clerestory windows above.
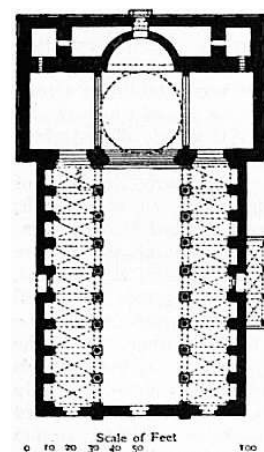

FIG. 39.—Plan of S. Nicola at Bari.

Externally these churches depend for their effect more on their fine masonry than on any decorative treatment; the blind arcades of the lower storey have very little projection, and the pilaster strips which in the Lombard churches break up the wall surface are not found here; the arched corbel table is freely employed but rarely the open gallery. There is one remarkable example in Bitonto cathedral; above the aisle chapels, and approached from the triforium, is an open gallery, the arches of which rest on widely projecting capitals sculptured with animals and foliage, half

Lombardic and half Byzantine in style. The small shafto supporting these capitals are of infinite variety of design, with spirals, chevrons, fluting and vertical mouldings of many kinds.

The cathedral at Molfetta is in plan quite different from those already described, and consists of square bays with aisles, transept and apse, having domes over the nave and crossing. The Byzantine influence here comes in, but it is much more pronounced in La Cattohca at Stilo, a small church square on plan with four columns carrying the superstructure, which consists of a central and four domes on the angles. Other domed churches are those of the Immaculata at Trani; San Sabino, Canosa; and San Marco, Rossano. The lower part of the cathedral at Troja shows the direct influence of the cathedral at Pisa. The cathedral at Trani has the same plan as the churches at Bari, except that the earlier apses are not enclosed. The cathedral of Salerno retains still the fine atrium by Robert Guiscard in 1077. In the cathedrals of Acerenza, Aversa and Venosa, the French chevet was introduced towards the end of the 12th century.

In the magnificent octagonal tower which encloses the dome on the crossing in the cathedral of Caserta-Vecchia, we find the interlacing blind arcades of the Norman architecture in Sicily, as also in the cathedral at Amalfi. The porches, entrance doorways and windows being the chief decorative feature of the south Italian churches, were enriched with splendid sculptures. So were the pulpits of the cathedrals of Sessa, Ravello, Salerno and Troja, the rich mosaic inlays at Sessa, Ravello and Salerno according in design with the Cosmati work in Rome, though they possibly had an earlier origin in Sicily.

Sicilian Romanesque.—Although the earliest remains in Sicily date from the Norman occupation of the island, they are so permeated with Saracenic detail as to leave no doubt that the conqueror employed the native workmen, who for two centuries at all events had been building for the Mahommedans, and therefore, whether Arab or Greek, had been reproducing the same style as that found in Egypt or North Africa.

It is possible that, so far as the Norman palaces of the 12th century are concerned, they were based on those built under the Saracenic rule, but the requirements of a mosque and of a church are entirely different, and therefore in the earliest church existing (San Giovanni-dei-Leprosi, at Palermo, built by Robert Guiscard in A.D. 1071) we find a completely developed Christian structure, having nave, aisles and transepts, with a dome over the crossing and three apses. The next church, at Troina (1078), was similar on plan, but had three square wings at the east end instead of apses. The next two churches, La Martorana and San Cataldo (1129), at Palermo, followed the plan of the Greek church, with four columns carrying the superstructure and three domes over the nave bays carried on Saracenic squinches, similar to those in San Giovanni-dei-Leprosi. San Giovanni-degli-Eremiti (T-shaped on plan) has no aisles, but carries domes over the nave and three smaller domes on the transept. The most important feature found in all these churches is the pointed arch, of Saracenic origin imported from the East, which was employed for the nave, arcades, the crossing, and in the squinches carrying the domes. The blind arcades which decorate the walls of San Cataldo and of the Norman palaces—La Favara, the Torre della Ninfa, La Ziza and La Cuba (all in or near Palermo),—in two or three orders, and sometimes (as in the Favara palace) of great height, have all pointed arches and no impost mouldings or capitals. The distinguishing characteristic of these blind arcades (and the same is found in the open arcades) is the very slight projection of the outer order of arch.

The finest early example of Norman architecture in Sicily is the Cappella Palatina, at Palermo, consecrated in 1140, and attached to the palace. The plan consists of nave, aisles, transept and triple apse, the arches, all pointed and stilted, being carried on monolith columns of granite and marble alternately. The nave is covered over with a timber roof with stalactitic coves and coffered ceiling, richly decorated in colour and gilded, the borders of the panels bearing Arabic inscriptions in Cufic characters. Similar inscriptions exist on the upper part of the walls of the Cuba and Ziza palaces, proving that they were built by Saracenic workmen. The plans of the cathedrals of Palermo, Messina (destroyed 1908), Cefalu and Monreale are all similar, with nave and aisles separated by arcades, in which the arches are all pointed and stilted, transepts projecting north and south beyond the aisle walls, and square bays beyond, with apsidal terminations. That of Palermo has much suffered from restorations, but the cathedral of Monreale is in perfect condition. It was begun in 1176 and consecrated in 1182. The proportions of the arcade are much finer than in the Cappella Palatina, where the stilted arch was of the same height as the shaft of the columns, whereas here it is only half the height. The columns are all of granite with extremely fine capitals, some of which were taken from ancient buildings. All the roofs are in wood, with coffered ceilings richly decorated in gold and colour. The walls to a height of 22 ft. are all lined with slabs of marble with mosaic friezes, and all the surfaces of walls and arches are covered above with mosaics representing scenes from the Old and New Testaments, while in the apse at the east end a gigantic figure of Christ dominates the whole church. The same is found at Cefalu, where the mosaic decorations, however, are confined to the apses. Externally the walls are comparatively plain, the decoration being confined to the east end, where the three apses are covered with a series of blind intersecting arcades of pointed arches. This class of enrichment prevails throughout the great Sicilian churches, and extends sometimes to the smaller churches, as that of the Chiesa-dei-Vespri. Of the conventual buildings attached to the cathedral of Monreale, which occupied an immense site, there remain only the cloisters, about 140 ft. square, enclosed by an arcade with pointed arches carried on coupled columns, the shafts of which are elaborately carved and inlaid with mosaic; the capitals are of the most varied design and of exquisite execution.

Italian Gothic.—Italy is poorer than any other country in examples of the transition from round arched to pointed arched buildings. The use of the pointed arch was accepted at last as a necessity, and cannot be said ever to have been welcomed. The first buildings in which it is seen worked out fully in detail are those of Niccola Pisano, and but few examples exist of good Gothic work earlier than his time. The elaborately arcaded and sculptured west front of Ferrara cathedral is a screen to an early building. The cathedral and other churches at Genoa are certainly exquisite works, but they appear to owe their internal design rather to the influence of (perhaps) Sicilian taste than north Italian, and the exquisite beauty of the west front owes a good deal, at any rate, to French influence, softened, refined and decorated by the extreme taste of an Italian architect. The feature which most marks all Italian Gothic is the indifference to the true use of the pointed arch. Everywhere arches were constructed which could not have stood for a day had they not been held together by iron rods. There was none of that sense of the unities of art which made a northerner so jealous to maintain the proper relations of all parts of his structure. In Niccola Pisano's works the arch mould rarely fits the capital on which it rests. The proportions of buttresses to the apparent work to be done by them are bad and clumsy. The window traceries look like bad copies of some northern tracery, only once seen in a hurry by an indifferent workman. There is no life, or development, or progress in the work. If we look at the ground-plans of Italian Gothic churches, we shall find nothing whatever to delight us. The columns are widely spaced, so as to diminish the number of vaulting bays, and to make the proportions of the oblong aisle vaulting bay very ungainly. Clustered shafts are almost unknown, the columns being plain cylinders with poorly sculptured capitals. There are no triforium galleries, and the clerestory is generally very insignificant. In short, a comparison of the best Gothic works in Italy with the most moderate French or English work would show at once how vast its inferiority must be allowed to be. Still there were beauties which ought not to be forgotten or passed over. Such were the beautiful cloisters, whose arcades are carried on delicate coupled shafts,—*e.g.* in St John Lateran and St Paul's at Rome. Such also were the porches and monuments at Verona and elsewhere; and the campaniles,—both those in Rome, divided by a number of string-courses into a number of storeys, and those of the north, where there are hardly any horizontal divisions, and the whole effort is to give an unbroken vertical effect; or that unequalled campanile, the tower of the cathedral at Florence by Giotto, where one sees in ordered proportion, accurately adjusted, line upon line, and storey upon storey, perhaps the most carefully wrought-out work in all Europe.

The Italian architects were before all others devoted to the display of colour in their works. St Mark's had led the way in this, but, throughout the peninsula, the bountiful plenty of nature in the provision of materials was seconded by the zeal of the artist. They were also distinguished for their use of brick. Just as in parts of Germany, France, Spain and England, there were large districts in which no stone could be had without the greatest labour and trouble; and here the reality and readiness which always marked the medieval workman led to his at once availing himself of the natural material, and

making a feature of his brickwork.

The Gothic of Italy has, it must be admitted, no such grand works to show as more northern countries have. Allowance has to be made at every turn for some incompleteness or awkwardness of plan, design or construction. There is no attempt to emulate the beauties of the best French plans. Milan cathedral, magnificent as its scale and material make it, is clumsy and awkward both in plan and section, though its vast size makes it impressive internally. San Francesco, Assisi, is only a moderately good early German Gothic church, converted into splendour by its painted decorations. At Orvieto a splendid west front is put, without any proper adjustment, against a church whose merit is mainly that it is large and in parts beautifully coloured.

The finest Gothic interiors are of the class of which the Frari at Venice and Sant' Anastasia at Verona are examples. They are simple vaulted cruciform churches, with aisles and chapels on the east side of the transepts. But even in these the designs of the various parts in detail are poor and meagre, and only redeemed from failure by the picturesque monuments built against their walls, by the work of the painter, and by their furniture. In fine, Gothic art was never really understood in Italy, and, consequently, never reached to perfection.

Whilst the Pointed style was almost exclusively known and practised in northern Europe, the Italians were but slowly improving in their Gothic style; and the improvement was more evinced in their secular than in their ecclesiastical structures. Florence, Bologna, Vicenza, Udine, Genoa, and, above all, Venice, contain palaces and mansions of the 12th, 13th, 14th and 15th centuries, which for simplicity, utility and beauty far excel most of those in the same and other places of the three following centuries. The contemporary churches do not exhibit the same degree of improvement in style that is conspicuous in these domestic works, for there are no works in Europe more worthy of study and admiration than the Ducal Palace at Venice, and some of the older works of the same class, and even of earlier date. The town halls of Perugia, Piacenza and Siena, and many houses in these cities, and at Corneto, Amalfi, Asti, Orvieto and Lucca, the fountains of Perugia and Viterbo, and the monuments at Bologna, Verona and Arezzo, may be named as evidence of the interest which the national art affords to the architectural student even in Italy, as late as the end of the 14th century; but after this it gradually gave way to the new style, though in some instances its influence may be traced even when it had been overborne by it.

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Romanesque and Gothic Architecture in France

Most generally, Romanesque art is thought of as that period of art which followed and partook of the nature of Roman art and yet was too far removed from it to be classed as Roman. The difference, however, was not merely one of decay; it is rather in positive factors that we shall find the true characteristics of the style. Its formation was parallel to the development of the Romance languages, and like them it acquired barbaric elements.

In Rome itself hardly any, if any, contributions were made to its growth, and there as late as the 12th century the early Christian form of basilican church continued to be built. It may, perhaps, best be conceived as a Germano-Roman product, for even in Spain and north Italy, which became such strong centres of the art, the Visigoths and Lombards provided the Teutonic element. Besides this change of "blood" in the style, there is another element of change in the influences obtained from the more rapidly developed art of the East. This influence indeed was so strong and constant that, having it in view, we might almost describe the Romanesque style as Germano-Byzantine.

In the 6th and 7th centuries we have, on the one hand, the almost pure traditional early Christian art of Rome and indeed of western Europe, and on the other the direct establishment of matured Byzantine art at Ravenna, Parenzo, Naples and even in Rome. Then followed the mixture of these and of barbaric elements in the formation of several pre-Romanesque varieties, one of which has been named Italo-Byzantine. It was not until the age of Charlemagne that a centre was established strong enough for the formation of a new western school which should persist. From this time a progressive style was developed which led straight forward to the Gothic, and it is this movement which is best called Romanesque. This art was a perfect ferment of striving and experiment, of gathering and even of research; Roman, Byzantine and Saxon elements entered into its composition. It is probable also, as a result of Saracenic pressure on Syria, Asia Minor, North Africa and Spain, that artists, "bringing their crafts with them," drew together from still remoter parts to gain the protection of the great ruler of the West and to help in the formation of Carolingian art. With the disintegration of the empire of Charlemagne many local schools arose in Germany, France and Lombardy, which—especially after the year 1000, when there appears to have been a renewed burst of building energy—resulted in considerable differentiation of styles. The centre of energy seems to have been now here, now there, yet with all the differences there was a general resemblance over the whole field. Until the exact date of a very large number of monuments is more perfectly established, it will be impossible to trace out exactly the intricate windings of the line of advance. In fact there are two conflicting sides to the question presented by Romanesque art. In the first place we have to consider the several schools in regard to a standard of absolute attainment, and in the second as relative to the line of persistence and to the formation of Gothic, which was so largely the culmination, and then the decay, of the forces present in Romanesque art. Some of the most beautiful and complete of the Romanesque schools contributed least, some of the most inchoate gave the most, to that which was to be.

The most important existing monument of the age of Charlemagne is the cathedral of Aix-la-Chapelle (see fig. 44), which was being built in the year 800. It has an octagonal central area, covered by a dome and surrounded with two storeys of aisles both completely vaulted. The interior surface of the dome was encrusted with mosaic. Another important work of about the same time is the church of Germigny-des-Prés near Orleans, which also is of the "central type," having a square tower above four piers surrounded by an aisle with semicircular apses in the centre of each external wall, the apse to the east having a mosaic.

Plate III.

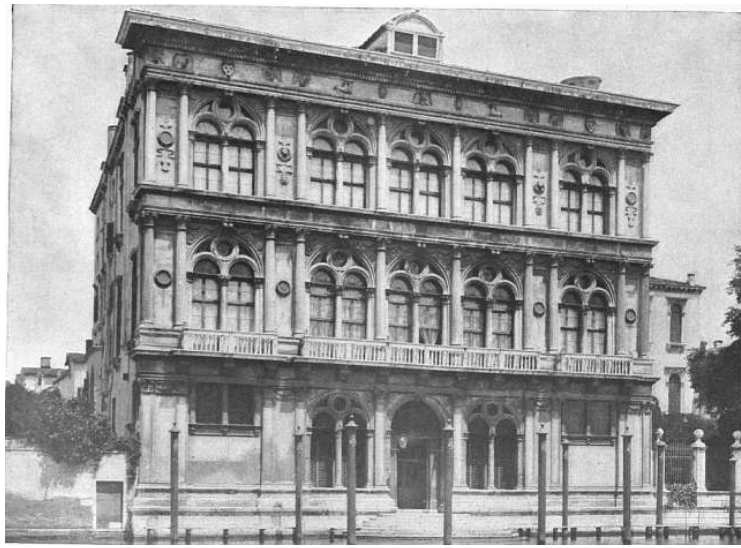*Photo, Brogi.*

Fig. 68.—ST PETERS, ROME.

Photo, Alinari.

Fig. 69.—INTERIOR OF ST PETER'S, ROME.

Plate IV.

Photo, Koch.

Fig. 70.—TOWN HALL, BREMEN.

Fig. 7l.—VENDRAMINI PALACE, VENICE.

From the 9th to the 11th century the great problem worked out was that of perfecting the standard plans of large churches. In the MS. plan of the monastic church of St Gall, drawn about 820, we find a great nave with aisles, apsidal terminations both to the east and the west, transepts and probably a central tower (cf. the abbey church of Saint-Riquier near Abbeville, built *c*. 800, of which a slight representation has been preserved). In St Martin at Tours was probably evolved the most perfect type of plan, that with an ambulatory and radiating chapels surrounding the eastern apse. A magnificent church of this form was built here at the beginning of the 11th century, but not for the first time. Excavations have shown that the plan was probably suggested by a still earlier church in which five tomb-niches surrounded the central apse and tomb of St Martin. At Jumièges (begun 1040) it has recently been found that the plan terminated to the east with parallel apses, as at St Albans in England; this is a second important type. A third type is that in which the transepts as well as the east end are finished with apses, like St Mary-in-the-Capitol at Cologne.

When we come to the developed Romanesque of the end of the 11th century, we find not only several French varieties, but strong schools in Lombardy and on the Rhine. Without distinguishing too minutely, four broad types representing schools of the east and west, north and south (or rather north-east, north-west, south-east and south-west) of France, may be spoken of, and all of these were engaged in the task of completely covering with vaults large churches of basilican plan— the typical problem of this period. In the east of France we have a school represented by the monastic church of Tournus, where the nave was vaulted by a series of compartments placed transversely to the axis of the church. This church, which has a plan of the type of St Martin's at Tours, was begun in 1019, but the nave vaults were not reached until after 1066. This style of vaulting persisted in Burgundy, and from thence it spread to Fountains Abbey in England, where it is found over the aisles. The most beautiful class of buildings in eastern France is that of which the church at Issoire is the most perfect example. The external walls are here ornamented with patterns countercharged in light and dark stone. The wonderful church at Le Puy also belongs to this group, but here strong Moorish influence is to be traced. The inlays were probably derived from a late Gallo-Roman source. Countercharging of stones of two colours was a favourite method of building in Romanesque churches erected between 1100 and 1150. We find it at Vézelay, a magnificent abbey church of Burgundy, at Le Mans cathedral, and as far north-west as Exeter and Worcester. In the west (south-west) the most prominent school was that of Perigord, of which the church of St Front, Périgueux, may be taken as the example. St Front was rebuilt after a fire in 1120, but there are many earlier specimens, two of the most important being at Angoulême (1105-1128) and Fontevrault. This school applied a series of domes of eastern fashion not only at the centre but over the whole extent of the church. St Front so closely resembles St Mark's, Venice, that it must be derived from it or from some similar eastern church. The method largely influenced the Angevin school of vaulting, but it does not seem to have been effective as a protection from the weather. Some examples were covered by external roofs, as was St Front itself at a late time. St Ours at Loches, originally a small church covered by domes, had spire-like pyramids substituted for them when the church was enlarged about 1168.

The third class of vaulting we may for symmetry's sake associate with the south, though it is found widely distributed. The chapel in the Tower of London is an example, and its true centre seems to be the Auvergne. The vaults of this type run along with the axis of the space to be covered. In the case of large churches the central span is frequently supported by quadrant vaults leaning against it on either side. One of the most noble churches in which the central span is covered by such a barrel vault is that of St Savin near Poitiers, where very much has been preserved of the complete series of paintings which once adorned it and the walls beneath.

The most characteristic buildings of the south are the churches of Moissac, St Trophime at Aries, St Gilles near Nîmes and St James of Compostella, where there is much sculpture of a Lombardic type. There was a great revival of sculpture, going together with a study of the antique, in Lombardy at the end of the 11th century. Wiligelmus, who later worked at San Zeno, Verona, signed some sculptures at Modena in 1099.

Of the schools of the north, Normandy took the lead. It was adventurous, if somewhat barbaric. It derived much from Germany and gave much to the Gothic style. About the middle of the 11th century the Normans began to experiment with cross-groined vaults and their application to the church problem. This from the first contained an important possibility of future development, in that it allowed of windows of considerable height being placed in the lunettes of these vaults. Soon a very great step in advance was made by the invention or application of diagonal ribs under the intersection of the plain groined vault. This association of strengthening ribs in a cross form to each bay of the structure forms the *ogive*, the characteristic form from which the alternative name to Gothic, "ogival," has been derived. The first instance we know of the use of this system is at Durham cathedral, where the aisles of the east end were so covered about 1093, and where the high vault erected about 1104 was almost certainly of the same kind. Another outcome of the genius of Norman builders seems to have been the donjon or keep type of castle.

The word "Gothic" was applied by Italian writers of the Renaissance to buildings later than Roman, which in some cases (*e.g.* Theodoric's works at Ravenna) might be properly so named. What we now call Gothic the same writers called Modern. Later the word came to mean the art which filled the whole interval between the Roman period and the Renaissance, and then last of all, when the Byzantine and Romanesque forms of art were defined, Gothic became the art which intervened between the Romanesque era and the Renaissance.

As remarked above, Gothic architecture is to a large extent the crown of Romanesque. It is agreed that its chief element of construction was the ogival vaulting which was being widely used by Romanesque builders in the first half of the 12th century; and pointed arches appeared as early.

The eminent architect, G.E. Street, writing[3] of what we have called the standard plan of great 12th-century churches, says, "In whatever way the early *chevets* (as the French term them) grew up there is no doubt that they contain the germ of the magnificent *chevets* in the complete Gothic churches of the north of France." Architecture of the middle ages having been continuously developed, it is necessarily somewhat arbitrary to mark off any given period; all are agreed, however, that about the year 1150 there was a time of rapid change towards a slenderer and more energetic type of building, and the forms which followed for about four centuries we now call Gothic. The special character which the architecture of this period took was partially conditioned by the fact that the expanding power of the French kingdom, with its centre at Paris, was situated in a particular artistic environment. The body of ideas on which it for the most part worked was furnished by the Romanesque art of north France, the German borderland and Burgundy. A great contributory cause was the immense monastic activity of the time, and the need of accomplishing large results with limited means resulted in a casting aside of old ornamental commonplaces and in innovations of planning and structure. This was especially the case with the Cistercian order, which carried certain transitional Gothic forms of building into England, Germany, Italy and Spain. If, however, we make the transition to Gothic date from the first use of "ogival" vaults in north-west Europe, then Durham cathedral is, so far as we now know, the earliest example of the transitional style. The next step, the appearance of Gothic itself, may best be held to date from the systematic but not exclusive use of pointed arches in association with ogival vaults about the middle of the 12th century.

At this time was waged a war of domination amongst the styles, a war which resulted not necessarily in the victory of the most beautiful nor even of the strongest, but one in which political and geographical considerations had much to do with the decision. When the French kingdom took the lead in western civilization, it was settled that a northern form of art, one which had perforce to make a chief element of the window, should be followed out. The consequent development of the window is, after all, as the first observers thought, the great mark of the mature style. As to the position of France in the movement, Mr Street may again be quoted:—"When once the Gothic style was well established, the zeal with which the work of building was pursued in France was almost incredibly great. A series of churches exists there within short distances of each other, so superb in all their features that it is impossible to contest their superiority to any corresponding group of buildings. The old Domaine Royale is that in which French art is seen in its perfection. Notre Dame, Paris, is a monument second to nothing in the world; but for completeness in all its parts it would be better to cite the cathedral of Chartres, a short description of which must suffice as an explanation of what French art at its zenith was. The plan has a nave with aisles, transepts with aisles on each side, a choir with two aisles all round it, and chapels beyond them. There are two immense steeples at the west end, two towers to each transept and two towers at the junction of the choir with its apse. The doorways are triple at the west end, whilst to each transept is a vast triple porch in front of the three doorways. The whole of these doorways are covered with sculpture, much of it refined, spirited and interesting in the highest degree. You enter and find the interior surpassing even the exterior. The order of the columns and arches, and of all the details, is so noble and simple that no fault can be found with it. The whole is admirably executed; and, finally, every window throughout its vast interior is full of the richest glass coeval with the fabric. As compared with English churches of the same class, there are striking differences. The French architects aimed at greater height, greater size, but much less effect of length. Their roofs were so lofty that it was almost impossible for them to build steeples which should have the sort of effect that ours have. The turret on Amiens cathedral is nearly as lofty as Salisbury spire, but is only a turret; and so throughout. Few French churches afford the exquisite complete views of the exterior which English churches do; but, on the other hand, their interiors are more majestic, and man feels himself smaller and more insignificant in them than in ours. The palm must certainly be given to them above all others. There is no country richer in examples of architecture than France. The student who wishes to understand what it was possible for a country to do in the way of creating monuments of its grandeur, would find in almost every part of the country, at every turn and in great profusion, works of the rarest interest and beauty. The 19th century may be the consummation of all, but the evidences of its existence to posterity will not be one-tenth in number of those which such a reign as that of Philip Augustus has left us, whilst none of them will come up to the high standard which in his time was invariably reached."

The remarks which have been made as to the variation in style visible in various parts of the same country, apply with more force, perhaps, in what we now call France than to any other part of Europe. For the purposes of complete study it would be necessary to keep distinct from each other in the mind the following important divisions:—(1) Provence and Auvergne; (2) Aquitaine; (3) Burgundy; (4) Anjou and Poitou, (5) Brittany; (6) Normandy; (7) the Île-de-France and Picardy; (8) Champagne; and, finally, (9) the eastern border-land (neither quite German nor quite French in its character), the meeting-point of the two very different developments of French and German art. Speaking generally, it is safe to say that Gothic architecture was never brought to its highest perfection in any portion of the south of France. Aquitaine, Auvergne and Provence were too wedded to classic traditions to excel in an art which seems to have required for its perfection no sort of looking back to such a past. Hence there is no Gothic work in the south for which it is possible to feel the same admiration and enthusiasm as must be felt by every artist in presence of the great works of the north. In Anjou this is less the case; but even there the art is extremely inferior to that which is seen in Normandy and the Île-de-France. Brittany may be dismissed from consideration, as being, like Cornwall, so provincial and so cut off from neighbours, that its art could not fail to be very local, and without much influence outside its own borders.

There are examples of true Gothic outside its proper habitat, almost pure French works being found as far south as Laon and Burgos, as far east as Strassburg and Lausanne and as far north as Canterbury and Cologne. Westminster Abbey was profoundly influenced by direct study of French work. Normandy, Burgundy, and the land as far north as Tournay seem to have shared in the work of transition; but the Gothic area proper is the Île-de-France with Picardy and Champagne, then Burgundy, Normandy and England.

Four remarkable buildings best represent the early phase of the Gothic style, the abbey church of St Denis, and the cathedrals of Noyon, Senlis and Sens. The first was begun in 1137, and the choir was consecrated in 1143. The few parts of this work which remain are sufficient to show how stately and yet fresh the whole work must have been. Noyon cathedral, begun after a fire which occurred in 1131, had its choir consecrated in 1157. The cathedral of Senlis was begun in 1155. Sens cathedral, begun about the same time, or even earlier, is the first of the great cathedrals. Many other buildings belong to the first years of the style; such are the abbey churches of St Remi at Reims, Notre Dame at Châlons and St Germain-des-Prés, Paris. The choir of this last was consecrated in 1163, and in the same year Notre Dame, Paris, was begun. This mighty building, although very complete, was altered as to its effect by the substitution, early in the 13th century, of large two-light windows for the earlier lancets of the clerestory. The sculptures of the west front are exquisite. Laon cathedral, another of the great churches, is of about the same age as Notre Dame. It also has beautiful sculpture in its western porches, but its most marked characteristic is the group of six great and romantic towers which flank the fronts to the west, the north and the south. In the 13th century, the church was extended to the east and the original *chevet* was destroyed. From the evidence furnished by fine double-staged chapels to the transepts, it is most probable that three similar chapels were set about the ambulatory of the apse, the upper chapels opening from the fine vaulted triforium. Such an arrangement existed at the noble church of Valenciennes, now destroyed, but well recorded. At the end of the 12th century Chartres cathedral was begun, perhaps its most notable constructive feature being the high development that the flying buttresses have here attained. It was followed in the early years of the 13th century by Rouen cathedral, which derived much from its prototype. St Omer, a fine early church, in turn, followed Rouen.

The second stage of Gothic, introducing the traceried window, was opened by the building of the cathedral of Reims, begun in 1211. This is in every way one of the most perfect of cathedrals, as well for its sculpture and glass as for its

structure. Reims was followed by the still greater cathedral at Amiens (fig. 40), which was begun in 1220 at the west front, so that the superb sculpture (Plate II., fig. 64) of the porches is earlier than that of Reims. Beauvais cathedral was begun in 1247 on a still vaster scale, and with an ambition that o'erleaped itself. Auxerre cathedral, and the very beautiful collegiate churches of St Quentin and Semur, also followed Reims. Two other cathedrals of the first rank which must be mentioned are those of Bourges and Le Mans, each of these having double aisles about the apse, with a large clerestory to the inner one of the two, above which rises the great clerestory. This scheme is one of the great feats of Gothic construction. Le Mans again furnished the most highly developed form of *chevet* planning (fig. 41). On this point Mr Street may again be cited. "It was in the planning of the apse, with its surrounding aisles and chapels, that all their ingenuity and science were displayed. A simple apse is easy enough of construction, but directly it is surrounded by an aisle or aisles, with chapels again beyond them, the difficulties are great. The bays of the circular aisle, instead of being square, are very much wider on one side than the other, and it is most difficult to fit the vaulting to the unequal space. In order to get over this, various plans were tried. At Notre Dame, Paris, the vaulting bays were all triangular on plan, so that the points of support might be twice as many on the outside line of the circle as on the inside. But this was rather an unsightly contrivance, and was not often repeated, though at Bourges there is something of the same sort. At Le Mans the aisle vaulting bays are alternately triangular and square; and this is, perhaps, the best arrangement of all, as the latter are true and square, and none of the lines of the vault are twisted or distorted in the slightest degree. The arrangement of the chapels round the apse was equally varied. Usually they are too crowded in effect; and, perhaps, the most beautiful plan is that of Rouen cathedral, where there are only three chapels with unoccupied bays between, affording much greater relief and variety of lighting than the commoner plan which provided a chapel to every bay. The planning and design of the *chevet* is the great glory of the French medieval school. When the same thing was

Fig. 40.—Plan of Cathedral at Amiens.

attempted, as at Westminster, or by the Germans at Cologne, it was evidently a copy, and usually an inferior copy, of French work. No English works led up to Westminster Abbey, and no German works to the cathedral at Cologne."
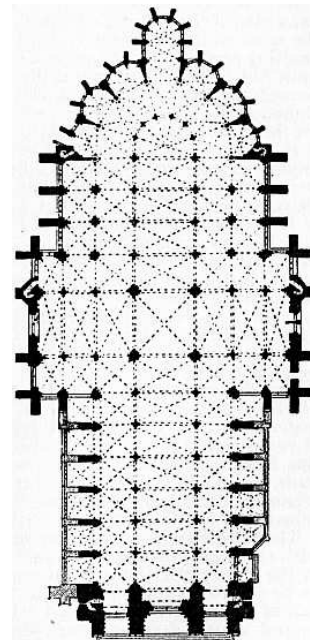
The variety in the planning of the *chevets* must be remarked. There might be only one chapel opening from the semicircular ambulatory, as at Langres, Sens, Auxerre, Bayeux and Lausanne. Canterbury cathedral, designed by William of Sens, is perhaps the most perfect example. There were three separated chapels, as at Rouen, St Omer, Semur, &c., or there might be five filling the whole space, which became the general later scheme. Chartres furnishes an intermediate plan, in having the alternate chapels much shallower than the others. The chapels might be circular or polygonal or alternately square and round. Of the last the cathedral of Toledo is a wonderful example. The plan with parallel apses also continued in use, as at the beautiful abbey church at Dijon and St Urbain at Troyes. Apsidal transepts were built at Noyon, Soissons and Valenciennes.

Another stage of development was reached with the building of the Sainte Chapelle in Paris, begun in 1244. With this work the Gothic system reached complete maturity. Here for the first time large traceried windows seem to have been perfected, and, moreover, the structure was so organized into a series of wide window spaces, only divided by strong far-projecting buttress piers, that the stained glass ideal found full expression and the building became a lantern for its display.
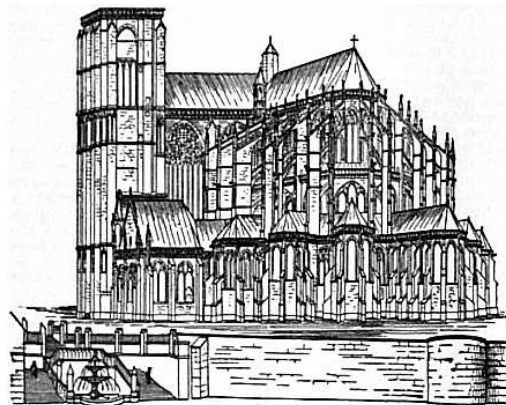

Fig. 41.—Cathedral of Le Mans. East end and Chevet.

During the next half-century the influence of the Sainte Chapelle is to be traced everywhere, and its system of construction was developed to the furthest possible point in St Urbain at Troyes, begun in 1260. Exploration of the Gothic theory of structure could be carried no further. From this point the style turned in on itself, becoming more unreasonably intricate, artificial and mannerized. One of the finest examples of the style of the early 14th century is the eastern limb of St Ouen, Rouen; Troyes cathedral is also an important example of later work. As Mr Street says: "Later French architecture ran a very similar course to that in England. The 13th century was that in which it was seen at its best. In the 14th the same sort of change took place as elsewhere; and art was beautiful, but it was too much an evidence of skilfulness and adroitness. It was harder and colder also than English work of the same age; and when it fell, it did so before the inroads of a taste for what has been called Flamboyant architecture,—a gay and meretricious style which trusted to ornament for all its effect, and, in spite of many beauties, had none of the sturdy magnificence of much of our English Perpendicular style."

M. Enlart has recently accepted the view that the germs of flamboyancy in the later French Gothic are to be found in the flowing curvilinear forms of early 14th-century work in England.

Up to the middle of the 16th century, magnificent works in the national style were still being executed. St Vulfran at Abbeville, St Maclou in Rouen, and the façade of the cathedral of Rouen, may be mentioned; some of the last works were the immense transepts of Beauvais cathedral and the façade of Tours.

We have necessarily spoken most of churches, but the palaces, castles and civic buildings form another great class hardly less interesting. The castles of Coucy and Château Gaillard may rival any cathedral. Among civic buildings may be mentioned the palais de justice at Rouen and the hôtel de ville at Compiègne, both late but beautiful and impressive types. The royal palace of Paris is now represented by the Sainte Chapelle, but accounts of its splendid hall and general arrangements have been preserved. At Poitiers is still extant the hall of the palace of the counts of Poitou; at Laon the episcopal palace is almost entire; there are considerable remains of the bishops' palaces of Beauvais, Evreux, Rouen, Reims: and the pope's palace at Avignon must also be mentioned in this connexion. The most perfect existing great houses of the middle ages are those of Jacques Coeur at Bourges and of the abbot of Cluny in Paris. A large number of fine houses

on a small scale, dating from the 12th and 13th centuries, are still preserved at Beauvais, Auxerre, Chartres, Cordes, &c. The house of the musicians at Reims, *c.* 1280, is adorned by a series of seated life-sized figures playing instruments, in sculpture of a very high order. A good and concise account of the smaller houses in France is given in Hudson Turner's *Some Account of Domestic Architecture*, and in C. Enlart's *Manuel d'archéologie*, the best and most recent survey of the whole field of medieval antiquities in France.

<div align="right">(W. R. L.)</div>

Romanesque and Gothic Architecture in Spain

What strikes the architectural student most forcibly in Spain is the concurrent existence of two schools of art during the best part of the middle ages. The Moors invaded Spain in 711, and were not finally expelled from Granada until 1492. During the whole of this period they were engaged, with more or less success, in contests for superiority with the Christian natives. In those portions of the country which they held longest, and with the firmest hand, they enforced their own customs and taste in art almost to the exclusion of all other work. Where their rule was not permanent their artistic influence was still felt, and even beyond what were ever the boundaries of their dominion, there are still to be seen in Gothic buildings some traces of acquaintance with Arabic art not seen elsewhere in Europe, with the exception, perhaps, of the southern part of the Italian peninsula, and there differing much in its development. The mosque of Cordova in the 9th century, the Alcazar and Giralda at Seville in the 13th, the Court of Lions in the Alhambra in the 14th, several houses in Toledo in the 15th century, are examples of what the Moors were building during the period of the middle ages in which the best Gothic buildings were being erected. Some portions of Spain were never conquered by the Moors. These were the greater part of Aragon, Navarre, Asturias, Biscay and the northern portion of Galicia. Toledo was retaken by the Christians in 1085, Tarragona in 1089, Saragossa in 1118, Lerida in 1149, Valencia in 1238 and Seville in 1248. In the districts occupied by the Moors Gothic architecture had no natural growth, whilst even in those which were not held by them the arts of war were of necessity so much more thought of than those of peace, that the services of foreign architects were made use of to an extent unequalled in any other part of Europe.

Of early Christian buildings erected from the 9th to the 11th century remains of some twenty to thirty are known, and there are probably others which will be found when the communications in the country become more extended. The most interesting of these is Santa Maria de Naranco near Oviedo, originally built in 848 as part of a palace. It consisted of a rectangular hall, 42 ft. long and 16 ft. wide, with entrance doorways in the centre of each side, and at each end an arcade of three arches, carried on piers and coupled columns, which led to an open loggia from which the hall was lighted. Fifty to sixty years later it was converted into a church by blocking up the end of the east loggia. The church is remarkable for its barrel vault, built in fine masonry, and for the knowledge that is displayed in meeting its thrust. Internally, in order to lessen the span, the upper part of the walls is brought forward and carried on a series of arches on each side, which are supported on piers consisting of four coupled columns, virtually constituting an interior abutment. Externally, the thrust is met by buttresses, features not found in France until about a century and a half later. All the columns are spiral-fluted, and a twisted-cord torus-moulding decorates the capitals and other features in the church. The transverse ribs of the hall, which are of slight projection, are carried on broad bands with disks in the spandrils of the arches, the disks having badges in the centre, and being bordered, as well as the bands, with twisted cords. Underneath the church is a spacious vaulted crypt, which was built as a cellar or basement storey, to raise and give more importance to the palace. The twisted cord seems to have been a favourite device in all the early churches, and is extensively employed in the decoration of San Miguel de Lino, a small church about a quarter of a mile from Santa Maria de Naranco and coeval with that church. Externally the church of San Miguel has all the character of a Byzantine church; the windows in the front are pierced with Moorish tracery, probably brought there by those Christians who were flying to the sanctuaries of Asturias from the incursions of the Moors. In another church, about 15 m. south of Oviedo, Santa Christina de Leon, all the attached staffs are decorated with spiral fluting. The choir is raised, and approached by steps on either side through a screen of three arches, of the type known as Transennae in the earlier Christian of Rome. Here, as in Santa Maria de Naranco, the church is covered with a barrel vault with similar constructive and decorative features. Externally the buttresses are in great profusion, there being two to each bay. The screen, the pierced marble slabs between the columns carrying it, and the decoration of the capitals, all show Byzantine influence. Other early churches are those of San Pablo del Campo (930) and San Pedro de las Puellas, both in Barcelona, the fine church at the village of Priesca near Villaviciosa (915), the monastery of Valdedios (893) and that of San Salvador (1218), in which, notwithstanding its late date, there is a distinct Moorish influence. This influence is also to be noticed in the north of Spain, although it was never occupied by the Moors. Thus in the earliest church known, at Banos de Cerrato near Palencia (founded in 662, but restored in 711), there is a horse-shoe barrel vault over the square apse. Again in San Miguel de Escalada (913) near Leon, there are horse-shoe arches in the nave, and the three apses are horse-shoe on plan. San Pedro at Zamora is a vaulted church with horse-shoe arches in the nave, but otherwise Byzantine in style. In the church of Corpus Christi at Segovia the nave is Moorish in style, and the octagonal columns of the nave have capitals with fir cones, as in the well-known Santa Maria la Blanca at Toledo, originally a synagogue. The most remarkable church of all, so far as Moorish style is concerned, is the church of the monastery of Santiago de Peñalva, near Villafranca del Vierzo, built between 931 and 951, and therefore coeval with Cordova. The church is 40 ft. long by 20 ft. wide, covered by a barrel vault with transverse horse-shoe arch in the centre carrying the same. At each end is an apse with horse-shoe arches carried on marble shafts with Byzantine capitals. Though of later date, there is another interesting Romanesque example in the Templars' church of La Vera Cruz at Segovia (1204), which is twelve-sided with three apses, and in the centre has a chapel built in imitation of the Holy Sepulchre at Jerusalem.

The buildings which come next in point of date are all evidently derived from or erected by the architects of those which were at the time being built in the south of France. These churches are uniform in plan, with central lanterns and three eastern apses. The nave has usually a waggon or barrel vault, supported by quadrant vaults in the aisles, and the steeples are frequently polygonal in plan. If these churches are compared with examples like that of the cathedral at Carcassonne on the other side of the Pyrenees, their identity in style will at once be seen. A still more remarkable evidence of similarity has been pointed out between the church of St Sernin, Toulouse, and the cathedral of Santiago. The plan, proportions and general design of the two churches are identical. Here we see a noble ground-plan, consisting of nave with aisles, transepts, central lantern and chevet, consisting of an apsidal choir, with a surrounding aisle and chapels opening into it at intervals. This example is the more remarkable, inasmuch as the early Spanish architects very rarely built a regular *chevel*, and almost always preferred the simpler plan of apsidal chapels on either side of the choir. And its magnificent scale and perfect preservation to the present day combine to make it one of the most interesting architectural relics in the country.

Among the more remarkable buildings of the 12th and the beginning in the 13th century are San Isidore, Leon; San Vicente, Avila; several churches in Segovia; and the old cathedral at Lerida. They are much more uniform in character than are the churches of the same period in the various provinces of France, and the developments in style, where they are seen at all, seldom have much appearance of being natural local developments. This, indeed, is the most marked feature of Spanish architecture in all periods of its history. In such a country it might have been expected that many interesting local developments would have been seen; but of these there are but one or two that deserve notice. One of them is illustrated admirably in the church of San Millan, Segovia, where beyond the aisles of the nave are open cloisters or aisles arcaded on the outside, and opening by doors into the aisles of the nave. A similar external south portico exists in San Miguel de Escalada, already referred to, Santo Domingo, Burgos, and San Estéban at Segovia. It would be difficult to devise a more charming arrangement for buildings in a hot country, whilst at the same time the architectural effect is in the highest degree beautiful. The universality of the central tower and lantern has been already mentioned. This was often polygonal, and its use led to the erection of some lanterns or domes of almost unique beauty and interest. The old cathedral at Salamanca, the church at Toro and the cathedral of Zamora, all deserve most careful study on this score. Their lanterns are

almost too lofty in proportion to be properly called domes, and yet their treatment inside and outside suggests a very beautiful form of raised dome. They are carried on pointed arches, and are circular in plan internally and octagonal on the exterior, the angles of the octagon being filled with large turrets, which add much to the beauty of the design, and greatly also to its strength. Between the supporting arches and the vault there are, at Salamanca, two tiers of arcades continued all round the lantern, the lower one pierced with four, and the upper with twelve lights, and the vault or dome is decorated with ribs radiating from the centre. On the exterior the effect is rather that of a low steeple covered with a stone roof with spherical sides than of a dome, but the design is so novel and so suggestive, that it is well worth detailed description. Nothing can be more happy than the way in which the light is admitted, whilst it is also to be noted that the whole work is of stone, and that there is nothing in the design but what is essentially permanent and monumental in construction. The only other Spanish development is the introduction, to a very moderate extent, of features derived from the practice of the Moorish architects. This is, however, much less seen than might have been expected, and is usually confined to some small feature of detail, such, *e.g.* as the carving of a boss, or the filling in of small tracery in circular windows, where it would in no way clash with the generally Christian character of the art.

The debateable period of transition which is usually so interesting is very sterile in Spain. A good model once adopted from the French was adhered to with but little modification, and it was not till the 13th-century style was well established in France and England that any introduction of its features is seen here; and then, again, it is the work of foreign architects imported for the work and occasion, bringing with them a fully developed style to which nothing whatever in Spain itself led up by a natural or evident development. The three great Spanish churches of this period are the cathedrals of Toledo, Leon and Burgos (Plate II., fig. 65). Those of Sigüenza, Lerida and Tarragona, fine as they are, illustrate the art of the 12th rather than of the 13th century, but these three great churches are perfect Early Pointed works, and most complete in all their parts. The cathedral of Toledo is one of the most nobly designed churches in Europe. In dimensions it is surpassed only by the cathedrals of Milan and Seville, whilst in beauty of plan it leaves both those great churches far behind. The *chevet*, in which two broad aisles are carried round the apse with chapels alternately square and apsidal opening out of them, is perhaps the most perfect of all the schemes we know. It is as if the French *chevets*, all of which were more or less tentative in their plan, had culminated in this grand work to which they had led the way. The architectural detail of this great church is generally on a par with the beauty and grandeur of its plan, but is perhaps surpassed by the somewhat later church at Leon. Here we have a church built by architects whose sole idea was the erection of a building with as few and small points of support as possible, and with the largest possible amount of window opening. It was the work of men whose art had been formed in a country where as much sun and light as possible were necessary, and is quite unsuited for such a country as Spain. Nevertheless it is a building of rare beauty and delicacy of design. Burgos, better known than either of the others, is inferior in scale and interest, and its character has been much altered by added works more or less Rococo in character, so that it is only by analysis and investigation that the 13th-century church is still seen under and behind the more modern excrescences.

The next period is again marked by work which seems to be that of foreigners. The fully developed Middle Pointed or Geometrical Gothic is indeed very uniform all over Europe. Here, however, its efforts were neither grand in scale nor interesting. Some of the church furniture, as, *e.g.* the choir screens at Toledo, and some of the cloisters, are among the best features. The work is all correct, tame and academical, and has none of the dignity, power and interest which marked the earlier Spanish buildings. Towards the end of the 14th century the work of Spanish architects becomes infinitely more interesting. The country was free from trouble with the Moors; it was rich and prosperous, and certainly its buildings at this period were so numerous, so grand and so original, that they cannot be too much praised. Moreover, they were carefully designed to suit the requirements of the climate, and also with a sole view to the accommodation conveniently of enormous congregations, all within sight of the preacher or the altar. This last development seems to have been very much the work of a great architect of Majorca, Jayme Fabre by name. The grandest works of his school are still to be seen in Catalonia. Their churches are so vast in their dimensions that the largest French and English buildings seem to be small by comparison, and being invariably covered with stone vaults, they cannot be compared to the great wooden-roofed churches of the preaching orders in Italy and elsewhere, in which the only approach is made to their magnificent dimensions. The cathedral of Gerona is the most remarkable example. Here the choir is planned like the French *chevet* with an aisle and chapels round it, and opens with three lofty arches into the east wall of a nave which measures no less than 73 ft. in the clear, and is covered with a stone vaulted ceiling. In Barcelona there are several churches of very similar description; at Manresa another, but with aisles to its nave; and at Palma in Majorca one of the same plan as the last, but of even much larger dimensions. Perhaps there is no effort of any local school of architects more worthy of study and respect than this Catalonian work of the 14th and 15th centuries. Such a happy combination of noble design and proportions with entirely practical objects places its author among the very greatest architects of any time. It is one thing to develop patiently step by step from the work of one's fathers in art, quite another to strike out an entirely new form by a new combination of the old elements. In comparison with the works just mentioned the other great Spanish churches of the 15th century are uninteresting. But still their scale is grand and though their detail is over-elaborated and not beautiful, it is impossible to deny the superb effect of the interior of such churches as those of Seville, Segovia and Salamanca (new cathedral). They are very similar in their character, their columns are formed by the prolongation of the reedy mouldings of the arches, their window traceries are poorly designed, and their roofs are covered with a complex multitude of lierne ribs. Yet the scale is fine, the admission of light, generally high up and in sparing quantity, is artistic, and much of the furniture is either picturesque or interesting. The *tout ensemble* is generally very striking, even where the architectural purist is apt to grumble at the shortcomings of most of the detail.

Plate V.

Fɪɢ. 72.—DOOR OF SAN MICHELE, PAVIA.
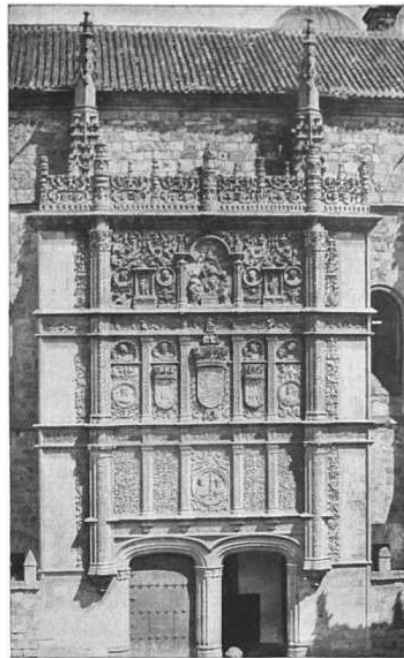
Fɪɢ. 73.—UNIVERSITY, SALAMANCA.

Fɪɢ. 74.—TOWN HALL, SEVILLE.

Pʟᴀᴛᴇ VI.

Fɪɢ. 75.—BANQUETING HOUSE, WHITEHALL.
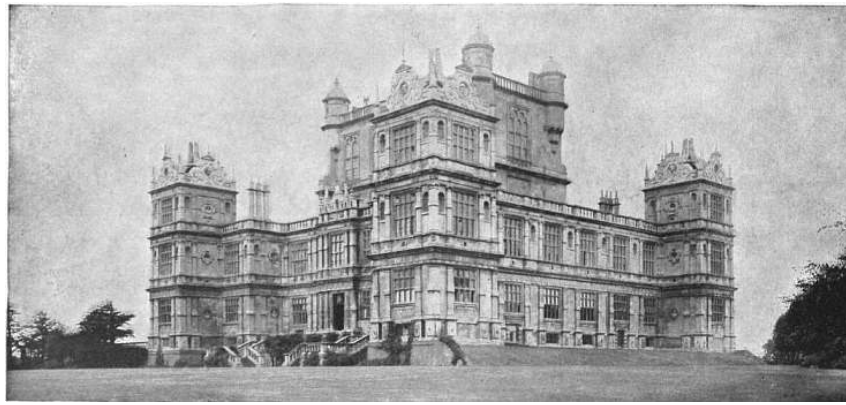
Fig. 76.—WOLLATON HALL.
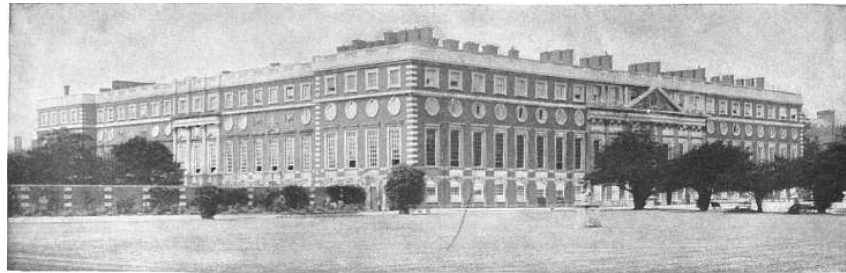
Fig. 77.—HAMPTON COURT.

The remarks which have been made so far have been confined to the fabrics of the churches of Spain. It would be easy to add largely to them by reference to the furniture which still so often adorns them, unaltered even if uncared for; to the monuments of the mighty dead; to the sculpture which frequently adorns the doorways and screens; and to the cloisters, chapter-houses and other dependent buildings, which add so much charm in every way to them. Besides this, there are very numerous castles, often planned on the grandest scale, and some, if not very many, interesting remains of domestic houses and palaces; and most of these, being to some extent flavoured by the neighbourhood of Moorish architects, have more character of their own than has been accorded to the churches. Finally, there are considerable tracts of country in which brick was the only material used; and it is curious that this is almost always more or less Moorish in the character of its detail. The Moors were great brickmakers. Their elaborate reticulated enrichments were easily executed in it, and the example set by them was, of course, more likely to be followed by Spaniards than that of the nearest French brick building district in the region of Toulouse. The brick towers are often very picturesque; several are to be seen at Toledo, others at Saragossa, and, perhaps the most graceful of all, in the old city of Tarazona in Aragon, where the proportions are extremely lofty, the face of the walls everywhere adorned with sunk panels, arcading, or ornamental brickwork, and at the base there is a bold battered slope which gives a great air of strength and stability to the whole. On the whole, it must be concluded that the medieval architecture of Spain from the 12th century is of less interest than that of most other countries, because its development was hardly ever a national one. The architects were imported at one time from France, at another from the Low Countries, and they brought with them all their own local fashions, and carried them into execution in the strictest manner; and it was not till the end of the 14th century, and even then only in Catalonia, that any buildings which could be called really Spanish in their character were erected.

<div style="text-align: right">(R. P. S.)</div>

ROMANESQUE AND GOTHIC ARCHITECTURE IN ENGLAND

Pre-Conquest.—The history of English architecture before the Norman Conquest is still only imperfectly known. Its parentage is triple: Roman, Celtic and Teutonic. To the first belongs the general building tradition of the Romanized West, and the influence of the mission of Augustine at the end of the 6th century, and of such men as Wilfrid in the 7th. The Celtic element is due to the Scottish (Irish) church, which never gained much hold on the south of England, while the Teutonic influence shows itself in the later developments, which are allied to the early buildings of kindred peoples in Germany. Fragments of existing early churches have been attributed to the time of the Roman occupation, but all are doubtful, with the exception of the remains of what is believed to have been a Christian church excavated at Silchester in 1892. This was a basilica of ordinary form, comprising an apse with western orientation, nave and aisles, transepts of slight projection, and narthex. Augustine's cathedral church of Canterbury, which he had learned was originally constructed by the labours of Roman believers (Bede), was also a basilica with western apse; its eastern apse and *confessio* beneath were probably a later addition. Remains of early churches are found on several sites where churches are recorded to have been built during the missionary period. Of these, Reculver (*c.* 670) and Brixworth (*c.* 680) have aisled naves and eastern apses. At Brixworth a square bay intervenes between the apse and the nave. St Pancras, Canterbury, of the time of Augustine, Rochester (604), and Lyminge (founded 633), show unaisled naves of relatively wide proportion, with eastern apses of stilted curve. In some of these churches there was a triple arcade in front of the sanctuary, in place of the usual "triumphal arch." The technique shows Roman influence, and Roman materials are largely used. The existing crypts of Hexham and Ripon were built by Wilfrid, *c.* 675. The description of Wilfrid's church at Hexham gives the impression of an elaborate structure (*columnis variis et porticibus multis suffultam*). Wilfrid also built at Hexham a church of central plan, with projections (*porticus*) on the four sides, a type of which no example has survived in England. Escomb (Durham) and parts of Monkwearmouth and Jarrow, which are attributed to the same period, have plans of an entirely different type—a relatively long and narrow nave, with small square-ended chancel—a plan, usually attributed to Celtic influence, which is most extensively represented in churches recognized as Saxon.

The evolution of the characteristic features of pre-Conquest architecture was slow, and was doubtless greatly hindered by the invasions of the Northmen from the end of the 8th century onward, but germs of the fully developed style are to be found in the earliest buildings. The western tower, usually of tall and slender proportion, was developed from the western porch found at St Pancras, Canterbury, and Monkwearmouth; sometimes, as in the latter church, actually raised over the older porch. The lateral chapels of St Pancras, which existed also in the Saxon cathedral of Canterbury, were developed into a transept, culminating in the cruciform plan with central tower. The characteristic "long-and-short" work, which consists of tall upright stones alternating with stones bedded flat bonding into the rubble work of the wall, has its prototype in the western arch of the porch of Monkwearmouth, and in the jambs of the chancel arch at Escomb. Sometimes the flat stones

are cut back on the face, so that the plaster which covered the rubble extended up to the line of the upright stones, thus giving the quoin the appearance of a narrow pilaster. The repetition of these pilasters on the face of the walling constitutes rib-work, and these ribs are frequently connected by semicircular or so-called "triangular" arches, forming a land of rude arcading (Earls Barton, Barton-on-Humber.) Windows in the earliest Saxon work are generally wide in proportion, and splayed on the inside only; in the later work they commonly have splays both on the inside and outside. Doorways have square jambs, without splay or rebate; sometimes the jambs of doorways and windows are inclined, as in early buildings in Ireland. Imposts to doorways, tower arches or chancel arches are often square projecting blocks, sometimes chamfered on the lower edge. The mid-wall shaft is a characteristic feature in the belfry openings of Saxon towers; it supports an impost or through-stone, of the full thickness of the wall, which receives the semicircular arches over the openings. The method is analogous to that commonly found in northern Italy and the Rhineland. Sometimes the mid-wall shaft is a baluster, turned in a lathe. In some of the later belfry openings, a capital intervenes between the mid-wall shaft and the impost. The dating of buildings of this style is at present a matter of considerable difficulty, but certain points, such as the development of the cruciform plan, are useful for comparison. A fully developed cross church was built at Romsey in 969, having also a single axial western tower, and this seems to have been the normal type of a large church in the later years of the style. Cruciform plans, not yet fully developed, are found at Deerhurst, Breamore and St Mary in the castle at Dover, and fully developed at Norton (Durham) and Stow (Lincolnshire). The most advanced detail which occurs in pre-Conquest buildings is the recessing of arches in orders. But for the Conquest, English architecture might have developed somewhat on the lines of contemporary work in Germany. It must be remembered, however, that, although the Norman Conquest marks the beginning of a new epoch in English architecture, the Norman manner had already been introduced into England under Edward the Confessor, as is proved by the considerable remains of that king's work at Westminster Abbey.

The succeeding periods of English architecture have been divided into so-called "styles" or "periods," though it should be recognized that all such hard and fast divisions are purely artificial, and that, apart from the objection that they exaggerate the importance of mere details, they tend to obscure the fact that the history of Gothic architecture is a history of continuous development. The following classifications, those of Thomas Rickman and Edmund Sharpe, are in most general use for the present by such students as are not content with a nomenclature based on simple chronology:—

Rickman.	Sharpe.
	1066-1145 Norman.
1066-1189 Norman.	1145-1190 Transitional.
1189-1307 Early English.	1190-1245 Lancet.
	1245-1315 Geometrical.
1307-1377 Decorated.	1315-1360 Curvilinear.
1377-1546 Perpendicular.	1360-1550 Rectilinear.

Norman Conquest to c. 1150.—At the time of the Conquest of England, the Norman school was already one of the most advanced Romanesque schools of western Europe. Its marked individuality and logical character are clearly expressed in the abbey churches of Jumièges and St Étienne and Sainte-Trinité at Caen, and it quickly supplanted the less advanced Romanesque manner of the conquered English. As soon as the conqueror had made himself master in his new kingdom, cathedral and abbey churches were rebuilt on a scale hitherto unknown either in Normandy or England. As the effect of the Norman Conquest was to incorporate the church in England more closely with western Christendom, so its effect on architecture was to bring it into line with the best continental achievement of its time. The immense energy of the Norman bishops and abbots gave such a stimulus to architecture that by the close of the 11th century, England, rather than Normandy, had become the real *foyer* of the Norman school.

The plans of the larger churches show greater development in the length of choir, transept and nave than was usual in Normandy. Many follow the type of choir plan generally represented in the contemporary churches of Normandy which have survived—a central apse, flanked by an apse terminating each aisle, but the two bays usual in the Norman churches frequently became four in England. The Confessor's church of Westminster seems to have had an ambulatory with radiating chapels, a plan which, although rare in the surviving churches of Normandy, was adopted in several of the more important English churches (St Augustine's, Canterbury; Winchester; Worcester; Gloucester; Bury St Edmunds; Norwich; Tewkesbury). Some of these have great vaulted crypts extending under the choir and its aisles. The transept, generally of considerable length, has one or more apsidal chapels on the east side of each arm, or an eastern aisle, or even (as at Winchester and Ely) both eastern and western aisles. The lantern-tower over the crossing was a characteristic feature in England, as in Normandy. Frequently the nave was of great length, extending to twelve bays at Winchester, thirteen at Ely, and fourteen at Norwich. Some churches, as Ely, Bury St Edmunds, and later Peterborough (Plate VIII., fig. 81), show a western transept, with corresponding development of the west front. Two western towers are most usual, but Ely (Plate II., fig. 67), and originally Winchester, had the single western tower, a survival from pre-Conquest times, which is found also in numberless parish churches. In their general design, the Norman churches show great skill in composition, and in the logical expression of structure, and sure grasp of the problems to be solved. The subordination of arches (arches built in rings, or orders, recessed one within the other) was carried further than in other Romanesque schools, and with this went the subordination of the pier, planned with a shaft to receive each order of the semicircular arch. Sometimes the shafted piers of the great arcades alternate with cylindrical (or later with octagonal) pillars; sometimes, as at Gloucester and Tewkesbury, all the pillars are cylindrical. The triforium usually has a single wide semicircular arched opening, enclosing two or more minor semicircular arches springing from detached shafts. Usually the aisle wall is carried up to form a complete triforium storey, unvaulted, and lighted by windows in the outer wall. The clerestory has a single window in each bay, with a wall passage between the window and an internal arcade, usually of three semicircular arches on shafts, the central arch being wider than the side arches. Most frequently naves and transepts were unvaulted, and finished with wood ceilings, while the aisles were covered with groined vaults of rubble, on transverse arches. The general design of the greater churches indicates, however, that the Norman builders were aiming at a completely vaulted structure. The half-barrel vault over the triforium of Gloucester, and the transverse arches over the triforium of Chichester, seem to be constructed to afford the necessary abutment to vaults over the choir, such indeed as still exist over some choirs in Normandy built before the end of the 11th century. The problem was only successfully solved by the introduction of the diagonal rib, which completed the structural membering of the vault. Durham, begun in 1093 (fig. 42), is the earliest example in England of this important innovation, and it precedes by some quarter of a century the earliest ribbed vaults of the Île-de-France. The abutting arches under the roof of its triforium are actually rudimentary flying-buttresses, and we have here all the essential elements of Gothic architecture, except the pointed arch, which is only systematically used in English vaulted construction from about the middle of the 12th century. The decorative forms of the earlier buildings of the Norman school are severely simple. Arches, which at first were usually unmoulded, soon received effective mouldings of rolls and hollows, continuing a tradition of the latest pre-Conquest architecture. Two types of capitals are found in the earlier buildings after the Conquest; the volute capital, descended from the Corinthian, which was the normal type in Normandy; and the cubic or cushion capital, formed by the penetration of a segment of a sphere, or segments of cones, with a cube, a type which, appearing earlier in England than in Normandy, was doubtless derived from pre-Conquest models, and in the 12th century developed into the scalloped capital. The decoration of wall-surfaces by arcades, frequently of intersecting semicircular arches, is characteristic of the Norman school. Windows are splayed in the interior, and in the more important buildings are enriched with shafts and moulded arches. Ornamentation is frequently concentrated on the doorways, which are often of many orders, with a shaft under each order. Based chiefly on geometric forms, such as the chevron or zigzag, star, fret and cable, the decoration becomes richer and more refined as the 12th century advances, though in sculpture the Norman was less advanced than some other Romanesque schools.
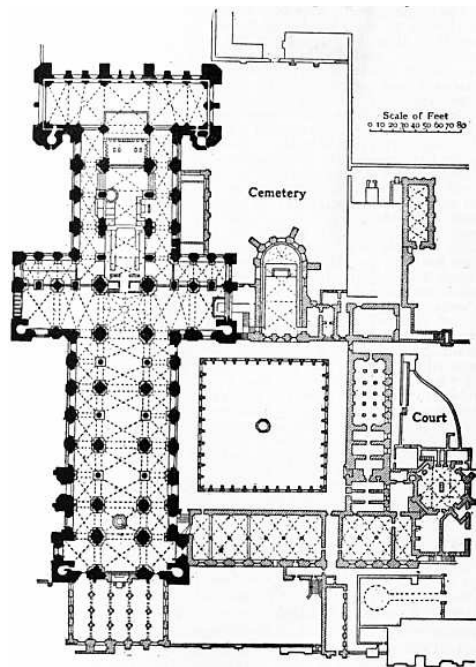
Fɪɢ. 42.—Plan of Durham Cathedral.

The foregoing generalization applies more particularly to the greater churches, but numberless parish churches present similar characteristics. Chancels are sometimes apsidal, but by far the most prevalent type of plan is the aisleless oblong nave and square-ended chancel, with or without a western tower. Other types of aisleless plans are the cruciform church with central tower, or simply nave and chancel with central tower. Even where subsequent alterations and rebuildings have destroyed almost everything, the influence of these plans on the later work is the key to a right understanding of the history of the greater number of English medieval churches.

12th Century (*second half*).—The second half of the 12th century is the period of transition *par excellence*—of transition from Romanesque to Gothic. The school of the Île-de-France, which up to *c.* 1120 was one of the most backward of the Romanesque schools, had made enormous progress when the ambulatory of Suger's church of Saint-Denis was built (1140-1144), and thenceforth it continued to lead the way. There is no doubt that, from the middle of the 12th century, English architecture was continuously influenced by the Île-de-France, for the most part through Normandy, but it must be considered to be a development on parallel lines, with strongly marked characteristics of its own, and not merely as an importation of forms already developed elsewhere. At the same time, the influence of the Cistercian revival was considerable, not so much in the introduction of foreign forms as in the direction of simplicity and severity, which acted as a valuable check to the prevalent tendency to exaggerate the importance of surface decoration.

The substitution of the square east-end for the apse in the plans of the greater churches, already effected at Romsey, was furthered by the simple plans of the Cistercian churches. The altar spaces provided by the radiating chapels of the French chevet were in England obtained by returning the aisles across the square east-end of the choir, or by an eastern transept. The latter occurs first here in "the glorious choir of Conrad" of the beginning of the 12th century at Canterbury which affords also the first example of the eastward extension of the choir which became so characteristic a feature of English planning. The reconstruction of Conrad's choir after the fire of 1174 led to a further extension eastward with the eastern chapel which was adopted in many of the greater churches, either in the form of a lower building, sometimes of three spans eastward of the east gable or of an extension of the choir itself to its full height. The work of William of Sens at Canterbury (1175-1178) was naturally more French in character than other contemporary works in England, but the work of his successor, William the Englishman (1179-1184) shows the beginnings of what became the characteristically English manner of the 13th century.

The second half of the 12th century was a period of rapid development of architectural forms in the direction of increased elegance and refinement. The pointed arch employed at first for the arches of construction entirely superseded the semicircular arch in doorways, windows and arcades by the end of the century and its adoption finally solved the problem of vaulted construction. The abutting arches under the triforium roofs of the earlier churches were developed into flying buttresses above the roofs springing from buttresses of increased projection and weighted by pinnacles. Mouldings became more graceful and subtle in their profiles. Capitals reverted to the volute type, transformed and refined. The massive Romanesque pier was gradually developed into the lighter Gothic pier in which detached shafts were extensively adopted. The use of Purbeck marble for these shafts must be considered in relation to the painted decoration of the wall surfaces which although now almost entirely lost was an important factor in the internal effect.

13th Century (*first half*).—The last decade of the 12th century marks the achievement of a fully developed Gothic style, with strongly marked national individuality. During the 13th century, English Gothic follows the same general course of evolution as that of northern France, but the parallelism is less close than in the preceding century.

St Hugh's choir at Lincoln (begun 1192) had indeed an apse, with ambulatory and radiating chapels though its plan does not appear to have been controlled by the vaulting as in the French chevets and what there is of French influence seems to have come rather through Canterbury than by a more direct route. This choir has the eastern transept which characterizes several of the greater churches of the first half of the 13th century—Salisbury (fig. 43), Beverley, Worcester, Rochester, Southwell. The square eastern termination, the less ambitious height, and the comparatively simple buttress-system combine to give the English Gothic cathedral an air of greater repose than is found in the magnificent triumphs of French Gothic art. In its structural system, too, English Gothic retained something of the Romanesque treatment of wall surface, the suppression of the wall and the concentration of the masonry in the pier was never carried so far as in the complete Gothic of France. The general tendency during the 13th century, as in the 12th, was in the direction of increased lightness and elegance. The employment of detached shafts and the extensive use of marble (generally Purbeck) for these shafts is a distinguishing feature of the first half of the century. The vaulting system is fully developed, the most usual form is the simple quadripartite but the tendency to introduce additional ribs (tiercerons) and ridge ribs already makes its appearance in the nave of Lincoln and the presbytery of Ely (Plate VIII., fig. 82) to be yet further developed in the second half of the century. Capitals are either simply moulded an elaboration of the plain bell capitals of the latter part of the 12th century, or finely sculptured, with conventional or stiff leaved, foliage of the crocket type. The use of the circular abacus begun in the preceding century entirely supersedes the square abacus which was retained in France. Mouldings are profiled with great refinement, the alternation of rounds and hollows producing effective contrasts of light and shade, and the far more

complicated profiles of arch mouldings provide another feature which distinguishes English work of this period from French. Windows of single pointed lights the so called "lancet," though frequently by no means sharply pointed are the prevalent type, grouped in pairs triplets &c. and arranged in tiers in the large gables or sometimes with only a single group of tall lights, like the "five sisters" of the north transept of York. Few works are more admirably designed than some of the towers of this period. Probably the greatest excellence ever attained in English art of the 13th century was reached in the great Yorkshire abbeys, for purity of general design excellence of construction, and beauty of detail, they are unsurpassed by the work of any other period.

13th Century (*second half*).—The grouping together of "lancet" windows, the piercing of the wall above them with foiled circles, and the combination of the whole under an enclosing arch, soon led to the introduction of tracery, for which the design of earlier triforium arcades had also afforded a suggestion.
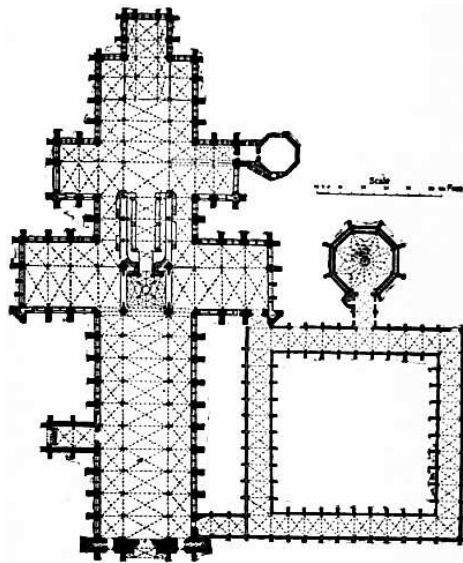

Fɪɢ. 43.—Plan of Salisbury Cathedral.

Bar-tracery appears just before the middle of the 13th century, and the great tracery window filling the whole width of a bay, or the entire gable end, soon becomes a most characteristic feature. The earlier tracery windows show only simple geometrical forms, foiled arches to the heads of the lights and foiled circles above, of which the abbey church and the chapter houses of Westminster and Salisbury afford most beautiful examples. In some particulars, such as its chevet plan and its comparatively great height, Westminster approaches more nearly to the French type than other English churches of the 13th century, but its details are characteristically English and of great beauty. In the last quarter of the century, pointed trefoils or quatrefoils are largely used in tracery, and the foliations frequently form the lines of the tracery, without enclosing circles. Contemporary with this change is the gradual absorption of the triforium into the clerestory, of which Southwell and Pershore are precocious examples. Contemporary also was the adoption of an excessively naturalistic type of foliage. The art of masonry and stone cutting was rapidly developed. The detached shaft, always structurally weak, was abandoned for the pier with engaged shafts separated by mouldings. The mouldings of arches become less deeply undercut, and the greater use of the fillet tends to give a more liney effect. The whole practice of art was growing more scholarly, perhaps but at the same time it was more conscious, and the cleverness of the mason was almost as often suggested as the noble character of his work.

14th Century (*first half*).—The juxtaposition of the foliations without enclosing circles in tracery windows produced curves of contraflexure, which led insensibly to the complete substitution of flowing lines for geometrical forms in tracery.

Flowing tracery makes its appearance in England about 1310, and lasts some fifty years. Up to the end of the 13th century, window tracery had developed in France and England on parallel lines though the English work was always slightly behind France in point of date. All this is changed with the adoption of flowing tracery in England its development was purely national, and owed nothing to France. Indeed, the French flamboyant only makes its appearance at the time when flowing tracery was being abandoned in England. Not only window traceries, but mouldings, carvings and other details are changed in character. The ogee form is used in arches in wall arcades of great beauty and elaboration, as in the Lady chapel at Ely, and in the canopies of tombs, such as the magnificent Percy tomb at Beverley. Niches and arcades are richly ornamented, and small decorative buttresses are used in the jambs of doorways, windows and niches. The moulded capital is still used, along with the capital with a continuous convex band of wavy foliage. Many of the most beautiful English towers and spires date from this period, the work of which is perhaps seen at its best in the parish churches of south Lincolnshire.

From Middle of 14th Century.—The over-elaboration of flowing tracery inevitably led to a reaction. The beauty of the lines of the tracery had controlled everything, and the resulting forms of the openings, which presented serious difficulties for the glass painter, had been a secondary consideration. Hence an endeavour to return to a simpler and more dignified, if more mechanical, style of building. The splendid exuberance of the earlier 14th century style gave way to the introduction of vigorous, straight, vertical and horizontal lines.

The beginnings of the new manner are to be seen in the south transept of Gloucester before 1337. After the great interruption of building works caused by the Black Death of 1349 and its recurrence in following years, the so-called "Perpendicular" style became general all over the country. The preference for straight in place of flowing lines became more and more developed. Doorways and arches were enclosed within well-defined square outlines; walls were decorated by panelling in rectangular divisions; vertical lines were emphasized by the addition of pinnacles, and buttresses were used as mere decorations, while horizontal lines were multiplied in string-courses, parapets and window transoms. Capitals were frequently omitted, and the mouldings of arches were continued down the piers. The use of the depressed "four-centred" arch became common. Vaulting, which had already been enriched by the multiplication of ribs, was further complicated by cross-ribs (liernes), subdividing the simple spaces naturally produced by the intersection of necessary ribs into panels; these, again, were filled with tracery. The fan-vault was developed by giving to all the ribs the same curvature; the outline of the fan is bounded by a horizontal circular rib, and its effect is that of a solid of revolution upon whose surface panels are sunk. The cloister of Gloucester presents the earliest and perhaps the most beautiful example. Finally, the builders displayed their mechanical skill by introducing pendants, as in Henry VII.'s chapel at Westminster. This latest period of English Gothic was a purely national development of which it has been too much the fashion to speak disparagingly; for it is futile to call such works as the nave of Winchester or the choir and Lady-chapel of Gloucester "debased." Perhaps the worst that can be said of this period is that there was too great a love of display, and too much mechanical repetition, but it is none the less true that it is to the 15th century that a very large number of English parish churches owe their fine effect. East Anglia and Somersetshire possess some of the choicest examples, and few things can be more beautiful than the

central towers of Gloucester and Canterbury, and the towers of the Somersetshire churches. The open timber roofs, as, for instance, those of the East Anglian churches, are superb, while many of the churches of this period are still full of interesting furniture and decoration. Finally, a word must be said of the wealth of interesting examples of domestic architecture, which yet count among the ornaments of the country.

After the middle of the 16th century the practice of Gothic architecture virtually died out, though traces of its influence, especially in rural districts, were hardly lost until the end of the 17th century. Good, sound, solid and simple forms, well constructed by men who respected themselves and their work, and did not build only for the passing hour, were still popular and general, so that the vernacular architecture to a late period was often good and never absolutely uninteresting.

Scotland.—A few words will suffice for Scottish and Irish architecture, since the development in these countries followed much the same course of change as in England.

The earliest ecclesiastical structures which still survive in Scotland follow the same general type as those of Ireland. The monastic foundations of Queen Margaret and her sons introduced into Scotland the Norman manner then universal in England. The best examples, such as the nave of Dunfermline, which is an obvious inspiration from Durham, Kelso of the later 12th century, and the parish churches of Dalmeny and Leuchars, present the same characteristics as are found in English churches of somewhat earlier dates than the buildings in question, and some Romanesque forms survive to a later period than in England. In the 13th century, too, the style of the Scottish churches corresponds very closely with that of England, though the details are generally simpler, and the structures are smaller. It is naturally allied most closely with the north of England, where Cistercian influence in the direction of simplicity and severity had been exercised with the best results. The transept of Dryburgh, the choir and crypt of Glasgow cathedral, the nave of Dunblane, the choir of Brechin, and later Elgin cathedral, exhibit the style at its purest and best. The disturbed condition of the country during the 14th century was unfavourable to architecture, and when building revived at the beginning of the 15th century its style became more national. During the first half of the 15th century, it shows a certain borrowing from English architecture of the flowing-tracery period. Later, many features are borrowed both from England and France, and architecture develops in picturesque and interesting fashion. Melrose is one of the most characteristic, as it certainly is one of the most charming of Scottish buildings; its earlier parts bear a close resemblance to the earlier 14th-century work at York, while its later parts show more similarity to English "Perpendicular" than is common in Scotland. One of the most characteristic features of Scottish architecture in the 15th century is the pointed barrel vault, which directly supports the stone flagged roof. French influence is seen in the employment of the polygonal apse for the termination of choirs, and in some approaches to Flamboyant tracery. The details of the later Gothic churches have but slight connexion either with France or England, and show a curious revival of earlier motives. The semicircular arch is in frequent use, and the "nail-head" and "dog-tooth" ornament, as well as the use of detached shafts, are revived. One of the most remarkable buildings of the 15th century in Scotland is the collegiate church of Roslin, which has a pointed barrel vault over its choir, with transverse barrel vaults over the aisles, and is distinguished by the extreme richness of its decoration.

The domestic remains in Scotland are full of picturesque beauty and magnificence. They are a distinctly national class of buildings of great solidity, and much was sacrificed by their builders to the genius of the picturesque. They can only be classed with the latest Gothic buildings of other countries, but the mode of design shown in them lasted much later than the late Gothic style did in England. The vast height to which their walls were carried, the picturesque use made of circular towers, the freedom with which buildings were planned at various angles of contact to each other, and the general simplicity of the ordinary wall, are their most distinct characteristics.

Ireland.—The chief interest of the medieval architecture of Ireland belongs to the buildings which were erected before the English conquest of the 12th century. The early monastic settlements seem to have resembled the primitive Celtic fortresses, and consisted of a series of huts or cells, surrounded by an enclosing wall. The so-called "bee-hive" cell, which goes back to pre-Christian times, was built of rough stone rubble without mortar, and roofed in the same manner by corbelling over the courses of masonry. Some of these were certainly dwellings, but others were oratories. The largest of those in Skellig Michael is four-sided, and from this type the stone-roofed church of oblong plan was developed. The later type, with oblong nave and small square-ended chancel, retained much of the character of these primitive structures, and their barrel vaults were sometimes independent of the stone roof-covering, a system which lasted into the 12th and 13th centuries. A certain megalithic character, and the inclined jambs of doorway openings, are marked features of these early churches. The round towers so frequently associated with them are believed to be not earlier than the 9th century. Before the introduction of Norman forms, Ireland possessed a Romanesque style of her own, characterized by the survival of horizontal forms and their incorporation into the round-arched style, the retention of the inclined jambs of doorways, rich surface decoration, and the use of certain ornamental motives of earlier Celtic origin. King Cormac's chapel at Cashel is one of the best examples of the imported Norman manner of the 12th century, and here we find much of the influence of the earlier native style. The English conquest may be said to have been the introduction to Ireland of Gothic art, and it was the local variety of western England and south Wales which the conquerors introduced. Among the buildings erected by the English in Ireland, Kilkenny cathedral and the two 13th-century cathedrals of Dublin—Christ Church and St Patrick's—are the most remarkable, but there are many others. Their style is most plainly that of the English conqueror, with no concession to, or consideration of, earlier Irish forms of art. The result of the conquest was that the native style of construction was never applied to large buildings, though it did not at once disappear, as is witnessed by the church St Doulough near Malahide, which appears to be a 14th-century building. The characteristic features of later medieval Irish buildings, such as the stepped battlements, the retention of flowing lines in the tracery, and the peculiar treatment of crockets, are matters of no great importance in the history of architecture, and indeed it is hardly to be expected that a country with so stormy a history could have given rise to any systematic developments. Of the monastic remains those of the friaries are the most numerous, Ireland having many more friars' churches to show than England, but such peculiarities as they possess belong rather to the order than to any local influences.

(J. Bn.)

ROMANESQUE AND GOTHIC ARCHITECTURE IN GERMANY

With the exception of the church built at Trèves (Trier) by the empress Helena, of which small portions can still be traced in the cathedral, there are no remains of earlier date than the tomb-house built by Charlemagne at Aachen (Aix-la-Chapelle), which, though much restored in the 19th century, is still in good preservation. It consists (fig. 44) of an octagonal domed hall surrounded by aisles in two storeys, both vaulted; externally the structure is a polygon of sixteen sides, about 105 ft. in diameter, and it was preceded by a porch flanked by turrets. It is thought to have been copied from S. Vitale at Ravenna, but there are many essential differences. The same design was repeated at Ottmarsheim and Essen, and a simpler version exists at Nijmwegen in the Netherlands, also built by Charlemagne. Although no remains exist of the monastery of St Gall in Switzerland (see Abbey), built in the beginning of the 9th century, a valuable manuscript plan was found in the 17th century, in its library, which would seem to have been a design for a complete monastery. It contains features which are peculiar to the early German churches and are rarely found elsewhere, and is therefore of considerable interest, suggesting that some of the accessories of a monastery, supposed to have been the result of subsequent development, were all clearly set forth at this early period. The plan shows an eastern apse with a crypt, and a choir in front; a western apse, nave and aisles, with a series of altars down the latter; and on the west side, but detached from the apse, two circular towers with staircases in them. Unfortunately
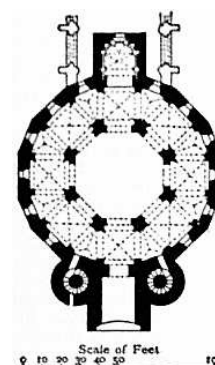
Fig. 44.—Plan of Cathedral at Aix-la-

there are no churches remaining of the same date from which we might judge how far these arrangements were followed; but there are three early churches in the island of Reichenau on the Lake of Constance, in one of which, Mittelzell, is a western apse with staircases (here built up into a central tower), nave, and aisles with altars at the side between every window. The eastern portion has been rebuilt. At Oberzell, at the south end of the island, is a vaulted crypt, which dates from the end of the 10th century. In the third and much smaller church, Unterzell, there was no crypt, but three eastern apses and a western apse, which was destroyed when the present nave was built. At Gernrode in the Harz is a church with western and eastern apses with vaulted crypts underneath (one of which dates from 960 when the church was founded), and circular towers with staircases in them on either side of the western apse. The church was completed about a century later. In the arcade between the nave and aisles piers alternate with the columns. Alternating piers are found also in Quedlinburg (the crypt of which dates from 936 and the church above about 1030) and many other early churches. Western apses exist at Drubeck, Ilbenstadt, Trèves, Huyseberg, St Michael and St Godehard at Hildesheim, Mainz, the Obermunster at Regensburg, Laach, Worms, and at a later date at Naumbergand Bamberg, showing that it was a feature generally accepted in early and late periods. It has, however, one great defect, that of depriving the west end of the church of those magnificent porches which are the glory of the churches of France, the cathedral of Spires (Speyer), the church at Limburg near Durkheim, the cathedrals of Erfurt and Regensburg, being the few examples where a dignified entrance is given; and further, that on entering the church from the side, one is distracted by the rivalry of the two apses, and it is only when turning the back on one or the other that one is able to judge of the monumental effect of the interior.
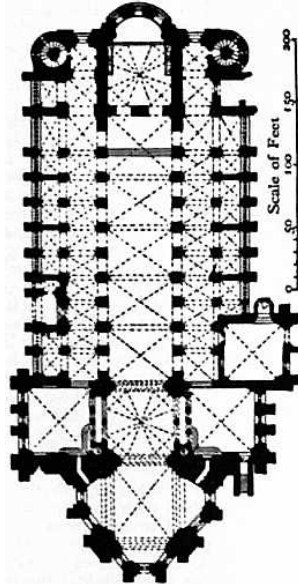

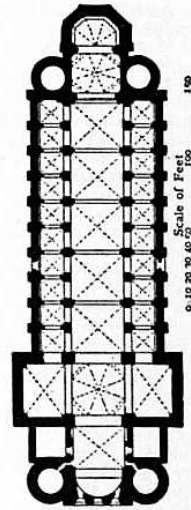
FIG. 45.—Plan of Cathedral at Mainz.   FIG. 46.—Plan of Cathedral at Worms.

The greater number of the churches above mentioned were covered over with open timber roofs or flat ceilings; but the problem to be solved in Germany, as well as in Italy, was that of vaulting over the nave, and the cathedrals of Spires, Worms and Mainz (fig. 45) are the three most important churches in which this was accomplished. The dates of their vaults have never been quite settled; that of Spires would seem to have been the earliest built, probably after 1162, when the church was seriously damaged by a conflagration, and the vault is groined only. In Worms (fig. 46) and Mainz there are diagonal moulded ribs, which suggest a later date. Although of great height and width, the absence of a triforium gallery in these cathedrals is a serious defect, as it deprives the interior of that scale which the smaller arcades in such a gallery give to the nave arcade below and the clerestory above, and of those horizontal lines given by string courses which are entirely wanting in these churches. Seeing that in some of the earlier churches, as at Gernrode, St Ursula (Cologne), and Nieder-Lahnstem, the triforium had already been introduced, and that it was repeated in the later examples at Limburg on the Lahn, Bacharach, Andernach, Bonn, Sinzig, and St Gereon (Cologne), it is difficult to understand why, in the three great typical German Romanesque churches, they should have been omitted. Externally the design is extremely fine, owing to the grouping of the many towers at the west and on either side of the transept or choir. In this respect the cathedral of Mainz is the most superb structure in Germany, and to the cathedral of Spires with its fine entrance porch (fig. 47) must be given the second place.

FIG. 47.—Plan of Cathedral in Spires.

One of the most perfect examples of the Rhenish-Romanesque styles is the church of the abbey of Laach, completed shortly after the middle of the 12th century. The eastern part of the church resembles the ordinary type, but at the west end there is a narrow transept flanked by circular towers, and a western apse enclosed in an atrium with cloisters round, which forms the entrance to the church. The sculptures in the capitals of the atrium are of the finest description and represent the perfected type of the German Romanesque style. In addition to the two circular towers flanking the west transept, a square tower rises in the centre of the west front, two square towers flank the choir and a crystal lantern crowns the crossing of the main transept, and the grouping of all these features is very fine and picturesque in effect. A small church at Rosheim in Alsace is quite Lombardic in its exterior design, the pilaster strips and arched corbel tables being almost identical. The same applies to the church at Marmoutier, but the towers flanking the main front and the square tower on the crossing of the western transept produce a composition which one looks for in vain in the greater number of the churches in Italy.

In describing the Lombardic churches of North Italy, reference has been made to the probable origin of the eaves-gallery, best represented in the eastern apse of Santa Maria Maggiore, Bergamo. This feature was largely adopted throughout the Rhine churches, and in the Apostles' church and St Martin's at Cologne receives its fullest development, being in addition to the eastern apse carried round the apses of the north and south transepts, which in these two churches and in St-Mary-in-the-Capitol, also in Cologne, constitute a special treatment. In the Apostles' church, where round towers are built at the junction of the three apses, the effect is extremely pleasing. In the church at Bonn, the single apse is flanked by two lofty towers which give great importance to the east front.

The steeples of the same period have a character of their own. They are either square or octangular in plan, arcaded or pierced with windows, and roofed with gables or with spires rising out of the gables.
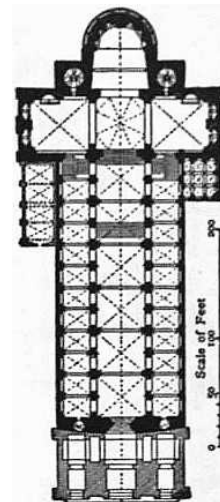
One peculiarity found in some of the German churches, and specially those in the north-east, is that the nave and aisles are of the same height. To these the term *Hallenkirchen* is given. This type of design is very grand internally, owing to the vast height of the piers and arches. It also dispenses with the necessity for flying buttresses, as the aisles, which are only half the width of the nave, carry the thrust of the vault direct to the external buttresses. The nave, however, is not so well lighted, though the aisle windows are sometimes of stupendous height. The principal examples are those of the church of St Stephen, Vienna, where both nave and aisles are carried over with one vast root; at Munster, the *Wiesenkirche* at Soest; St Lawrence, Nuremberg; St Martin's, Landshut; Munich cathedral, and others.

St Gereon (1200-1227) and St Cunibert (1205-1248), in Cologne, besides churches at Naumburg, Limburg and Gelnhausen, in which the pointed arch is employed, are almost the only transitional examples in Germany, and respond to work of a century earlier in France. Toward the end of the 13th century the Romanesque style was supplanted by a style which in no way grew out of it, but was rather an imitation of a foreign style, the earliest examples being in the *Liebfrauenkirche* at Trèves (1227-1243), and the churches at Marburg (1235-1283) and Altenberg (1255-1301). In the latter church is a French chevet with seven apsidal chapels. This brings us to the great typical cathedral of Germany at Cologne (fig. 48), which had the advantages of having been designed at the best age and completed on the original design, so that with small exceptions a uniformity of style reigns throughout it. It was begun in 1270 and apparently based on the plan of Amiens, the transepts however having an additional bay each, and the two first bays of the nave having thicker piers so as to carry the enormous towers and spires which flank the chief façade. The principal defect of the building is its relative shortness, owing to its disproportionate height. This has always been felt in the interior, and now that the lofty buildings all round have been taken down, isolating the cathedral on all sides, it has the appearance of an overgrown monster. The length of the cathedral is 468 ft., 17 ft. less than the cathedral at Ulm, the longest in Germany. The height of the nave vault is 155 ft., and as the width is only 41.6 (about one in four) the proportion is very unpleasing. There is also a certain mechanical finish throughout the design, which renders it far less poetical than the great French cathedrals. Where, however, it excels is in the extraordinary vigour of its execution, the depth of the mouldings, and the projection given to the leading architectural features; and in this respect, when compared with St Ouen at Rouen, about fifty years later, the latter (which is even more mechanical in its setting out) looks wire-drawn and poor. The twin spires of the façade rise to the height of 510 ft.; they were completed only in the latter part of the 19th century, and would have gained in breadth of effect if there had been some plain surfaces left. In this respect the spire of Freiburg cathedral, which is simple in outline and detail, is finer, and gains in contrast on account of the simpler masonry of the lower part of the tower. The spire at Ulm cathedral, only recently terminated, rises to the height of 530 ft. In both these cases the single tower is preferable to the double towers of Cologne, when elaborated to the same extent, as they are in all these examples; and perhaps that is one of the reasons why the spires of Strassburg and Antwerp cathedrals are more satisfactory, as the twin towers were never built. The front of Strassburg cathedral (1277-1318), by Erwin von Steinbach, is too much cut up by vertical lines of masonry, owing to the *tours-de-force* in tracery of which the German mason was so fond. On the whole the most beautiful of German spires is that of St Stephen's at Vienna, and one of its advantages would seem to be that its transition from the square base to the octagon is so well marked in the design that it is difficult to say where the tower ends and the spire begins. The strong horizontal courses under the spires of Strassburg or Freiburg are defects from this point of view.
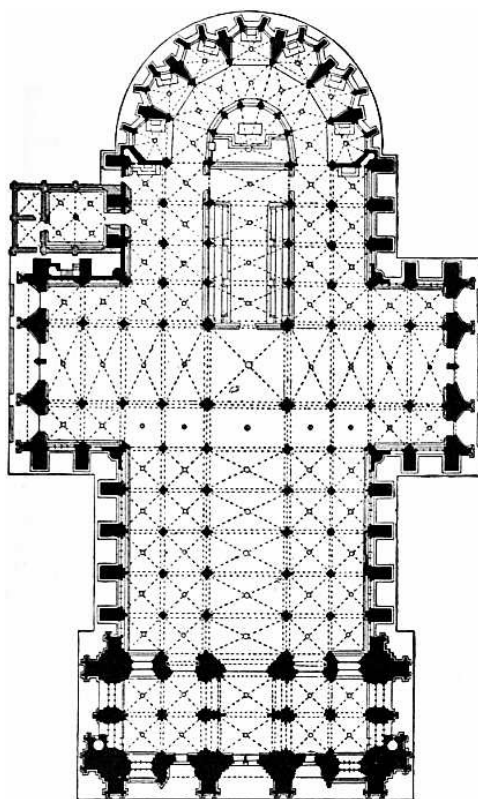
FIG. 48.—Plan of Cathedral at Cologne.

In domestic architecture nothing remains of the palace at Aix-la-Chapelle, but at Lorsch near Mannheim is the entrance gateway of the convent which was dedicated by Charlemagne in 774. It is in two storeys, in the lower one three semicircular arches flanked by columns with extremely classic capitals. The upper storey is decorated with what might have been described as a blind arcade, except that instead of arches are triangular spaces similar to some windows found in Saxon architecture; the whole gateway being crowned with a classic cornice. The palaces at Goslar (1050) and Dankwarderode in Brunswick (1150-1170) still preserve their great halls, and in the palace built (1130-1150) by the emperor Frederick I. at Gelnhausen there remain portions extremely fine and vigorous in style, and showing a strong Byzantine influence. The largest and most important castle is that of the Wartburg at Eisenach, which is in complete preservation.

To sum up, the German Complete Gothic is essentially national in its complete character. It has many and obvious defects. From the first there is conspicuous in it that love of lines, and that desire to play with geometrical figures, which in time degenerated into work more full of conceit and triviality than that of any school of medieval artists. These conceits are worked out most elaborately in the traceries of windows and panelling. The finest early examples are in the cathedral at Minden; a little later, perhaps, the best series is in the cloister of Constance cathedral; and of the latest description the examples are innumerable. But it is worth observing that they rarely at any time have any ogee lines. They are severely geometrical and regular in their form, and quite unlike our own late Middle Pointed, or the French Flamboyant. In sculpture

the Germans did not shine. They, like the English, did not introduce it with profusion, though they were very prone to the representations of effigies of the deceased as monuments.

In one or two respects, however, Germany is still possessed of a wealth of medieval examples, such as is hardly to be paralleled in Europe. The vast collection of brick buildings, for instance, is unequalled. If a line be drawn due east and west, and passing through Berlin, the whole of the plain lying to the north, and extending from Russia to Holland, is destitute of stone, and the medieval architects, who always availed themselves of the material which was most natural in the district, built all over this vast extent of country almost entirely in brick. The examples of their works in this humble material are not at all confined to ecclesiastical works; houses, castles, town-halls, town walls and gateways, are so plentiful and so invariably picturesque and striking in their character, that it is impossible to pass a harsh verdict on the architects who left behind them such extraordinary examples of their skill and fertility of resource.

This development is largely due to the fact that all these countries in north-east Germany were connected and very much influenced by the confederation of the Hanse towns, and hence the similarity in the design of all their buildings. Although some of the earliest buildings date from the 12th century, the chief development took place in the 14th and 15th centuries, and in the 16th century formed the basis of the transitional works of the Renaissance. The principal Hanse towns are Hamburg, Lübeck and Danzig. The chief buildings in Hamburg were destroyed by the fire in 1842, and it is in Lübeck that the most important churches are to be found. The church of St Mary (Marienkirche), 1304, is the most striking on account of its dimensions, 346 ft. in length, the nave being 123 ft. high, with two western towers 407 ft. high. Great scale is given to the building in consequence of the small material (brick) used, and some of the windows in this or other churches are nearly 100 ft. in height, with lofty mullions, all in moulded brick. The *Dom* or cathedral of Lübeck, though slightly larger, is not so good in design, but has a remarkable north porch in richly moulded brick, with marble shafts and carved capitals. In the church of St Catherine the choir is raised above a lofty vaulted crypt, similar to examples in some of the Italian churches. The *Marienkirche* at Danzig (1345-1503), built by a grand master of the Teutonic knights, to whom the chief development of the architecture of north-east Germany is largely due, is one of those examples already mentioned as *Hallenkircken*. The nave, aisles, side chapels, transept and aisles, and choir with square east end, are all of the same height; as the church is 280 ft. long and 125 ft. wide, with a transept 200 ft. long, the effect is that of one stupendous hall, but as the light is only obtained through the windows of the side chapels, the interior, though impressive, is somewhat gloomy. The same is found in the choir of the Franciscan church at Salzburg, where five slender piers, 70 ft. in height and 4 ft. in diameter, carry the vault over an area 160 ft. long by 66 ft. wide. Right up in the north of Germany, in Pomerania, are many fine examples in brick and sometimes of great size, such as those at Stralsund, Stettin, Stargard, Pasewalk, and in the island of Rugen. The *Marienkirche* at Stralsund, owing to its massive construction and picturesque grouping, is an interesting example. Its western transept or narthex with tower in centre is a common type of the churches in Pomerania, and though very inferior in design is a version of those which in England are seen in Ely and Peterborough cathedrals.

In the entrance gateways to the towns and in domestic architecture north Germany is very rich; the palace of the grand master of the Teutonic Order at Marienburg is a vast and imposing structure in brick (1276-1335), in which the chapter house of the grand master, with its fan-vaulted roof, resting on a single pillar of granite in the centre, and the entrance porch of the church richly carved in brick, are among the finest examples executed in that material.

<div align="right">(R. P. S.)</div>

Romanesque and Gothic in Belgium and Holland

Of early Romanesque work neither Belgium nor Holland retains any examples; for with the exception of the small building at Nijmwegen built by Charlemagne, there are no churches prior to the 11th century, and at first the influence in Belgium would seem to have come from Lombardy, through the Rhine Provinces. As all her large churches are built in the centres of her most important towns, it is probable that the older examples were pulled down to make way for others more in accordance with the increasing wealth and population. In the 13th century they came under the influence of the great Gothic movement in France, and two or three of their cathedrals compare favourably with the French cathedrals. The finest example of earlier date is that of the cathedral of Tournai (fig. 49), the nave of which was built in the second half of the 11th century, to which a transept with north and south apses and aisles round them was added about the middle of the 12th century. These latter features are contemporaneous with similar examples at Cologne, and the idea of the plan may have been taken from them; externally, however, they differ so widely that the design may be looked upon as an original conception, though the nave arcades, triforium storey, and clerestory resemble the contemporaneous work in Normandy. The original choir was pulled down in the 14th century, and a magnificent *chevet* of the French type erected in its place. The grouping of the towers which flank the transept, with the central lantern, the apses, and lofty choir, is extremely fine (fig. 50). The sculptures on the west front, dating from the 12th to the 16th century, protected by a portico of the late 15th century, are of remarkable interest and in good preservation. They are in three tiers, the two lowest consisting of bas-reliefs, the upper tier with life-size figures in niches, resting on corbels. The Romanesque tower of the church of St Jacques in the same town, with angle turrets, is a picturesque and well-designed structure.

FIG. 49.—Plan of Cathedral at Tournai.

Other early examples are those of St Bartholomew at Liége (A.D. 1015) and the churches at Roermonde and St Servais at Maastricht, both belonging to Holland. The latter is an extremely fine example, which recalls the work at Cologne, and in its great western narthex follows on the lines of the German churches at Gernrode, Corvey and Brunswick.

Among other churches of later date are St Gudule at Brussels, with Gothic 13th century choir and a 14th century nave with great circular pillars, the west front of later date, approached by a lofty flight of steps, having a very fine effect; Ste Croix at Liége, with a western apse; St Martin at Ypres and St Bavon at Ghent, both with 13th-century choir and 14th-century nave; Tongres, 13th century with great circular pillars and an early Romanesque cloister; Notre Dame de Pamele at Oudenarde; and Notre Dame at Bruges, 14th century. Of 15th and 16th century work (for the Gothic style lasted without any trace of the Renaissance till the middle of the 16th century) are St Gommaire at Lierre (1425-1557); St Martin, Alost (1498), St Jacques, Antwerp; and St Martin and St Jacques, both at Liége. The largest in area, and in that sense the most important church in Belgium, is Notre Dame at Antwerp (misnamed the cathedral). It was begun in 1352, but not completed till the 16th century, so that it possesses many transitional features. It is one of the few churches with three aisles on each side of the nave, the outer aisle being nearly as wide as the nave, which is too narrow to have a fine effect. Only one of the two spires of the west front is built, perhaps to its advantage; the upper portion presents in its pierced stone spires one of those remarkable *tours-de-force* of which masons are so proud, and having a simple substructure it gains by contrast with and is much superior to the spires of Cologne, Vienna and Ulm.
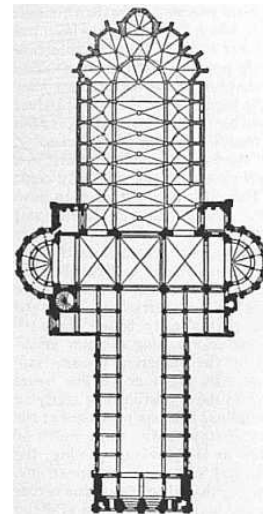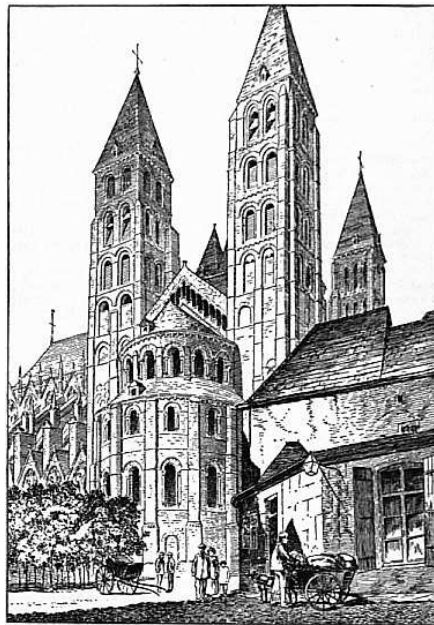
Fig. 50.—Tournai Cathedral.

Among the most remarkable features in these Belgian churches are the rood screens, the earliest of which is in the church of St Peter at Louvain, dating from 1400, in rich Flamboyant Gothic, retaining all its statues. In the church at Dixmuiden, St Gommaire at Lierre (1534), and in Notre Dame, Walcourt (1531), are other examples all in perfect preservation; the last is said to have been given by the emperor Charles V., and in the same church is a lofty tabernacle in Flamboyant Gothic.

Owing to the comparatively late date of many of the Belgian churches, they are all more or less unfinished, as the religious fervour of the citizens who built them would seem to have changed in favour of their town halls and civic buildings immediately connected with trade. The Cloth Hall at Ypres (1200-1334) with a frontage of 460 ft., three storeys high with a lofty central tower and a hall on the upper storey 435 ft. long, one of the finest buildings of the period in Europe; Les Halles at Bruges, originally built as a cloth hall, also with a lofty central tower; and a simple example at Malines, are the earliest buildings of this type.

There follow a series of magnificent town halls, of which that at Brussels is the largest, but the tower not being quite in the centre of its façade gives it a lopsided appearance. There is no tower to the town hall at Louvain (1448-1469), but this is compensated for by the angle turrets, and the design is far bolder. In both these examples the vertical lines are too strongly accentuated, and seeing that they are in two or three storeys, the latter should have been maintained in the design of the façades. In this respect the town hall of Oudenarde (1527-1535) is more truthful, and as a result is far superior to them; the tower also is in the centre of the principal front, which at all events is better than at Brussels, though as a matter of composition it would have been more effective and picturesque if it had been placed at one end of the façade. In the town hall at Mons there is no tower, but a fine upper storey with ten windows filled with good tracery. Of the town hall at Ghent only one half is Gothic (1480-1482), as it was not completed till a century later, and though overladen with Flamboyant ornament it has fine qualities in its design. Although but few examples still exist of the Gothic structures belonging to the various gilds, owing to their having been rebuilt in the Renaissance style, those of the Bateliers at Ghent (1531), and of the Fishmongers at Malines (1519), bear witness in the rich decoration to the wealth of these corporations.

Holland is extremely poor in church architecture, but there are two examples which should be noted, at Utrecht and Bois-le-Duc ('s Hertogenbosch). Of the former only the choir exists. It is of great height (115 ft.), and belongs to the finest period of Gothic architecture (1251-1267). The nave was destroyed by a hurricane in 1674, and so seriously damaged that it was all taken down (a wall being built to enclose the choir) and an open square left between it and the lofty west tower. The cathedral of St John at Bois-le-Duc, though founded in 1300, was rebuilt in the Flamboyant period (1419-1497). It is of great length (400 ft.) with a fine *chevet*, and possessed originally a magnificent rood screen in the early Renaissance style (1625); this seemed to the burghers to be out of keeping with the Gothic church, so it was taken down and sold to the South Kensington Museum, being replaced by a very poor example in Modern Gothic.

There is only one Gothic town hall of importance in Holland, that at Middleburg (1468), a fine example, and quite equal to those in Belgium. The ground and upper floors are kept distinct, and as the wall surface of these lower storeys is in plain masonry, the traceried windows and the canopied niches (all of which retain their statues) gain by the contrast. There is a small picturesque specimen at Gouda, and at Leeuwarden in the house of correction (Kanselary) a rich example in brick and stone, with a remarkable stepped gable in the centre having statues on its steps.

Both in Belgium and Holland there are numerous examples of domestic architecture in brick with quoins and tracery in stone, in both cases alternating with brick courses and arch voussoirs and with infinite variety of design.

<div align="right">(R. P. S.)</div>

The Renaissance Style: Introduction

The causes which led to the evolution of the Renaissance style in Italy in the 15th century were many and diverse. The principal impulse was that derived from the revival of classical literature. Already in the 14th century the coming movement was showing itself in the works of the painters and sculptors, especially the latter, owing to the influence of the classic sculpture which abounded throughout Italy. Thus in the tomb of St Dominic (1221) at Bologna, the pulpits of Pisa (1260) and Siena (1268), and in the fountain of Perugia (1277-1280) by Niccola Pisano and his son Giovanni, all the figures would seem to have been inspired in their character by those found in Roman sarcophagi. A classic treatment is noticeable in the doorway of the Baptistery of Florence by Andrea Pisano (1330), probably influenced by Giotto, in whose paintings are found the representation of imaginary buildings in which Gothic and Classic details are mixed up together. The time for its full development, however, did not come till the following century, when, with the papal throne again firmly established under Martin V., the amelioration of the city of Rome was commenced, and discoveries were made which awakened an archaeological interest fostered by the Medici at Florence, who not only became enthusiastic collectors of ancient works of art, but promoted the study of the antique figure. In addition to the acquisition of marbles and bronzes, ancient manuscripts of classic writers were sought for and supplied by Greek exiles who seemed to have foreseen the breaking up of the eastern empire; everything, therefore, at the beginning of the 15th century fostered the spread of the new movement. Accordingly, when a great architect like Brunelleschi, who for fifteen years had been making a special study of the ancient monuments in Rome and who possessed in addition great scientific knowledge, brought forward his proposals

for the completion of the cathedral built by Arnolfo di Lapo, and showed how the existing substructure could be covered over with a dome like the Pantheon at Rome, his designs were accepted by the town council of Florence, and in 1420 he was entrusted with the work. Subsequently he carried out other works, in which pure classic architectural forms are the chief characteristics. There were, however, other causes which not only promoted the encouragement of the revival, but extended it to other countries, though at a later period; the most important of these was the invention of printing (1453), which in a sense revolutionized art, not so much in its enabling classical literature to be more extensively studied and known, as in its taking away to a certain extent from the painter and sculptor and indirectly the architect one of their principal missions, so far as ecclesiastical architecture is concerned. Henceforth these who had hitherto taught their lessons in sculpture, painting, stained glass and fresco, could, through the printed book, bring them more immediately before and directly to mankind. Victor Hugo's pithy saying, "*ceci tuera cela; le livre tuera l'église*," expressed not only the fall of architecture from the position it occupied as the principal teacher, but to a certain extent the change in the channel by which religious teachers and the writers of the day, the poets and philosophers, could best make their works known.

With the invention of printing came the partial cessation of fresco painting, stained glass and sculpture, which subsequently came to be regarded more as decorative adjuncts than as having educational functions. But this transfer from the Church to the Book, the extinction of the one by the other, led to another important change. Henceforth the architect or master-mason, as he was then known, could no longer count on the co-operation of the various craftsmen, men often of greater culture than himself; and the individuality of the man, which has sometimes been put forward as a gain to humanity, was a loss so far as architecture is concerned, since it was scarcely possible that the imagination and conceptions of a single individual, however brilliant they might be, could ever reach to the high level of the joint product of many minds, or that there could be the same natural expression in what had hitherto been the traditional work of centuries.

In France the introduction of the Revival resulted at first in a transitional period during which classic details gradually crept in, displacing the Gothic. In Italy this does not seem to have been the case to the same extent. It is true that in Florence and Venice, where an independent style existed, the new buildings in their general principles of design were, copied from the old, but with no mixture of details as in France; in Brunelleschi's church, Santo Spirito at Florence, the capitals and details are all pure Italian, as pure as if they had been carried out in the 3rd or 4th century, the fact being that already before the 15th century the craftsman's work was approaching the new movement, and this was facilitated by the numerous remains still existing of Roman architecture. In the four or five years Brunelleschi spent in Rome, he had the opportunity of studying a far larger number of Roman buildings than are preserved at the present day, so that the purity of style in the work which he carried out in Florence was due to his previous training; the same is found in Alberti's work, and with these two great men leading the way it is not surprising that throughout the earlier Renaissance period in Italy we find a classic perfection of detail which it took half a century to develop in other countries.

It is difficult to say what might have been its ultimate development if another discovery had not been made about 1452, that of the manuscript of Vitruvius, a Roman architect who lived in the time of the emperor Augustus; his work on architecture gives an admirable description of the building materials employed in his day (*c.* 25 B.C.), and among other subjects, a series of rules regulating the employment of the various orders and their correct proportions. These rules were based on the descriptions which Vitruvius had studied of Greek temples, but as he was not acquainted with the examples quoted, never having been in Greece or even in south Italy at Paestum, his knowledge was confined to the architectural monuments then existing in Rome. Vitruvius's manuscript, entitled *De re aedificatoria*, was illustrated by drawings, none of which have however been preserved; when therefore in subsequent years translations of the architectural portion of the manuscript were printed and published by various Italian architects, among whom Vignola and Palladio were the more important, they were accompanied by woodcuts representing their interpretation of the lost illustrations, and thus copybooks of the orders were published, with more or less fidelity to those of existing Roman monuments, in which attempts were made to adhere to the rules laid down by Vitruvius. In Rome and other parts of Italy, where ancient monuments or portions of them still remained *in situ*, architects could study their details and base their designs on them, but in other countries they were bound to follow the copybook, and thus they lost that originality and freedom of design which characterizes the earlier work of the Renaissance.

On the other hand, there is no doubt that the publications of Vignola and Palladio, based as they were on the remains of ancient Rome, then much better preserved than at the present day, tended to maintain a high standard in the employment of the Classic orders, with correct proportions and details; so much so, that in referring to the influence which those works exerted from the middle of the 16th century in France and Spain, and during the 17th and 18th centuries in England and to a certain extent in Spain, Germany and the Netherlands, it is generally spoken of as the introduction of the pure Italian style. The tendency, however, of such hard and fast rules leads eventually to an excess in the opposite direction, and the works of Borromini in Italy and Churriguera in Spain in the middle of the 17th century resulted in the production of what is generally referred to as the Rococo style. This style was fostered in France by the attempts to reproduce, externally and in stone, ornamental decoration of a type which is only fitted for internal work in stucco, and in Germany and the Netherlands by reproductions of fantastic designs published in copybooks, which led to the bastard style of the Zwinger palace in Dresden and the Dutch architecture of the 18th century. Vignola's work on the five orders was published in 1563, and Palladio's in 1570; they were preceded by a publication of Serlio's in 1540, giving examples of various architectural compositions, and to him is probably due the introduction of the pure Italian style in the Louvre in 1546. They were followed by other authors, as Scamozzi in Italy, Philibert de l'Orme in France, and, at a later date, Sir William Chambers in England.

The term given to the earlier Renaissance or transition work in Italy is the Cinque cento style, though sometimes that title is given to buildings erected in the 16th century; in France it is known as the François I. style, in Spain as the Plateresque or Silversmiths' style, and in England as the Elizabethan and Jacobean styles.

There is still another and very important difference to be noted between the styles of the middle ages and those of the Renaissance. Although the names of the designers in the former are occasionally known and have been handed down to us, they were only partially responsible, as the works were carried out by other craftsmen working on traditional lines, whereas in the latter they are of much more importance because of the independent thought and study of the individual; and though to a certain extent the development of each man's work may have been influenced by others working in the same direction, his special object was to acquire personal fame and by his own fancy or predilection to produce what he conceived to be an original work peculiar to himself. Consequently in our description the name of the architect who designed a particular building, as well as the date of its erection, are necessarily given to show the progress made In his studies or otherwise.

(R. P. S.)

RENAISSANCE ARCHITECTURE IN ITALY

In the styles hitherto described a chronological order has been followed, as far as possible, in order to show the gradual development of the style; that course is adopted here to a certain extent, when dealing with the Renaissance, though the introduction of the personal element, to which reference has been made, brings in a change of some importance. Henceforth the career of the individual has to be taken into consideration, and at times it may be an advantage when describing a building by an architect of eminence to mention other works by him, and so depart from the chronological sequence.

Ecclesiastical.—The classic revival in Italy, though foreshadowed in other branches of art, as in painting and sculpture, and also to a marked degree in literature, was virtually introduced by one great man, Filippo Brunelleschi of Florence, who, trained as a sculptor, and disappointed with his want of success in the competition held in 1403 for the bronze gates of the baptistery at Florence, determined to devote himself to architecture, possibly in the hope that he might some day be able to solve the great problem of erecting over the crossing of Arnolfo di Lapo's great cathedral the dome projected by the latter but never executed. Having spent some years in Rome, Brunelleschi returned to his native town about 1410, with a profound knowledge of classic architecture and of Roman construction, as shown in the Pantheon, the thermae, Colosseum and other remains, then in much better preservation than at the present day. Some years passed in the production of various schemes and in deliberations with the council of Florence, but eventually in 1420 the completion of the cathedral was entrusted to him, and he undertook to construct the dome without centreing, and to raise it on a drum so as to give it greater importance than Arnolfo had contemplated, as shown in the fresco of the Spanish chapel of Santa Maria Novella, Florence. The dome as projected by Brunelleschi was of considerable size, being 130 ft. in diameter and 135 ft. from the cornice to the eye of the dome, including the drum on which it was raised; it was octagonal in plan, and built with an inner and outer casing partly in brick, with angle and two intermediate ribs on each face, which were in stone. The construction of the dome was completed in 1434; but the lantern, built on the basis of the model he had made, was not carried out till 1462, some years after his death. Brunelleschi's other works in Florence consisted of the church of San Lorenzo, which he rebuilt in 1425 after a fire, and the church of Santo Spirito (1433), a very remarkable building, the design of which was based on the medieval basilicas of Rome, with such modifications in plan and section as his knowledge of ancient Roman work suggested. This church consists of nave, transept and choir, with aisles all round, the centre or crossing being covered with a dome on pendentives, which henceforth became the chief characteristic in all the Renaissance churches. Brunelleschi's earliest work was the Pazzi chapel, an original conception which is more remarkable for the pure classic feeling and refinement in all its details than for the design. The weakness of the archivolt round the central archway, and the mass of panelled wall carried on columns (far too slight in their dimensions), detract seriously from the effect of the façade; internally the structural function of the pilasters is not sufficiently maintained, and instead of a simple hemispherical dome, as in the cathedral, a quasi-Gothic type was built, with twelve ribs and scalloped cells, which destroys its dignity.

Brunelleschi was followed by another great Florentine architect, Leon Battista Alberti, who was also a great mathematician and a scholar, and further promoted the study of classic architecture by writing a treatise in Latin, *Opus praestantissimum de re aedificatoria*, which was based partly on that of Vitruvius and was published in 1485, after his death, accompanied by illustrations. The first building with which he was connected was the church of San Francesco at Rimini, to which in 1440 he added the front. In this he was evidently inspired by the Roman triumphal arch in that city, and his interpretation of it, to meet the requirements in its façade which were imposed upon him by the existing nave, was admirable. Unfortunately the principal front was never completed, but on the south side he designed a series of recesses to hold the sarcophagi containing the remains of the friends of his client, Sigismondo Malatesta, the effect of which is simple and grand. Alberti's largest work, the church of Sant' Andrea at Mantua (1472), in which the nave, transept and choir are all covered with barrel vaults, recalls the vaulted corridors of the Colosseum. There are no aisles, but a series of rectangular chapels on each side, the division walls of which act as buttresses to resist the thrust of the great vault. The lofty arched openings to the chapels, separated by Corinthian pilasters with entablature supporting the coffered vault and a central dome (since rebuilt), complete the structure, which has served since as the model for all the Renaissance churches of the same type. The principal front is not satisfactory, as it takes no cognizance of the width of the nave, and the side doors have no use or meaning; here Alberti seems to have been led astray in his triumphal arch treatment, which is inferior to his scheme for the church at Rimini.

In 1462 Michelozzo, another Florentine architect, built the chapel of St Peter at the east end of the church of Sant' Eustorgio, Milan. Externally it has little attraction, but internally the dome, with its magnificent frieze of winged angels in relief with a painted background of arcades and other accessories, is the most beautiful composition of the Renaissance. Michelozzo's first work was the Dominican monastery and church of San Marco at Florence (1439-1452), but he is better known for his secular work, to which we shall return.

The next great architect chronologically is Bramante d' Urbino, to whom was entrusted the commencement of the church of St Peter at Rome. His first important work was the church of Santa Maria della Consolazione at Todi (1472), which consists of a square nave with immense semicircular apses, one on each side. The nave is covered with a dome raised on a drum, and carried on pendentives, and the apses with hemispherical vaults butt against the nave walls and form externally a very fine group. Bramante was the architect of the chapel in the cloisters of San Pietro-in-Montorio, Rome (1472), a small circular building covered with a dome and surrounded with a peristyle of columns of the Doric order; and of the dome of the church of Santa Maria delle Grazie in Milan, as also of the three apses, which are decorated with pilasters and baluster shafts with circular medallions enclosing busts, all in terra cotta. Before passing to his work at St Peter's there are some other early churches we must notice. The Certosa, near Pavia, was begun in 1396, and in one sense suggests the revival of classic architecture, in that all its arches have semicircular heads. The magnificent façade of the church was commenced in 1473 from the designs of Borgognone, a Milanese architect: it is one of the few examples in Italy of large size in which the transition is noticeable, for although there are no Gothic details the design follows that of the middle ages, and instead of great pilasters of the Corinthian order, buttresses with niches containing statues divide the façade and accentuate the internal divisions of the church; the open galleries above the entrance doorway crossing the upper storey of the central portion are all derived from well-known Lombardic features. The upper part of the façade is inferior to the lower, Borgognone's design having been departed from. The enrichment of the whole front, from the lower plinth to the string course under the first gallery, with bas-reliefs, panelled pilasters, niches, medallions and other decorative accessories, all in white marble, so completely covers the whole surface that scarcely any portion is left plain, which to a certain extent detracts from its effect as a whole; but there is an endless variety of design, and the baluster or candelabrum shafts dividing the windows and the friezes and cresting above their cornices, are of great beauty. The circular rose window above, with its enclosing frontispiece of later date, shows the coming influence of the later Italian style. The cloisters adjoining are surrounded with a light arcade, with enrichments in the spandrils and frieze, all in terra cotta.

The cathedral of Como is also a transitional example, where buttresses are employed all round the church, and it is only in the finials which surmount them, the great projecting cornice which crowns the structure, and the doorways and windows, that we find classical details; the doorways recall the porches of the Lombard churches, and are of great beauty in design, the south doorway being said to be by Bramante. Another example, remarkable for its elaborately carved front and porch, is the church of Santa Maria dei Miracoli at Brescia (1487-1490) by Ludovici Beretta, which both externally and internally is one of the richest specimens of the early Italian Renaissance. The church dedicated to Santa Maria dei Miracoli in Venice (1481-1489), by Pietro Lombardo, is another transitional example in which the Byzantine influence of St Mark's is recognizable in the semicircular pediments of its façade and of the exterior of the chancel, and Lombardic influence in its external decorations with pilaster strips and blind arcades. The interior is one of the gems of the Renaissance, on account of its splendid decoration with marble linings and fine cinque-cento carving. Similar semicircular pediments are found in the façade of the church of San Zaccharia at Venice (1515), but are purely decorative because the roof behind is not semicircular like that of the Miracoli. The decoration of the main front, here all in marble, is of an entirely different design, and is subdivided into a series of storeys, the lower panelled, the first storey with arcades and the upper ones with pilasters. An earlier example (1461) in San Bernardino at Perugia is of a far higher standard, and its enrichment with bas-reliefs by the Florentine sculptor Agostino di Duccio (*c.* 1418-*c.* 1490) gives it the first place for its conception and execution. Among others, the church of Spirito Santo, Bologna, in terra cotta; the church of Santa Giustina, Padua (1532); the sacristy of San Satiro, Milan (1479), by Bramante; and the sacristy of the church of Santo Spirito, Florence (1489-1496), by Sangallo, are all interesting examples of the early Renaissance in Italy.
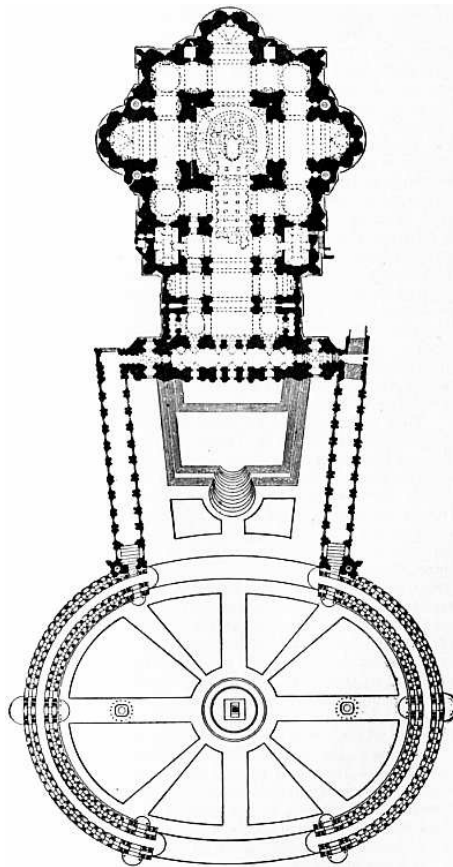
FIG. 51.—Plan of St Peter's at Rome.

In 1505, on the advice of Michelangelo, Bramante was instructed to prepare designs for a new church in Rome dedicated to St Peter, to take the place of the early basilica, which, built in haste, began to show serious signs of failure. Already, fifty years earlier, Pope Nicholas V. had commenced a new building, the erection of which was stopped by his death in 1454. The scheme was revived by Julius II., and the foundation stone of the new structure was laid in 1506. On Bramante's death in 1514, Raphael, Peruzzi and Sangallo were successively appointed, and the last named prepared a new design, which, however, was not carried out, as he found it necessary first to strengthen the piers of the dome provided by Bramante and to remedy the defects of his successors. In 1546 Michelangelo, then seventy-two years of age, was entrusted with the continuance of the work, and he made radical changes, chiefly in the design of the dome. Comparison of the plans of Bramante and Sangallo with that actually carried out by Michelangelo shows that he not only increased the size of the piers to carry his dome, but the outer walls of the north, south and west apses, and omitted the aisles which surrounded the latter (fig. 51). He would seem to have availed himself of the foundation walls already built and of Bramante's piers to carry the dome, which had been raised up to the cornice, but otherwise the architectural features of the whole building externally and internally were carried out from Michelangelo's own designs. Sangallo had suggested for the exterior a series of superimposed orders with three storeys; Michelangelo elected to have one order only with an attic storey. The building gained thereby in dignity, but it lost in scale, for the huge pilasters of the Corinthian order (87 ft. high) look considerably smaller, in spite of the two storeys of windows between them. These windows also, which from their design are apparently about 10 to 12 ft. high, actually measure 20 ft. in height. The same defect exists in the interior, where the Corinthian order, over 100 ft. in height to the top of the cornice (Plate III., fig. 69), calls for a similar increase in the dimensions of all the sculptured decorations; the figures in the spandrils being 20 ft. high, and the cherubs supporting the holy water spouts 10 ft. Otherwise the scheme realizes the conception which Bramante proposed from the first, viz. to raise the dome of the Pantheon on the top of the basilica of Constantine; the latter being represented by the magnificent barrel vault (75 ft. in span) of the nave, transepts and choir; the former by the great hemispherical dome, 140 ft. in diameter, which, including the drum, is 162 ft. from the top of the cornice above the pendentives to the soffit of the dome. The dome is built in two shells with connecting ribs on the same principle as Brunelleschi's dome in Florence, and was nearly completed before Michelangelo's death in 1563, and the lantern in 1590 from the model which he had made. In 1605 the east end of the old basilica was taken down, and three more bays were added, thus converting the Greek cross of Michelangelo's design into the Latin cross originally conceived by Bramante. The nave and the eastern vestibule were completed in 1620, and the great semicircular portico was added by Bernini in 1667. The immense height of the east façade, and its prolongation in front of Michelangelo's chief feature, the dome, hides the design of a great portion of the latter, so that it can only be seen either from a great distance (Plate III., fig. 68), or from behind the western apse, where the relative grouping with the great apses can be properly appreciated. A second well-known work by Michelangelo is the new sacristy of the church of San Lorenzo, Florence (1523-1529), designed to contain the monuments of Giuliano and Lorenzo de' Medici, the architectural design of which is poor.

Antonio di Sangallo was the architect of the church of San Biagio at Montepulciano (1518), with a cruciform plan, and dome in the centre, and a campanile at the south-west angle somewhat similar to those of Wren in London.

The church of Santa Maria-di-Carignano (1552) at Genoa, by Galeazzo Alessi, is finely situated but unsatisfactory in its design, the lower part being stunted in its proportions and its order to a different scale from that in the campanile towers and the dome. The most beautiful interior is that of the Annunziata in the same town, by Giacomo della Porta (1587); the arches of its nave arcade are carried on Corinthian columns of marble, of fine proportion, and the nave is covered with a barrel vault with penetrations admitting the light from clerestory windows. The churches of San Giorgio Maggiore (1556-1579), San Francesco della Vigna (1562), and Il Redentore (1577), all in Venice, were designed by Palladio, the interior of the latter being the finest; the façade of the first named is the best-proportioned, but whether its design is due to Palladio, or to Scamozzi, who built it in 1610, is not known. A far finer church in its picturesque grouping and the originality of its design is that of Santa Maria della Salute on the Grand Canal (1631), by Baldassare Longhena; the church is octagonal on plan, with aisles round, giving access to six recesses with altars and to an important eastern chapel with central dome. The central octagon is covered with a lofty dome with immense corbel buttresses of vigorous and fine design. The entrance portal of the west front is perhaps the best example of the period in Italy. Longhena also designed the Santa Maria degli Scalzi (1680), completed by Sardi in 1689, the latter being responsible for the heavy front of San Salvatore (1663), as also of the rich but somewhat debased church, in the Jesuit style, Santa Maria Zobenigo (1680-1683).

Secular Architecture.—In the application of the leading features of classical architectural design to palaces and mansions,

the Italians had a much easier field on which to exercise their originality, as the requirements were very different from those which obtained in the middle ages. Moreover, the classic style lent itself more readily to the horizontal lines given by string courses, cornices and ranges of windows, which naturally exist in dwelling-houses on account of the various storeys. As in ecclesiastical, so in secular architecture, the first introduction of the Revival takes place in Florence, which was then the principal art centre of Italy, and the earliest examples are in a sense transitional, in that they are based on the earlier medieval work. As in the Palazzo Vecchio (1298) in Florence, and the Ricciarelli palace at Volterra (*c.* 1320), the rusticated masonry which gives them so fine a character forms the chief characteristic of the Riccardi and Strozzi palaces, the only changes being the substitution of a classic cornice of considerable projection in the place of the machicolations of the Palazzo Vecchio, and the employment of circular arches in the windows in the place of the pointed and curved arches.

The earliest example, the Riccardi palace (1430), by Michelozzo (fig. 52), built for Cosimo de' Medici, is certainly the finest, owing partly to its size but more especially to the magnificent bossed and rusticated masonry of the ground storey and the bold projecting cornice, which crowns so admirably the whole structure. The lower two storeys of the main front of the Pitti palace were built by Brunelleschi in 1435, the return wings and court not being carried out till after 1550 from the designs of Ammanati; compared with the other Tuscan palaces the cornice is extremely poor and the whole front too monotonous. The beautiful court of the Palazzo Vecchio was reconstructed and decorated by Michelozzo in 1434. The Strozzi palace (1489), by Benedetto da Maiano and S. Pollajuolo, (Cronaca), comes next to the Riccardi as regards general design, but in comparison with it the windows are too small, and the want of a much bolder rustication, as provided in the latter, is much felt. Other examples of the same type are the Gondi (1481) and the Antinori palaces, by G. di Sangallo, and the Casa Larderel, all in Florence; the Spanochi (1470) and the Piccolomini (1460) palaces in Siena, and the Piccolomini palace (1490) in Pienza. In the Guadagni palace at Florence, by S. Pollajuolo, there is a third storey, consisting of an open gallery, which gives the depth of shadow otherwise afforded by the projecting cornice. In the Ruccellai palace (1460), by Alberti, the design is spoilt by the introduction of the classic pilasters at regular intervals on each storey, which suggest no structural object and have too little projection to give any effect of light and shade, so that it is only on account of the purity of their details that they are worth notice. The Pandolphini palace, the design of which is attributed to Raphael, carried out after his death by Sangallo, is a simple and unpretentious building of fine proportions: the Pall Mall façade of Sir Charles Barry's Travellers' Club in London is a reproduction of this palace. The Bartolini palace (1520), by Baccio d' Agnolo, is said to have been the first astylar example in which the Classic orders were employed only to decorate the entrance door and windows, but this had already been done in 1488 in the Scuola di San Marco in Venice.

Throughout the greater part of the 15th century, the Venetian Gothic style still held its own in the palaces of Venice, so that it is only towards the close of the century we find the first actual results of the Classic Revival. The earlier palaces may be looked upon as transitional work, in which Gothic principles rule the design while the details are borrowed from classic sources. The intimate acquaintance with the proportions of the Classic orders and their ornamental detail shows that the designers of the earliest Renaissance palaces must have acquired their knowledge outside Venice. Among these designers we find the names of members of the Lombardi family (which, as the name suggests, come from Lombardy), who for three or four generations, either as architects or sculptors, would seem to have been the chief founders of the Renaissance style in Venice. One of these, Pietro Lombardo, has already been referred to as the designer of the church of the Miracoli, and to him is due the Vendramini-Calerghi palace on the Grand Canal (Plate IV., fig. 71), built in 1481, which in some respects is the finest example in Venice. It should be observed that all these palaces on the Grand Canal have an architectural frontage only, the flanks being built in plain masonry or brick stuccoed over, and with very poor, if any, dressings to the windows. This is well exemplified in the Vendramini palace, where there are gardens on each side, showing the total want of correlation between the rich architectural front and the poverty of the flanks.

Fig. 52.—Riccardi Palace, Florence.

In a still earlier example, the Dario palace, one of the flanks borders on a side canal, so that its brick construction, partly covered with stucco, contrasts strangely with the rich marbles encrusting the main front. In the Dario palace the transition from Gothic to Renaissance is more clearly seen, as the only changes made are the substitution of circular window-heads for the Ogee Venetian arch, the projecting cornice with modillions, and more or less pure classic details. In the Vendramini palace the employment of the orders, to break up or subdivide the wall surface, has become a recognized treatment, based on the theatre of Marcellus and the Colosseum at Rome. On the ground storey there are panelled pilasters only, but on the first and second storeys three-quarter detached columns of the Corinthian order are employed, and the entablature is doubled in height with a bold projecting cornice, so as to crown properly the whole building.

The semicircular-headed windows of the palace are filled with moulded tracery carried on columns in the centre of each, which must be looked upon as the classic version of the arcade of the Ducal palace. This feature is found in other early Renaissance work in Venice, as in the Scuola de San Rocco (1517), and the Cornaro Spinelli palace (1480). In the latter, probably also by Pietro Lombardo, there are pilasters only on the groins of the main front, and the window-heads are enclosed in square-headed frames. In the Scuola de San Marco (1488), by Lombardo, we find another type of window,

single and lofty, with pilaster strips each side carrying an entablature with pediment. The same window decoration is found on the south and west fronts of the court of the Ducal palace and the external south front, and also in the Camerlenghi palace (1525), by Bergamasco and in other examples of early 16th-century work. In the Scuola de San Rocco the columnar decoration assumes much greater importance, and, in imitation of the triumphal arches of Septimus Severus and Constantine in Rome, the column is completely detached, with a wall-respond behind. Among other examples to be noted are the Cornaro-della-Grande palace (1532), by Sansovino, which is very inferior to his other work in Venice; the Grimani palace (1554), by San Michele (who also designed the fortifications of the Lido); the Zecca or mint (1537), the small loggetta (1540) at the foot of the campanile of St Mark's and now destroyed, and the Procuratie Nuove (completed by Scamozzi in 1584), all by Sansovino; the Balbi palace (1582), by Vittoria; and the Ponte Rialto (1588), by Antonio da Ponte. Sansovino's greatest work in Venice was the library of St Mark's, which was commenced in 1531; in this he has shown not only remarkable powers of design but great boldness in the projection of his columns, cornices and other architectural features. The upper frieze has been increased in height, so as to admit of the introduction of small windows to light an upper storey, and this gives much greater importance and dignity to the entablature crowning the whole structure. Two of the most imposing palaces on the Grand Canal, but of later date, are the Pesaro (1679) and the Rezzonico (1680), both by Longhena, the architect of the Salute church. The former is too much overcharged with ornament, but it has one advantage, the classic superimposed orders of the main front being repeated on the flank overlooking the side canal, with pilasters substituted for the detached columns of the main front. The Rezzonico palace is much quieter in design, and finer in its proportions, but even there the cherubs in the spandrils are too pronounced in their relief.

In Rome there are no important examples of the 15th century, with the exception of the so-called "Venetian palace," which still retains externally the features of the feudal castle, such as machicolations, small windows and rusticated masonry. This was owing probably to the comparative poverty of the city, which had to recover from the disasters of the 14th century. The earliest example of the Renaissance is that of the Cancellaria palace (1495-1505), by Bramante, the architect of the church at Todi; this was followed by a second and less important example, the Giraud or Torlonia palace (1506). The former is an immense block, 300 ft. long and 76 ft. high, in three storeys, with coursed masonry and slightly bevelled joints, the upper two storeys decorated with Corinthian pilasters of slight projection and crowned with a poor cornice, so that its general effect is very monotonous, and the design is only relieved by the purity of its details, such as those of the window and balcony on the return flank. In 1506 Bramante was instructed to carry out the court of the Vatican, of which the great hemicycle at one end, designed in imitation of similar features in the Roman thermae, is an extremely fine example; to what extent he was responsible for the court of the Loggie, decorated by Raphael, is not known. The Villa Farnesina (1506), best known for its fresco decorations by Raphael and his pupils; the Ossoli palace (1525); and the Massimi palace (1532-1536), with magnificent interiors, were all built by Baldassare Peruzzi. The finest example in Rome is the Farnese palace, commenced in 1530 from the designs of Antonio di Sangallo; the design is astylar, as the employment of the orders is confined to the window dressings, the angles of the front having rusticated quoins; the upper storey, with the magnificent cornice which crowns the whole building, was designed by Michelangelo, and in the upper storey he introduced a feature borrowed from the Roman thermae, brackets supporting the three-quarter detached columns flanking the windows. The brilliance of the design is not confined to the exterior, and the entrance vestibule and the great central court are the finest examples in Rome. Here the upper storey added by Michelangelo is inferior to the two lower storeys by Sangallo.

The museum in the Capitol at Rome, by Michelangelo (1546), is one of those examples in which the principles of design are violated by the suppression of the horizontal divisions of the storeys which it should have been an object to emphasize. By carrying immense Corinthian pilasters, through the ground and first storeys, Michelangelo, it is true, obtained the entablature of the order as the chief crowning feature, and so far the result is a success, but in other hands it led to the decadence of the style. Among other examples in Rome which should be mentioned are the Villa Madama by Giulio Romano (1524); the Nicolini palace (1526) by Giacomo Sansovino; the Villa Medici (1540) by Annibale Lippi; the Chigi palace (1562) by G. de la Porta; the Spada palace (1564) by Mazzoni; the Quirinal palace (1574) by Fontana (the architect who raised the obelisk in the Piazza di San Pietro); and the Borghese palace (1590) by Martino Lunghi.

We now return to about the middle of the 16th century, to the period when the great architects Barozzi da Vignola and Andrea Palladio of Vicenza commenced their career, and by their works and publications exercised a great and important influence on European architecture.

The villa of Pope Julius (1550), and the Costa palace, Rome, are good examples of Vignola's style, always very pure and of good proportions, but his principal work was that of the Caprarola palace (1555-1559), about 30 m. from Rome, which he built for the cardinal Alessandro Farnese. The plan is pentagonal with a central circular court, and it is raised on a lofty terrace; the palace is in two storeys with rusticated quoins to the angle wings, and the Doric and Ionic orders, superimposed, separating arcades on the lower storeys and windows on the upper. The arcade of the central court is of admirable proportions and detail, second only to that of the Farnese palace.

Palladio in his earlier career measured and drew many of the remains of ancient Rome, and more particularly the thermae (the drawings of which are in the Burlington-Devonshire Collection), but he does not seem to have carried out any buildings there. His most important work, and the one which established his reputation, is that known as the basilica at Vicenza (1545-1549), which he enclosed with an arcaded loggia in two storeys of fine design and proportion, and extremely vigorous in its details. He built a large number of palaces in his native town, among which the Tiene (1550) and the Colleone Porto are the simplest and best, the latter being the model on which the front of Old Burlington House (London) was rebuilt in 1716. In the Valmarana, the Consiglio and the Casa del Diavolo he departed from his principles, in carrying the Corinthian pilasters through two floors, and by returning the cornice round the order he destroyed its value as a crowning feature. Among other works of his are the Chiericate (1560), Trissino (1582) and Barbarano (1570) palaces; the Olympic theatre (1580), which was completed after his death; and the Rotonda Capra near Vicenza, reproduced by Lord Burlington at Chiswick.

Though he laid down no rules for the guidance of others, the works of San Michele are superior to those of Palladio, with the exception, perhaps, of the basilica at Vicenza and the library at Venice. In the Bevilacqua palace (1527), at Verona, there is far greater variety of design than in Palladio's work, and the Pompei palace (1530) and the two gateways at Verona (1533 and 1552) are all bold and simple designs. In the same town is an extremely beautiful example of the early Renaissance, the Loggia del Consiglio (1476) by Fra Giocondo; a similar example with open gallery on the ground storey exists at Padua, where there is also the Giustiniani palace (1524) by Falconetto, an interesting example of a master not much known. The town hall of Brescia (1492) was built from the designs of Tommaso Formentone, who employed for the carving of the medallions on the lower storey, and the pilasters with their capitals and the friezes, various artists of high merit, so that the building takes its rank as one of the finest in north Italy, but independently of their collaboration the design of the first floor is in design and execution equal to Greek work. The upper storey and its circular windows are said to have been added by Palladio, and they are so commonplace and out of scale that by contrast they increase the artistic value of Formentone's work.

The so-called Palazzo de' Diamanti at Ferrara, built in 1493 for Sigismondo d'Este, is decorated externally with a peculiar kind of rustication, in which the square face of the stones is bevelled towards the centre in imitation of diamond facets: the quoins of the palace have panelled pilasters richly carved, and similar pilasters flank the entrance door; the windows, with simple architrave mouldings and cornices on ground storey and pediments on the first storey, constitute the only architectural features of a novel treatment.

At Bologna there are two or three palaces of interest,—the Bevilacqua by Nardi (1484), chiefly remarkable for its central court surrounded with arcades, there being two arches on the upper storey to one on the lower, which presents a pleasant contrast and gives scale to the latter; the Fava palace (1484), in which on one side of the court are elaborately carved

corbels carrying arches supporting an upper wall; and the Albergati palace (1521), by Peruzzi, in which the architectural decoration is confined to the entrance doorway windows flanked with pilasters and cornices in pediments and the entablatures of the ground and upper storeys, all the features being in stone on a background of simple brick construction. The Casa Tacconi is similarly treated. Many of the streets in Bologna have arcades on which the upper part of the house is built, and there is an endless variety in the capitals of these arcades.

If the palaces of Genoa are disappointing as regards their external design, this is in some measure compensated for by the magnificence of their entrance vestibules, which (with the staircases and the arcades in the courts beyond) are built in white marble, and have probably suggested the title of the "marble palaces of Genoa." Many of these palaces are situated in narrow streets, so that no general view can be obtained of them, which may account for their exterior being erected in inferior materials with stucco facing. The ground storey of the palaces is almost always raised about 6 to 8 ft. above the street level, so that the first flight of steps leading up to the court forms a prominent feature in every palace; the ceilings of the entrance vestibule are also mostly decorated with arabesque work in stucco, or with painted devices, &c. The palaces in the town are lofty, and as a rule crowned with fine cornices, and there are no examples of pilasters being carried through the floors; the palaces and villas in the vicinity of Genoa are of less height, and owe much of their magnificence to the terraces on which they are erected. They have no special qualities except in slight variations of the external wall surface decoration, consisting of the applied orders on the several storeys. Among the best examples are the Palazzo Cataldi, formerly Palazzo Carega (1560), in which there are no pilasters, but rusticated quoins at the angles and windows with moulded dressings and pediments. The entrance vestibules of the Durazzo-Pallavicini, Rosso (1558) and Balbi (1610) palaces are in each case their finest features. The Pallavicini palace, and the Pallavicini, Spinola, Giustiniani and Durazzo villas, are all fairly well designed and in good proportions, but with no original treatment. Two of the palaces are flanked by open loggias with arcades, from which fine views are obtained, giving them a special character; that of the Durazzo palace being on the first floor, and of the Doria Tursi on the ground storey. The University (1623) and the Ducal palaces have very magnificent entrance vestibules, the former with lions on the lower ramp of the staircase.

Many of the finest palaces at Genoa are by Galeazzo Alessi, but in none of them has he approached the design of the Marino or municipal palace at Milan, in which he produced a remarkable work; the internal courtyard surrounded with arcades carried on coupled columns is an original combination which is not excelled in any other court in Italy, and the exterior façades are very fine.

The internal courtyard of the hospital at Milan (243 ft. by 220 ft.), with an arcade in two storeys, was designed by Bramante and begun in 1457; only one side was completed by him, but in 1621, in consequence of a large benefaction, the remainder was completed by Ricchini according to the original design; the proportions of the arcade are extremely pleasing, and it forms now one of the chief monuments of the town. Ricchini was the architect of the Litta palace, one of the largest in Milan.

There still remains to be mentioned one of the early examples of the Renaissance, the triumphal arch which was erected in 1470 at Naples to commemorate the entry of Alphonso of Aragon into the town. It is built against the walls of the old castle in four storeys, and connected with bas-reliefs and statues. The largest palace in Italy, that of the Caserta at Naples, with a frontage of 766 ft., built in 1752 by Vanvitelli, is one of the most monotonous designs, rivalled in that respect only by the Escurial in Spain.

<div align="right">(R. P. S.)</div>

Renaissance Architecture in France

The classical revival of the 15th century in Italy was too important a movement to have remained long without its influence extending to other countries. In France this was accelerated by the campaigns of Charles VIII., Louis XII. and Francis I., which led to the revelation of the artistic treasures in Italy; the result being the importation of great numbers of Italian craftsmen, who would seem to have been employed in the carving of decorative architectural accessories, such as the panels and capitals of pilasters, niches and canopies, corbels, friezes, &c., either in tombs, as for instance in those of Charles of Anjou at Le Mans (1472) and at Solesmes (1498), of Francis, duke of Brittany (1501), and of the children of Charles VIII. (1506) at Tours, and of Cardinal d'Amboise in Rouen cathedral, the figures in all these cases being carved by French sculptors. They were also employed in architectural buildings, where the design and execution were by French master-masons, and the Italians were called in to carve the details, as in the choir screens of Chartres, Albi and Limoges cathedrals, the portal of St. Michel at Dijon, the eastern chapels of St Pierre at Caen, and numerous other churches throughout France; or for mansions like the Hôtel d'Alluye at Blois, the Hôtel d'Allemand at Bourges, and the châteaux of Meillant (1503), Châteaudun and Nantouillet (1519). The great centre of the artistic regeneration was at first at Tours, so that in Touraine, and generally on the borders of the Loire and the Cher at Amboise, Blois, Gaillon, Chenonceaux, Azay-le-Rideau and Chambord, are found the principal examples; later, Francis I. transferred the court to Paris, and the château of Madrid, and the palaces of Fontainebleau, St Germain-en-Laye, and the Louvre, follow the change. In all these châteaux the Italian craftsman would seem to have been under the direction of the master-mason or architect, because the whole scheme of the design and its execution is French, and only the decoration Italian. In cases where the Italian was not called in, the Gothic flamboyant style flourishes in full vigour with no suggestion of foreign influence, as in the palais de justice at Rouen, the church of Brou (Ain), 1505-1532, the Hôtel de Cluny, Paris, and the rood-screen of the church of the Madeleine at Troyes (1531).

Between the last phase of Flamboyant Gothic and the introduction of the pure Italian Revival there existed a transitional period, known generally as the "Francis I. style," which may be subdivided under three heads:—the Valois period, comprising the reigns of Charles VIII. and Louis XII. (1483-1515); the Francis I. period (1515-1547); and the Henry II. and Catherine de' Medici period (1547-1589). The first two are characterized by the lofty roofs, dormers and chimneys, by circular or square towers at the angles of the main building with decorative machicolations and hourds, by buttresses set anglewise, which run up into the cornice, and square-headed windows with mullions and transoms. In the second period the machicolations are converted into corbels carrying semicircular arcaded niches in which shells are carved; the buttresses become pilasters with Renaissance capitals; and the Gothic detail, which in the first period is mixed up with the Renaissance, disappears altogether. In the third period Italian design begins to exert its influence in the regular interspacing of the pilasters or columns with due proportion of height to diameter, in the completion of the order with the regular entablature, and its employment generally in a more structural manner than in the earlier work.

The two first periods are well represented in the château of Blois, where, in the east wing built by Louis XII., square-headed windows alternate with three central arches, the buttresses are set anglewise running into the cornice, and pillars and angle shafts are carved with chevrons, spiral flirtings, or cinque-cento arabesque; the cornices of the towers containing staircases project and are carried on arched niches supported on corbels (the new interpretation of the machicolations of the feudal castle); above the cornice is a balustrade with pierced flamboyant tracery, and the dormer windows retain their Gothic detail. In the north wing of Francis I. all these Gothic ornamental details disappear, and are replaced by the Renaissance. Panels and pilasters take the place of the buttresses—the panels sometimes enriched with cinque-cento arabesque; shells are carved in the arched niches of the cornice, and modillions and dentil courses are introduced; the balustrade is pierced with flowing Renaissance foliage interspersed with the salamanders and coronets; the same high roofs are maintained, but the dormer windows and chimneys, still Gothic in design, are entirely clothed with Renaissance detail.

The finest feature of the façade of this north wing, facing the court, is the magnificent polygonal staircase tower in its centre (Plate VIII., fig. 84); four great piers rise from ground to cornice, between which the rising balustrade is fitted; the

whole feature Gothic in design, but Renaissance in all its details. The splendid carving of the panels of the piers and the niches with their canopies was probably done by Italian artists. The figures in these niches are said to be by Jean Goujon. The great dormers and chimneys have not the refinement in their design which characterizes the lower portion, and may be of later date. The north front of the château is raised on the foundation walls of the old castle, part of which is encased in it, and this may account for the slight irregularities in the widths of the bays. The design differs from that of the south front, the windows all being recessed behind three-centre arched openings; the open loggia at the top, which is admirable in effect, is a subsequent alteration.

Before passing to the Louvre and Tuileries, representing the third period, we must refer to some other important early châteaux and buildings. Some of these, such as the châteaux of Madrid and Gaillon, are known chiefly from du Cerceau's work, as they were destroyed at the Revolution. Of the latter building, the entrance gateway is still *in situ*; there are some portions in the court of the École des Beaux-Arts at Paris, consisting of a second entrance gateway, a portico and some large panels. The gateway shows a singular mixture of Gothic and Renaissance; the centre portion, with the gateway and great niche over, is debased classic, the side portions retaining the buttresses, mouldings, panels and other features belonging to the latest phase of Flamboyant Gothic.

Of buildings still existing, the hôtel de ville of Orleans (1497) is a good example of early transition work, in which Gothic and Renaissance work is intermingled, and it is interesting to compare it with the hôtel de ville at Beaugency, built by the same architect, Viart, some twenty-five years later. There is the same principle in design, much improved in the later example, but all the Gothic details have disappeared.

In the château of Chenonceaux (1515-1524) we find a compromise between the two styles; Gothic corbels, piers and three-centre arches are employed, varied with debased classic mouldings, shells and capitals; here, as at Azay-le-Rideau (1520), the château was not transformed like those at Langeais and Rochefoucauld, where what was externally a 14th-century castle developed internally into a 16th-century mansion; both Chenonceaux and Azay-le-Rideau were built as residences, and yet in both are displayed those features which belong to the fortified castle; at the angles of the main structure in both cases are circular towers, in the latter case crowned with machicolations and hourds, which, however, are purely decorative, pierced with windows, and broken at intervals with dormer windows, a feature which gives it the aspect of an attic storey. The lofty roofs and conical terminations to these angle towers, with dormer and chimney, give the same picturesque aspect to the grouping as that which was afforded in the fortified castle, where, however, they originated in the necessity for defence. The entrance portals of both chateaux are beautiful features, absolutely Gothic in design, and only transformed by cinque-cento detail.

In the château of Chambord (1526) we find the same defensive features introduced, in the shape of great circular towers at the angles, but here with more reason, as the chateau was intended more for display than habitation. The chateau itself, about 200 ft. square, has circular towers at the angles, and in the centre a spiral staircase with double flight, leading to great halls on each side, which give access to the comparatively small rooms in the angles of the square and the towers beyond, and to the roof, which would seem to have been the chief attraction, as there is a fine view therefrom; and the elaborate octagonal lantern over the staircase, the dormer windows, chimneys and lanterns on the conical roofs of the towers, are all elaborately carved. There are three storeys to the building, subdivided horizontally by string courses, and terminated with a fine cornice carrying a balustrade, and vertically by a series of pilasters of the Corinthian order. The varied outline of this building, with the alternation of blank panels and windows between the pilasters, relieves what might otherwise have been its monotony. The château is situated on the east side of a great court measuring about 500 ft. by 370 ft., with a moat all round. To the right and left of the central block the walls are carved up three storeys, and an attic, with open arcades inside, leading to the angle towers of the enclosure. At a later period Louis XIV. continued the unfinished structure by a one-storey building round. The carving of the capitals, corbels and other decorative work was all done by Italian artists, under the direction of some architect whose name is not known.

One of the gems of Francis I.'s work is the small hunting lodge originally built at Moret near Fontainebleau, to which at one time the king thought of adding, before he began his great palace there. This was taken down in 1826, and re-erected in the Cours-la-Reine at Paris. Though small, it is the purest example of the first Renaissance. Other examples are the hôtel de ville of Paray-le-Monial (1526); the Hôtel d'Anjou at Angers (1530), built by Pierre de Pincé; the Hôtel Bernuy at Toulouse (1530); the Hôtel d'Ecoville at Caen (1532); the Manoir of Francis I. at Orleans; the Hotel Bourgthéroulde at Rouen (1520-1532) and other buildings opposite Rouen cathedral, and what remains of the château known as the Manoir d'Ango (1525) at Varengeville, near Dieppe. The château of St Germain-en-Laye (1539-1544), the upper half of which is built in brick, belongs also to the early period, as also the hôtel de ville at Paris, built in 1533 by Domenico da Cortona, an Italian, who after spending some thirty years in France would seem to have caught the spirit of the French Renaissance so well as to be able to produce one of the most remarkable examples of the Francis I. style. In the existing building the original design has been copied from the building burnt down by the Communists in 1871.

From this we pass to the palace at Fontainebleau, begun by Francis I. in 1526, to which there have been so many subsequent additions and alterations that it is difficult to differentiate between them. The building owes its picturesque effect more to its irregular plan (as portions of an earlier structure were enclosed in it) than to any brilliant conceptions on the part of its architect. There is an endless variety of charming detail in the capitals, corbels and other decorative features, but the employment of pilaster strips purely as decorative features (without any such structural property as that in the Porte Dorée at the Cour Ovale) suggests that the Italian architect Serlio, to whom sometimes the work is ascribed, certainly had nothing to do with it.

On the other hand, there is every reason to believe that the designs made by Pierre Lescot for the Louvre, begun in 1546, were, as regards their style, largely based on the principles set forth in Serlio's work on architecture, published in 1540. The south-west angle of the court of the Louvre is the earliest example of the third period of the Renaissance, in which the orders are employed in correct proportions with columns or pedestals carrying entablatures with mouldings based on classic precedent. The portion built from Lescot's designs (Plate VIII., fig. 83) consists of the nine bays on the east and north sides, the latter not being completed till 1574, as the workmen would seem to have been transferred to the building of the Tuileries, begun in 1564.

The Corinthian order is employed for the ground and first storeys and an attic storey above, in which the pilaster capitals run into the bedmold of the upper cornice. Of the nine bays, the central and side bays are twice the width of the others, and project slightly with the cornices breaking round them; this feature, and the crowning of the western bays with a segmental pediment, give a variety to the design, which otherwise might have become monotonous by its repetition of similar features. The balustrade also is replaced by the *chêneau*, a cresting in stone, which hereafter is found in nearly all French buildings. The sculptor, Jean Goujon, would seem to have worked in complete harmony with the architect, thus producing what will always be considered as one of the *chef-d'œuvres* of French architecture.

The architect employed by Catherine de' Medici for the Tuileries was Philibert de l'Orme, who combined the taste of the architect with the scientific knowledge of the engineer. Only a portion of his design was carried out, and of that much disappeared in the 17th century, when his dormer windows were taken down and replaced by a second storey and an attic. Bullant and du Cerceau also added buildings on each side.

The Tuileries were built about 500 yds. from the Louvre, and Catherine de' Medici conceived the idea of connecting the two. The work, which began with the "Petite Galerie," with the south wing, as far as the Pavilion Lesdiguieres, was started in 1566, being of one storey only. The mezzanine and upper storey were not completed till the beginning of the 17th century. In 1603 the remainder of the south front and the Pavillon-de-Flore were completed by Jacques Androuet du Cerceau.

Of Philibert de l'Orme's work at Anet (1549), only the entrance gateway, the left-hand side of court, and the chapel remain, sufficient, however, to show that he had already at that early date mastered the principles of the Italian Revivalists. The chapel is in its way a remarkable design, but the hemispherical dome, pierced by elliptical winding arches inside, is not happy in its effect. The frontispiece which he created opposite the entrance, now in the court of the École des Beaux-Arts in Paris, shows great refinement in its details, but proportionally errs in many points. De l'Orme built also the bridge and gallery on the river Cher, forming an addition to the château of Chenonceaux.

Amongst other work of this period are the additions made by Bullant to the château de Chantilly, where he traversed the principles of classic design by running Corinthian pilasters through two storeys and cutting through the cornice of his dormer windows. At Écouen (1550) he destroyed the scale of the earlier buildings of 1532 by raising in front of the left wing of the court four lofty Corinthian columns with entablature complete, which he copied from the temple of Castor in Rome.

Among the early Renaissance work are the chateau of Ancy le Franc (Yonne), Italian in character, which may be by Serlio (1546); the Hôtel d'Assézat at Toulouse (1555), in which there is a strong resemblance to the court of the Louvre; the houses at Orleans, known as those of Agnes Sorel, Jeanne d'Arc and Diane de Poitiers (1552); and there is other work at Caen, Rouen, Toulouse, Dijon, Chinon, Périgueux, Cahors, Rodez, Beauvais and Amiens, dating up to the close of the 16th century. In this list might also be included the fine town hall of La Rochelle, the Hôtel Lamoignon in the rue des Francs-Bourgeois, Paris (1580), and the Hôtel de Vogüé at Dijon, which retained the Renaissance character, though built in the first year of the 17th century.

In the reigns of Henry IV. and Louis XIII. the first work of importance in Paris is that of the Place Royale, now the Place des Vosges; in this brick was largely employed, and the conjunction of brick and stone gave a decorative effect which dispensed with the necessity of employing the Classic orders. At Fontainebleau, where Henry IV. made large additions, the same mixture of brick and stone is found in the Galerie des Cerfs, and in the great service court (*cour des cuisines*). The example set was followed largely through the country, and numerous mansions and private houses in brick and stone still exist. Henry IV.'s most important work at Fontainebleau is the Porte Dauphine, of which the lower part, with rusticated columns and courses of masonry, does not quite accord in scale or character with the superstructure, in which is put some of the best work of the century.

Except perhaps for the monotony of the rusticated masonry which is spread all over the building, the palace of the Luxembourg, by Salomon de Brosse (1615), is an important work, in which he was probably instructed by Marie de' Medici to reproduce the general effect of the Pitti palace at Florence. The three storeys of the main block are well proportioned, but the absence of a boldly projecting cornice, such as is found in the Riccardi and Strozzi palaces, is a defect; the same architect reconstructed the great hall of the palace of justice at Paris, burnt in 1871 but now rebuilt to the same design.

In 1629 the building subsequently known as the Palais Royal was begun from the designs of Lemercier; but it has been so materially altered since that scarcely anything remains of his design, though the works carried out from his designs at the Louvre were of the greatest possible importance. The court of the latter, as begun by Pierre Lescot, was of small dimensions, corresponding with that of the palace of Philip Augustus, but Lemercier proposed to quadruple its dimensions. It is not certain whether he built the lower portion of the Pavilion d'Horloge, but he designed the upper part, with the caryatid figures sculptured by Jacques Sarrazin. On the north side of this pavilion he built a wing similar in length and design to that of Pierre Lescot, and continued the wing along the north side to the centre pavilion; this was continued by Levau, the architect of Louis XIV., round the other sides of the court. His design for the east front, however, did not recommend itself to the king or to his minister Colbert, and a competition was held, the first place being given to the design by a physician, Dr Perrault. Prior to its being begun, however, Bernini was sent for, and he submitted other designs, fortunately not carried out, as they would have destroyed the court of the Louvre. In 1665 the works were begun on the design of Perrault, a grandiose frontispiece which appealed to Louis XIV., but in which no cognizance had been taken of the various rooms against which it was built; consequently no windows could be opened, and it forms now a useless peristyle. Moreover it was so much wider than the original building that on the north side it became necessary to add a new front. Fortunately the example set by Perrault of coupling columns together has rarely been followed since in France, so that in the Garde-Meuble on the south side of the Place de la Concorde, by Gabriel, we return again to the original classic peristyle. The works undertaken at the Louvre progressed but slowly, in consequence of the greater interest taken by Louis XIV. in the palace he was building at Versailles, an extension of the hunting-box built by his father Louis XIII., which he insisted should be maintained and incorporated as the central feature in the new building. But as it was comparatively small in dimensions, of simple design, and in brick and stone, it was quite unfit to become the central feature of the main front of the largest palace in Europe. To make it worse, the new wings built on either side were lofty and of more importance architecturally, and as they projected some 300 ft. in advance of the earlier building, they reduced it to still greater insignificance. But even then the architect, Jules Hardouin Mansart, might have redeemed his reputation by buildings of greater interest than those which now exist. The back elevation of the central block is 330 ft. wide, the returns 280 ft., and the length of the wings on each side 500 ft.; in other words he had nearly 1900 ft. run of façade, and it is simply a repetition of the same bays from one end to the other, in three storeys all of the same height, the lower one with semicircular arched openings, the first floor decorated with pilasters on columns of the Ionic order, and an attic storey above with balustrade. The slight projection given to the central and side bays of each block, just sufficient to allow of columns in the first floor as decorative features instead of pilasters, is of no value in fronts of such great dimensions. The great galleries inside have the same monotonous design as in the façades, relieved only by the rich decoration in the first case and the splendid masonry in the latter. There is one saving clause in the main front, the chapel by R. de Cotte on the right-hand side being externally and internally a fine structure, and the best ecclesiastical example of the period.

Among other buildings of the 17th century are those begun by Cardinal Mazarin in the rue de Richelieu, which now constitute the National library; the Hôtel de Toulouse (1626), now the Bank of France; the Hôtel de Sully (1630), by du Cerceau; the Hôtel de Beauvais (1654), by le Pautre; the Hôtel Lambert (also by le Pautre), in the Île St Louis; the château at Maisons, near St Germain-en-Laye, by François Mansart (1656); the Institute of France (1662), by Levau; two triumphal arches, of St Denis (1672), by Blondel, and St Martin (1674) by Bullet; the Hôtel des Invalides (1670), by Bruant; the Place des Victoires and the Place Vendôme (1695-1699), by Jules Hardouin Mansart, in which a series of large houses are grouped together in one design; the Trianon at Versailles (1676), and the château of Marly (1682), both by J.H. Mansart; and important monumental buildings in the principal provincial cities, such as Lyons, Bordeaux, Nantes and Tours.

In the 18th century those which are worthy of note are the Hôtel Soubise (1706), now the "Archives Nationales"; the fountain in the rue de Crenelle, a fine composition; the École Militaire (1752), by Gabriel; the École de Médecine (1769), by Gondouin; the mint (1772), by Antoine; the Place de la Concorde, with the Garde-Meuble, by Gabriel (1765); the Hôtel de Salm, now the Legion of Honour; the Place Stanislas at Nancy (1738-1766), in which are grouped the town hall, archbishop's palace, theatre and other public buildings, with triumphal arch and avenues leading to the palace of the duke Stanislaus (with magnificent wrought-iron enclosures and gates by Jean Lamour, the greatest craftsman of the century); the theatre at Bordeaux by Louis; and the Odéon, Paris (1789).

The ecclesiastical architecture of the French Renaissance comes at the end of our description owing to the far greater importance of the palaces, mansions and public monuments, and also because in the beginning of the 16th century France found herself in possession of a much larger number of cathedrals and large churches than she could maintain. Some of these are still unfinished, so that her first efforts would seem to have been directed to the completion of those already begun rather than to the erection of new ones, St Eustache in Paris being nearly the only exception of importance prior to the 17th century.

We have from time to time dwelt upon the important consideration which must not be lost sight of, viz. that nearly all the buildings erected in France up to the accession of Henry IV. were conceived and carried out in the spirit of the Flamboyant

Gothic style, cinque-cento details mixed up with Gothic at first, then superseding them, and even when the influence of the Italian revivalists began to exert itself, still retaining much of her traditional methods of design. If this was the case in civil architecture, it was naturally more pronounced in the additions made to ecclesiastical structures, and the gradual development of the style may be more easily followed in the latter. These are, however, so numerous, and they are so universally spread throughout France, that only a few of the most interesting examples can be here given; for instance, the porch of St Michel at Dijon; the upper part of the western towers of the cathedrals of Orleans and Tours; the three eastern chapels of St Jacques, Dieppe, built at the cost of Jean Ango, a celebrated merchant-prince of Dieppe, to whose chateau at Varengeville we have already referred; the eastern chapels of St Peter's, Caen, from the designs of Hector Sohier (1521), both internally and externally of great interest; the west end of the church at Vétheuil (Seine-et-Oise); the magnificent work of the west front and tower of the church at Gisors; the upper part of the west front of the cathedral at Angers; the portals of the church at Auxonne (Fichot); the choir at Tillières; the lantern of the church of St Peter, Coutances (1541); the porch of the Dalbade at Toulouse; and the north front of the church of Ste Clotilde at Les Andelys, which dates from the age of Henry II.

The church of St Eustache at Paris, begun in 1533, but not completed till the end of the century, is a large cruciform Gothic structure with lofty double aisles on each side and carried round the choir, and rectangular chapels round the whole building, excepting the west end. Structurally also it possesses all the most characteristic features of the Gothic church, with nave arcades carried on compound piers, triforium and clerestory, vaulted throughout, and flying buttresses outside. Close examination shows that all the details are of the early cinque-cento work, panelled pilasters of varying proportions, but with Renaissance capitals, corbels, niches and canopies all grouped together in a Gothic manner, and quite opposed to the principles of the Italian revivalists; what is more remarkable is that though long before its completion these principles had already borne fruit in the Louvre and Tuileries, the original conception was adhered to, and the portals of the north and south transepts (the last features added, with the exception of the ugly west front of the 18th century) still retain the character of the early French Renaissance.

In St Étienne-du-Mont, sometimes claimed as a second example, the church is Flamboyant Gothic throughout, the chief additions being the magnificent rood-screen of 1600, and the west portal, in which the banded columns of the Bourbon period form the chief features.

Coming to churches of later date, Salomon de Brosse (*c.* 1565-1627), the architect of the Luxembourg palace, added in 1616 a fresh front to the church of St Gervais, finely proportioned and of pure Italian design, which contrasts favourably with the Jesuits' church of St Paul and St Louis (1627-1641), overladen with rococo ornament; then came the churches of the Sorbonne (1629), by Jacques Lemercier, and of the Val-de-Grace (1645), by François Mansart, the dome of the latter, though small, being a fine design; the church of the Invalides, also by Mansart, the dome of which is the most graceful in France; the cathedral of Nancy (1703-1742), by Jules Hardouin Mansart and Germain Boffrand (1667-1754), the principal front of which is flanked by two towers with octagonal lanterns which group so well with the central portion (of the usual design, in two stages with pilasters and coupled columns, carrying a third stage with circular pediment) that it is unfortunate it should be almost the only example of its kind; and lastly the church of Ste Geneviève, better known as the Panthéon (1755), by Jacques Germain Soufflot (1713-1780), the dome of which is based largely on that of St Peter's in Rome. The main building with its great portico is a simple and fine piece of design, and unlike St Peter's the dome is well seen from every point of view; the decoration of its walls with paintings by Puvis de Chavannes and other French artists has now rendered the interior one of the most interesting in France.

(R. P. S.)

<div align="center">RENAISSANCE ARCHITECTURE IN SPAIN</div>

In Spain, as in France, the revival of classic architecture was engrafted on the Flamboyant style of the country, influenced here and there by Moorish work, so that the earlier examples of Spanish Renaissance constitute a transitional style which lasted till the accession of Philip II. (1558), who introduced what was then considered to be the purer Italian style of Palladio and Vignola. This, however, did not seem to have had much attraction for the Spaniards, owing to its coldness and formality, so that in the latter half of the 17th century a reaction took place in favour of the most depraved and decadent architecture in existence.

The magnificence of the earlier Renaissance work, which was introduced into Spain when she was at the zenith of her power, and (owing to the discovery of a new world) the possessor of enormous wealth, has scarcely yet been recognized, in consequence of the greater attraction of the Moorish architecture; there is no doubt that its exuberant richness in the 16th century derives its inspiration from the latter, and especially so in patios or courts found in every class of building, ecclesiastical as well as civil. There is still, however, another characteristic in the early Renaissance of Spain, which is not found in Italy or France, and which again owes its source to Moorish work, where the external walls and towers consist of simple plain masonry, and the rich decoration, generally in stucco brilliantly coloured and gilded, is confined to the courts and to the interiors of their magnificent halls. The Italian method of decorating the external front of the palaces with flat pilasters of the various orders placed at regular intervals, the windows and doors forming features of second-rate importance, was not followed by the architects of the Spanish Renaissance, who retained the simple plain masonry and reserved their decorations for the entrance doorways and windows, emphasizing therefore these features, and by contrast increasing their value and interest.

Instead also of the huge *cornicione* which the Italians employed to give the shadows required to emphasize the crowning features of their palaces, the Spanish architects preferred to obtain a similar effect by an open arcaded upper storey, which, as Fergusson remarks, "forms one of the most pleasing architectural features that can be applied to palatial architecture, giving lightness combined with shadow exactly where wanted for effect and where they can be applied without any apparent interference with solidity." These galleries would seem to have been provided to serve as promenades to the occupants of the palace, and more especially for the ladies when it would have been unwise or imprudent for them to venture into the streets. There is one well-known example in France, in the château of Blois, which is so attractive a feature that it is singular it has not been more often adopted.

Instead also of the monotonous balustrade, which is invariably found in Italy, the Spanish architects introduced richly carved crestings, with finials at regular intervals, a feature probably borrowed from Flamboyant Gothic and Moorish.

The three periods into which the architectural phases of the Renaissance style in Spain are divided are:—(1) The Plateresque or Silversmiths' work, from the conquest of Granada to the reign of Philip II. (2) The purer Italian style, called by the Spanish the Greco-Roman, though it has no Greek elements in its design, being based on the work of Palladio and Vignola. This style prevailed until the end of the 17th century. (3) The Rococo or Churrigueresque style, so called from the name of the architect, José Churriguera (d. 1725), the chief leader of the movement, which lasted for about 100 years.

Ecclesiastical Architecture.—The cathedral of Granada, built from the designs of Diego de Siloé, is the earliest example of the Renaissance in Spain, and in some respects the most remarkable, not only for its plan, in which there is an entirely new feature, but for the scheme adopted in the vaulting, which covers the whole church, and shows that its architect had studied the earlier Gothic churches, and was well acquainted with the principles of thrust and counter-thrust developed in them. The cathedral is 400 ft. long by 230 ft. wide, and therefore of the first class as far as size is concerned. The western portion consists of nave and double aisles on each side, the outer aisle being carried round the whole church and giving access to the chapels which enclose the building. The principal feature of the cathedral is at the east end, where the place of the ordinary apse is occupied by a great circular area, 70 ft. in diameter, crowned by a lofty dome, in the centre of which

in a flood of light stands the high altar. The vista from the nave through the great arch (37 ft. 6 in. wide and 97 ft. high) is extremely fine, and it is strange that it should be the only example of its kind. The west front was completed at a later date; the only feature of it belonging to the original church being the north-west tower, which, in its design, resembles the south-west tower of the church at Gisors in France. There are two other important Renaissance cathedrals at Jaen and Valladolid. The latter was built from a design of Juan de Badajoz in 1585 but never completed. On the south side of the cathedral is the chapel in which the Catholic kings lie buried, where there are two fine marble tombs enclosed by the *reja* or wrought-iron screen partly gilt, forged in 1522 by Maestre Bartholome. The *sagrario* or parish church, also on the south side, is a small version of the scheme of design employed in the cathedral.

In Spain, as in France, magnificent portals have been added to cathedrals and churches, and these are amongst the finest works of the Renaissance period. The more remarkable of these are the portals of the cathedral of Malaga, a deeply recessed porch, enriched with slender shafts and niches between; of Santa Engracia at Saragossa; and of Santo Domingo and the cathedral at Salamanca. Externally the Renaissance domes over the crossings of Spanish cathedrals are poor, but this is compensated for by the lofty steeples which form striking features. The western towers of the cathedral at Valladolid; the tower of the Seo in Saragossa, which bears some resemblance to Wren's steeples in the setting back of the several storeys and the crowning with octagonal lanterns; the tower of the cathedral Del Pilar at Saragossa, and that at Santiago, are all interesting examples of the Spanish Renaissance.

One of the most beautiful features of the Spanish Renaissance is found in the magnificent *rejas* or wrought-iron grilles, richly gilt, which form the enclosures of the chapels. Besides the example at Granada, others are found at Seville, where is the masterpiece of Sancho Muñoz (1528); at Palencia (1582); Cuenca (1557), where there are three fine examples; Toledo; Salamanca; and other cathedrals. The iron pulpit at Avila, the eagle lectern at Cuenca and the staircase railing at Burgos are all remarkable works in metal.

Secular Architecture.—With the exception of the magnificent portals, the finest works of the Renaissance in Spain as in France are to be found in the secular buildings, but with this difference, that the best examples in France are those built in the country or in comparatively small provincial towns, whereas in Spain they are all in the midst of the larger towns, and further they are not confined to palaces and chateaux; monasteries and universities coming in for an equal share in the great architectural development.

The characteristic style of the Spanish architecture of the Renaissance period is due probably to the influence of the earlier Moorish work, where the value of the rich Alhambresque decorations in the entrance doorways and windows, and the patios or courts, is enhanced by contrast with the plain masonry of their walls and towers. This influence had already been felt in the Spanish flamboyant Gothic panelling and tracery; when translated into Renaissance, and probably, at first, executed by Italian artists, it displayed a variety and beauty in its design scarcely inferior to some of the best work in Italy. And this development, taking place at a time when Spain was overflowing with wealth, resulted in that exuberant richness we find in the entrance doorways and windows, the external galleries of the upper storey, and the rich cresting surmounting the cornice.

Comparison with the contemporary and even earlier work in Italy, where the principal thought of the architect would seem to have been to break the wall surface by an unmeaning series of flat pilasters, and then fill in the windows as features of secondary importance, will show that the Spanish architect recognized more fully the true principle of design, and although, in the profiles of their mouldings, and the execution of the sculpture decorating their pilasters and friezes, Spanish work in contrast with Italian looks somewhat coarse, in general picturesqueness it is far in advance of the palaces of Rome, Florence, and even Venice, and has not yet received the recognition which it deserves.

The earliest palace built in the Renaissance style is that which adjoins the Alhambra at Granada, and was begun by the emperor Charles V. for his own residence in 1527, but never completed. The building is nearly an exact square of 205 ft., with a great circular court in the centre, nearly 100 ft. in diameter. This central court was enclosed by a colonnade with Doric columns, and an upper storey with columns of the Ionic order. From the unfinished condition of the palace and the absence of roofs, it is difficult to decide what the form of the latter might have been. But the design, begun by Pedro Machuca and continued by Alonso Berruguete (1480-1561), is so remarkable that it ought to be better known. Its proximity to the Alhambra, however, deprives it of the attention which otherwise it deserves for the purity of its details and for its good proportion.

A second palace, the Alcazar at Toledo, was begun in 1540 by Charles II., but little else than the bare walls remain, as it was destroyed by fire in 1886, after having been twice rebuilt. In its design it belongs to the true Spanish type of the Renaissance, with the simple ashlar masonry of its walls and the accentuation of the principal entrance doorway and the windows. In this palace also the plan is square, about 110 ft., with a square courtyard (240 ft.).

The third palace built, the Escorial, some 20 m. to the north-east of Madrid, is the most renowned—more, however, on account of its immense size than for its design. It was built for Philip II. and begun in 1563 from the designs of Juan Bautista de Toledo, being completed by his pupil, Juan de Herrera, in 1584. The principal front is 680 ft. in width, the depth of the palace 540 ft., with the king's residence in the rear. The plan is a fine conception, and consists of a large entrance court in the centre, with the church in the rear, having on the right the Colegio and on the left the monastery, with numerous courts in each case. The church is 320 ft. long by 220 ft. wide, the principal portion being the intersection of the nave and transept, which is covered by a dome. The coro is placed above the entrance vestibule, which is 100 ft. long and 27 ft. high, imperfectly lighted, but by contrast emphasizing the dimensions and the splendour of the church beyond. Externally the grouping is fine; the lofty towers at the angles, the central composition of the main front, and at the rear of the court the front of the church with its corner towers and the great dome, all form an exceedingly picturesque group, and it is only when one begins to examine the work in detail that its poverty in design reveals itself. Instead of accentuating the windows of the principal storeys and giving them appropriate dressings, the fronts are pierced with innumerable windows, which give the appearance of a factory, and the angle towers, nine storeys high, look like ordinary "sky-scrapers," without any of the dignity and importance which the architectural design of a palace requires. The same applies to the great entrance courts five storeys high with an attic, all of the most commonplace design. Internally the church is fine, but it is dwarfed by the immense size of the Doric pilasters, 62 ft. high, all in plain stone masonry, the coldness of which is emphasized by the rich colouring of the vaulted ceilings and the elaboration of the pavement, all in coloured marbles. The palace is regarded by the Spaniards as the Versailles of Spain, and if it had been possible to have interchanged some of the features, to transfer to Versailles some of the towers, and to break up the wall surface of the Escorial with the superimposed order of pilasters, which became monotonous by their repetition at Versailles, both palaces would have gained.

The palace at Madrid is the last of the series, and although it was begun at a much later period, by Philip V. in 1737, from the designs of the Italian architect Sachetti, it is a fine and simple composition, consisting of a lofty ground storey with coursed masonry, carrying semi-detached columns of the Ionic order, rising through three storeys, the whole crowned by an entablature and a bold balustrade. The slightly projecting wings at each end of the main front and the central frontispiece give that variety and play of light and shade of which one regrets the absence in the Cancellaria palace at Rome.

We must, however, retrace our steps to the beginning of the 16th century, to take up the early buildings of the style; the palace of the Conde de Monterey at Salamanca, built in 1530 from the designs of Alonso de Covarrubias, is a fine example. The masonry of the ground and first floors is of the simplest character, the decoration being confined to the entrance doorways and to the windows of the important rooms. It is on the second floor that the design becomes enriched with an open arcade and entablature above, crowned with a rich cresting. In the wings at the angles, and in the central block, the buildings are carried up an additional storey, the plain masonry of which gives value to the open galleries between. On these wings and the central block are other galleries crowned with entablature and cresting. These features therefore form

towers, which break the sky-line. There is still another treatment peculiar to the Spanish Renaissance, in which the example of the Moorish palaces would seem to have been followed, viz. the elaborate carving of the pilasters and their capitals, of the panelling and the horizontal friezes, which is extremely minute and finished in the lower storeys, but increases in scale and projection towards the upper storeys. This is very notable in the entrance gateway of the university of Salamanca (Plate V., fig. 73), where the carved arabesque in the panelling above the doors is of the finest description, equal to what might be found in cabinet work, whilst that of the upper portion immediately under the cornice is at least twice the scale of that below and is in bold relief.

The principal buildings characteristic of the Spanish Renaissance, in chronological order, are:—the hospital of Santa Cruz at Toledo, built in 1504-1514, and the Hospicio de los Reyes at Santiago (1504), both from the designs of Enrique de Egas, the former with a magnificent portal rising through two storeys and a gallery with an open arcade above; the Irish college at Salamanca, built (1521) from the designs of Pedro de Ibarra, Alonso de Covarrubias, and Berruguete; the convent of San Marcos, Leon, by Juan de Badajoz (1514-1545)—here, however, the whole façade is panelled out in imitation of late Gothic work, Renaissance pilasters and devices taking the place of the buttresses set angle-wise and flamboyant panelling; the Colegio de San Ildefonso at Alcalá de Henares (formerly the seat of the university), built in 1557-1584 by Rodrigo Gil de Ontañon.

Of municipal buildings the Lonja or exchange at Toledo (1551), built in brick-work, is somewhat Florentine in style.

The town hall of Seville (1527-1532), by Diego de Riaño and Martin Garuza, may be taken as the most gorgeous example in Spain (Plate V., fig. 74). The front facing the square is very simple, compared with the façade in the street at the rear, and here again we find, in the ornamental carving of the windows and door mouldings on the ground floor, a different scale from that adopted on the first floor, where the shafts are enriched with a superabundance of carved ornament in strong relief. There is still one other feature of great importance in Spain, the magnificent galleries of the patios or courts found in all the important buildings. It is from these galleries that access is obtained to the rooms on the first floor. They have sometimes arcades on the first floor, and columns with bracket-capitals on the upper storey. There is an infinite variety of design in these capitals, the brackets on each side of which lessen the bearing of the architrave.

The earliest Renaissance example of these patios (1525) is in the Irish college at Salamanca; it was carved by Berruguete, Alonso de Covarrubias being the architect. In the same town is the Casa de la Salinas, another example with fine sculpture. In the Casa Polentina (1550) at Avila, and the Casa de Miranda at Burgos, columns with bracket-capitals are employed on both storeys. Rich examples are found in the Casa de la Infanta and Casa Zaporta (1580), both at Saragossa. Of late examples the patio of the Lonja at Seville by Juan de Herrera resembles in its style the courtyard of the Farnese palace at Rome; and the same style obtains in the court of the Escorial, built at a time when the purer Italian style was introduced into Spain. These courts, though cold in design, compared with the earlier Renaissance type, are of fine proportion. Two other examples are found in the bishop's palace at Alcalá de Henares, one of which has a magnificent staircase.

<div align="right">(R. P. S.)</div>

<div align="center">RENAISSANCE ARCHITECTURE IN ENGLAND</div>

In England, as in France, the influence of the Classic Revival was first seen in connexion with tombs and church work, though not nearly to the same extent as in France, where throughout the country the work of the Italian sculptor is to be found not only in churches but in country mansions. On the other hand, two if not three of the Italian artists who came over to England were men of some reputation, such as Pietro Torrigiano, a Florentine sculptor who was invited over by Henry VIII. and entrusted with the tomb of Henry VII. in Westminster Abbey (1512-1518), and executed the tomb of John Young (in terra-cotta) in the Rolls chapel (1516). Another Italian was Giovanni da Maiano, who was also a Florentine, who modelled the busts of the emperors in the terra-cotta medallions over the entrance gates at Hampton Court, and probably the panel flanked by Corinthian pilasters, in which are modelled the arms of Cardinal Wolsey, also in terra-cotta. Benedetto da Rovezzano (1478-*c.* 1552), and Toto del Nunziata, Italian artists of note, were also employed in England, the first on the tomb of Cardinal Wolsey (now destroyed), and the second on the palace of Nonsuch, built by Henry VIII., which was pulled down in 1670. Other early Renaissance work is found at Christchurch Priory, in the Salisbury Chantry (1529), the design of which is Gothic and some of the details Italian, and in the tombs of the countess of Richmond in Westminster Abbey (1519), of the earl of Arundel in Arundel church, Sussex, of Henry, Lord Marney, at Layer Marney (1525), of the duke of Richmond (1537) and the duchess of Norfolk (1572) in Framlingham church; and of Queen Anne of Cleves (1557) in Westminster Abbey, attributed to Haveus of Cleves. The sedilia (in terra-cotta) of Wymondham church, Norfolk, the choir screen at St Cross, and Bishop Gardiner's chantry, Winchester, and the vaulted roof of Bishop West's chapel at Ely, all show the direct influence of the Italian cinque-cento style. The most beautiful example in England of Italian woodwork is the organ screen in King's College chapel, Cambridge (1534-1539), which, except for the coats of arms, the roses, portcullis and other English emblems, might be in some Italian church, so perfect is its design and execution. Of early domestic work, Sutton Place (1523-1525), near Guildford, Surrey, is a good example of transition work. The design is Tudor, but the window mullions and panels inserted throughout the structure, which is built in brick, are all enriched with cinque-cento details in terra-cotta, and probably executed by Italian craftsmen. Similar enrichments in the same material are found decorating the entrance tower (1522-1525) at Layer Marney, Essex.

Nearly all the examples above mentioned come within the first half of the 16th century. Passing into the second half and dealing with domestic architecture, we find the history of the introduction of classic work into England more complicated than in other countries, because in addition to the Italian, we have French, Flemish and German influences to reckon with, and it is sometimes difficult to decide from which source the features are borrowed. There were, however, two still more important considerations to be taken into account—firstly, the extremely conservative character of the English people, who were satisfied with the traditional work of the country, and the methods by which it was carried out, and secondly, the great progress in design which was made during the Elizabethan period, resulting in a phase which was peculiarly English and did not lend itself easily to classic embellishment.

Already in the last phase of Gothic work, to which the title of Tudor is generally given, important changes were being made in the planning of the larger country mansions, and features were introduced which seemed to give an impetus towards their further development.

The most important of these features were the following:—the bow window, rectangular or polygonal, of which the earliest examples date from the reign of Edward IV. (1461-1483), such as Eltham Palace in Kent, Cowdray Castle in Sussex, and Thornbury Castle in Gloucestershire, and at a later period at Hampton Court; octagonal towers or turrets flanking the entrance gateway at each end of the main front; the projecting forward of the side wings so as to get better light to the rooms in them by having windows on both sides, such projections varying the otherwise monotonous effect of a uniform façade without breaks; the long gallery (generally on an upper floor), which was an important characteristic of the Elizabethan house; and last but not least, the adherence to the type of old Tudor window, with its moulded mullions and transoms but with square head.

One of the first modifications was the introduction of semicircular bow windows, as in Kirby Hall, Northamptonshire, followed by a second example at Burton Agnes in Yorkshire (1602-1610), and a third at Lilford Hall in Northamptonshire (1635). They were carried up through three storeys at Kirby Hall, the upper storey in the roof; three storeys at Burton Agnes with balcony and balustrade; and two storeys at Lilford Hall—these features being extremely simple but fine in effect, and the windows with moulded mullions and transoms lending themselves naturally to the curve.

The projecting bays and bow windows seemed to have such an attraction for the builders of these country mansions that at Burton Agnes (with a rectangular plan of 120 ft. by 80 ft.) there are no fewer than thirteen of them, which break up the wall surface and give a picturesque group externally, whilst internally they add to the fine effect of the rooms. At Barlborough Hall, Derbyshire, with a frontage of 80 ft., there is a central rectangular bay forming the entrance porch and carried up above the roof, and two large octagonal bow windows which rise as towers with an extra storey. In all these mansions the only influence which the Revival seems to have exerted was in the introduction of an entablature, which sometimes takes the place of the Gothic string course, balustrades which crown the building, but with no projecting cornice, and gables with curved outlines and Renaissance panels or scrolls. The fact is that, with prominent features so widely differing from those which were represented on the perspective drawings attached to the earlier publications of the five orders, such as those of Serlio (1537) and Vredeman de Vries of Antwerp (1577), the only course left open to the master-mason was to decorate the principal entrance with columns and pilasters of the Classic orders, sometimes superposed one upon the other.

To the further development of this singular introduction of the Classic orders we shall return; for the moment it will be better to follow a chronological sequence and take up the principal examples of the country mansion, some of which were from the first intended to be Classic buildings. Of the house built at Gorhambury in Hertfordshire (1563) for Sir Nicholas Bacon, the father of Lord Bacon, too little remains to render its design intelligible, except that it still retains in its lofty window the Tudor pointed arch; but in Longleat in Wiltshire, built by Sir John Thynne (1567-1580), we have a typical example, the design of which departs from the English type, though it would seem to have been carried out according to the traditional custom of entrusting the whole work to a master-mason, and furnishing him with sketch designs of some kind suggesting the required arrangements of the plan, the principal features of the exterior elevation and the internal disposition. This custom was adhered to far into the 18th century at Oxford and Cambridge, where the alterations and additions to some of the colleges, such as the chapel of Clare College, Cambridge (1763), were carried out by master-masons or builders who were supplied with sketch designs and sometimes even the materials for the buildings they had to carry out, notwithstanding the existence of properly trained architects, who from the first half of the 17th century were usually entrusted with the preparation of the necessary designs for new structures of any considerable importance.

The name of the designer of Longleat is not known; the master-mason was Robert Smithson, who in 1580 went to Wollaton in Nottinghamshire and constructed the mansion there. Longleat is so Italian in style that it must have been conceived by some one who had been in Italy, because it departs from the usual English type. The plan is rectangular, with a frontage of 220 ft. by 180 ft. deep, an entrance porch in the centre, with two projecting bays on each side carried up through the three storeys, and three similar bays on the flanks. The whole block is crowned with a parapet, the centre portion of which is pierced with a balustrade, but the main cornice bears no resemblance to the Italian feature, being only that of the entablature of the upper order. The projecting bays are decorated with pilasters of the Doric, Ionic and Corinthian orders, each with its proper entablature. These classic features would seem to have been copied from a work by John Shute, painter and architect, who had been sent to Italy by the duke of Northumberland in 1551, and in 1563 brought out his *Chief Groundes of Architecture*, the first practical work published in English on architecture. Shute died in the same year, but two other editions appeared in 1579 and 1584, which shows that it must have had an extensive circulation and probably exercised the greatest influence on English architecture. A second book on the orders, already referred to as published in 1577 by Jan Vredeman de Vries of Antwerp, was not of the same type, for instead of confining his work, like Shute and Serlio, to a simple representation of the Classic orders, he introduced, on the shafts of his columns and on the pedestals, designs of the most debased rococo type, with additional plates suggesting their application to various buildings. Robert Smithson, or his client Sir Fr. Willoughby, apparently obtained a copy of this book, and the result is seen (Plate VI., fig. 76) in the mansion built at Wollaton (1580-1588), in which we find the first examples of elaborately decorated pedestals; crestings on the angle towers, the design of which is known as strap-work; and medallions with busts in them, enclosed with twisted curves similar to those which flowers and leaves take when thrown into the fire. The plan and the scheme of the design of Wollaton is, however, so far superior to the usual type, that it may fairly be ascribed to John Thorpe, an architect or surveyor, of whose drawings there is a large collection in the Soane Museum, representing many of the more important mansions of the Elizabethan era; some of his own design, others either plans measured from existing buildings upon which he was called in to report or copies from other sources, and some reproduced from published works such as Vredeman de Vries's pattern book and Androuet du Cerceau's *Des plus excellents bastiments de France* (1576).

To John Thorpe is also attributed the design of Kirby Hall (1570-1572) in Northamptonshire, in which the plan of the feudal castle with great central court is still retained. This court is symmetrically designed, and was evidently considered to be the principal feature, the decoration being far richer than that of the exterior of the building.

Amongst other important mansions are Moreton Old Hall (1550-1559, partly rebuilt in 1602; see House, Plate III., fig. 11) in Cheshire, a fine house in half-timber; Knole House, Kent (1570), possibly also designed by John Thorpe; Charlecote Hall (1572) near Stratford-on-Avon; Burleigh House, Northamptonshire (1575), the most remarkable feature in which is the great tower in the courtyard, decorated with the Doric, Ionic and Corinthian orders superposed, the design apparently suggested by a similar feature in the château of Anet, France (published in du Cerceau); Apethorpe Hall, Northamptonshire (1580); Montacute House, Somersetshire (1580-1600); Castle Ashby, Northamptonshire (1583-1589); Brereton Hall, Cheshire (1575-1586), in brick and stone; Westwood Park, Worcestershire (1590); Wakehurst Place, Sussex (1590); Hardwick Hall, Derbyshire (1590-1597); Longford Castle, Wiltshire (1591-1612); Cobham Hall, Kent (1594); Dorton House, Buckinghamshire (1596); Speke Hall, Lancashire (1598), partly in half-timber work; Holland House, Kensington (1606; wings and arcades, 1624); Bolsover Castle, Derbyshire (1607-1613); Charlton House, Kent (1607); Bramshill, Hampshire (1607-1612), an interesting example of Jacobean architecture; Hatfield, Hertfordshire (1608-1611), with an extremely fine courtyard (north side in brick and stone, 1621); Audley End, Essex (1610-1616), a great portion of which was afterwards pulled down; Ham House, Surrey (1610), chiefly in brick; Pinkie House, at Musselburgh in Midlothian (1613); Aston Hall near Birmingham (1618-1635); Blickling Hall, Norfolk (1619); Heriot's hospital, Edinburgh (1628-1659); and Lanhydroc, Cornwall (1636-1641), which brings us down to the period of the pure Italian Revival introduced by Inigo Jones.

We have already referred to the reproduction of the Classic orders, superposed as an enrichment of the principal entrance doorways. In addition to Burton Agnes and Burleigh House, there are endless examples in mansions and country houses, but the most remarkable are those at Oxford: in the old Schools, where coupled columns flank the entrance gateway with the five orders superposed, and in Merton and Wadham Colleges, with four orders (the Tuscan being omitted), in neither case taking any cognizance of the levels of windows or string courses of the earlier building to which they were applied, or serving any structural purpose. The orders were all taken from one of the pattern books, and in the Schools and in Merton College the rococo ornament and strap-work found in Vredeman de Vries's work were copied with more or less fidelity to the original. There are, however, two or three buildings in Northamptonshire which are free from rococo work, and in their design form a pleasant contrast, as much to the elaboration of the buildings just described as to the cold formality of the works of the later Italian style. Lyveden new buildings (1577), the Triangular Lodge at Rushton, and the Market House at Rothwell, are all examples in which the orders from Serlio or John Shute are faithfully represented, and are of a refined character; in the first named the entablatures only of the orders are introduced. In Rushton Hall (1595) the cresting of the bow windows shows the evil influence of Vredeman de Vries's pattern-book and of numerous designs by him and other Belgian artists, which were printed at the Plantin press. Two other publications of a similar rococo type were brought out in Germany, one by Cammermayer (1564) and the other by Dietterlin (1594), both at Nuremberg; neither of them would seem to have been much known in England, but indirectly through German craftsmen they may have influenced some of the work of the Jacobean period, and more particularly the chimney pieces and the ceilings of the gallery and other important rooms in which strap-work is found. Among the finer examples of ceilings of early date are those of Knole, Kent; Haddon Hall, Derbyshire; Sizergh Hall, Westmorland; South Wraxall Manor House, Wiltshire; the Red Lodge, Bristol; Chastleton House; and Canons Ashby—in the last three with pendants. Two of the best-

designed ceilings of modest dimensions are those of the Reindeer Inn at Banbury and the Star Inn at Great Yarmouth. The principal decorative feature of the reception rooms was the chimney-piece, rising from floor to ceiling, in early examples being very simple—as those at Broughton House and Lacock Abbey—but at a later date overlaid with rococo strap-work ornament and misshapen figures, as at South Wraxall and Castle Ashby. One of the most beautiful chimney-pieces is in the ballroom at Knole, probably of Flemish design, but at Cobham Hall, Hardwick, Hatfield and Bolsover Castle are fine examples in which different-coloured marbles are employed, there being a remarkable series at the last-named place.

The long gallery has already been incidentally mentioned. Its origin has never been clearly explained; it was generally situated in an upper storey, and may have been for exercise, like the eaves galleries in Spain. The dimensions were sometimes remarkable; one at Ampthill (no longer existing) was 245 ft. long; and a second at Audley End, 220 ft. long and 34 ft. wide. Of moderate length, the best known are those of Haddon Hall, with rich wainscotting carried up to the ceiling, Hardwick, Knole, Longleat, Blickling Hall and Sutton Place, Surrey.

In early work the staircases were occasionally in stone with circular or rectangular newels, but the more general type was that known as the open well staircase, with balustrade and newels in timber. Of these the more remarkable examples are those at Hatfield; Benthall Hall, Shropshire; Sydenham House, Devonshire; Charterhouse, London; Ockwells Manor House, Berkshire; Blickling, Norfolk; and the Old Star Inn at Lewes, Sussex.

One of the important features in the old halls was the screen separating the hall from the passage, over the latter being a gallery; the front of the screen facing the hall was considered to be its chief decoration, and was accordingly enriched with columns of the Classic orders, and balustrade or cresting over. The screens of Charterhouse (London), Trinity College (Cambridge), Wadham College (Oxford), and the Middle Temple Hall (London), are remarkable for their design and execution. The great hammer-beam roof (1562-1572) in the last named is the finest example of the Renaissance in existence (see Roofs, Plate I., fig. 25).

With the exception of chantry or other chapels added to existing buildings, there was only one church built in the period we are now describing, St John's at Leeds. This church is divided down the centre by an arcade of pointed arches, virtually constituting a double nave, and the rood-screen is carried through both. The window tracery and the arcade show how the master-mason adhered to the traditional Gothic style, but the rood-screen, notwithstanding its rococo decoration, is a fine Jacobean work, eclipsed only by the magnificent example at Croscombe, which, with the pulpit and other church accessories, dating from 1616, constitutes the most complete example of that period.

The pure Italian style, as it is sometimes called, was introduced into France probably by Serlio, and the result of its first influence is shown in the Louvre, begun in 1546. It entered Spain about 20 years later, under the rule of Philip II., and Germany about the same time, creating about 100 years later a reaction in Spain in favour of a less cold and formal style, and scarcely taking any root in Germany. In England its first appearance does not take place till 1619, when Inigo Jones, after his second visit to Rome, designed an immense palace, measuring 1150 ft. by 900 ft., of which the only portion built was the Banqueting House in Whitehall (Plate VI., fig. 75); a fine design, in which the emphasizing of the central portion by columns in place of pilasters is an original treatment not found in Italy, but of excellent effect. Unfortunately many subsequent designs of Inigo Jones were either not carried out or have since been destroyed; but nothing approached this admirable work in Whitehall.

Inigo Jones.

Among his buildings still remaining are St Paul's, Covent Garden (1631), a simple and massive structure which requires perhaps an Italian sun to make it cheerful; York Stairs Water-gate (1626); the front of Wilton House, near Salisbury (1633); the Queen's House, Greenwich (1617), a very poor design; Coleshill, Berkshire; Raynham Park, Norfolk, with weakly-designed gables and an entrance doorway with curved broken pediment, which can scarcely be regarded as pure Italian; and Ashburnham House, Westminster (the staircase of which is extremely fine), carried out after his death by his pupil John Webb, who, at Thorpe Hall, near Peterborough (1656), shows that he possessed some of his master's qualities in his employment of simple and bold details.

Sir Christopher Wren, who follows, was by far the greatest architect of the Italian school, though curiously enough he had never been in Italy. His first work was the library of Pembroke College, Cambridge (1663-1664), followed by the Sheldonian theatre at Oxford, in the construction of the roof of which, with a span of 68 ft., he showed his great scientific knowledge. In 1665 he went to Paris, where he stopped six months studying the architectural buildings there and in its vicinity, and where he came across Bernini, whose designs for destroying the old Louvre (fortunately not carried out) were being started. On his return Wren occupied himself with designs for the rebuilding of the old St Paul's, but these were rendered useless by the great fire of the 22nd of September 1666, which opened out his future career. His plan for the reconstruction of the city was not followed, owing to the opposition of the owners of the sites, but he began plans for the rebuilding of the churches and of St Paul's cathedral. In his treatment of the former, where he was obliged to limit himself to the old sites, often very irregular, and in most cases to the old foundations, he adopted, perhaps quite unconsciously, one of the principles of ancient Roman architecture, and made the central feature the key of his plan, fitting the aisles, vestries, porches, &c., into what remained of the site; this central feature varied according to its extent and proportions, and sometimes from a desire to work out a new problem. The central dome was a favourite conception, the finest example of which is that of St Stephen's, Walbrook (1676); other domed churches are St Mary-at-Hill, St Mildred's, Bread Street, St Mary Abchurch (1681), where the dome virtually covers the whole area of the church, and St Swithin's, Cannon Street, an octagonal example. In St Anne and St Agnes, Aldersgate, the crossing is covered with an intersecting barrel vault; and in this small church, about 52 ft. square with four supporting columns, he manages to get nave, transept and choir with aisles in the angles. In those churches where there was sufficient length, the ordinary arrangement of nave and aisle is adopted, with an elliptical barrel vault over the nave, sometimes intersected and lighted from clerestory windows, the finest example of these being St Bride's, Fleet Street; other examples are St Mary-le-Bow (Cheapside), Christchurch (Newgate) and St Andrew's (Holborn). In St James's, Piccadilly, of which the site was a new one, the plan of nave and aisles with galleries over, and a fine internal design with barrel-vaulted ceiling, was adopted; the exterior is very simple, which suggests that Wren attached much more importance to the interior. It should be pointed out that in all these cases, the vaults, to which we have referred, were in lath and plaster, and consequently covered over with slate roofs, and as a rule the exteriors (which are rarely visible) were deemed to be of less importance. This is, however, made up for by the position selected for the towers, and in their varied design those of St Mary-le-Bow, St Bride's (Fleet Street) and St Magnus (London Bridge) are perhaps the finest of a most remarkable series.

Wren.

The foundation stone of St Paul's cathedral was laid in 1675, and the lantern was finished in 1710. The silhouette of the dome (Plate II., fig. 66), which is, of course, its principal feature, is far superior to those of St Peter's at Rome, or the Invalides or Panthéon at Paris, and the problem of its construction with the central lantern was solved much more satisfactorily than in any other example. Wren realized that the attempt to render a dome beautiful internally as well as externally could only be obtained by having three shells in its construction; the inner one for inside effect, the outer one to give greater prominence externally, and the third, of conical form, to support the lantern.

In plan, Wren's design (fig. 53) was in accordance with the traditional arrangement of an English cathedral, with nave, north and south transepts and choir, in all cases with side aisles, and a small apse to the choir. The great dome over the crossing is, like the octagon at Ely, of the same width as nave and aisles together. It resembles the plan of that cathedral also in the four great arches opening into nave, transepts and choir, with smaller arches between. Instead of the great barrel vault of St Peter's, Rome, Wren introduced a series of cupolas over the main arms of the cathedral, which enabled him to light the same with clerestory windows; these are not visible on the exterior, as they are masked by the upper storey which Wren carried round the whole structure, in order, probably, to give it greater height and importance; by its weight,

however, it serves to resist the thrust of the vaults transmitted by buttresses across the aisles. The grouping of the two lanterns on the west front with the central dome is extremely fine; the west portico is not satisfactory, but the semicircular porticoes of the north and south transepts are very beautiful features. Greater importance is given to the cathedral by raising it on a podium about 12 ft. above the level of the pavement outside, which enables the crypt under the whole cathedral to be lighted by side windows.

The principal examples of the churches which followed are those of St George's, Bloomsbury; St Mary Woolnoth; Christ Church, Spitalfields, by Nicholas Hawksmoor; and St Mary-le-Strand (1714), and St Martin's-in-the-Fields (1721), by James Gibbs. Gibbs's interiors are second only to those of Wren, while Hawksmoor's are very weak; in both cases, however, the exteriors are finely designed. Amongst subsequent works are St John's, Westminster, and St Philips, Birmingham (1710), by Thomas Archer; St George's, Hanover Square (1713-1714), by John James; All Saints' church, Oxford, by Dean Aldrich; St Giles-in-the-Fields (1731), by Henry Flitcroft; and St Leonard's, Shoreditch (1736), by George Dance.
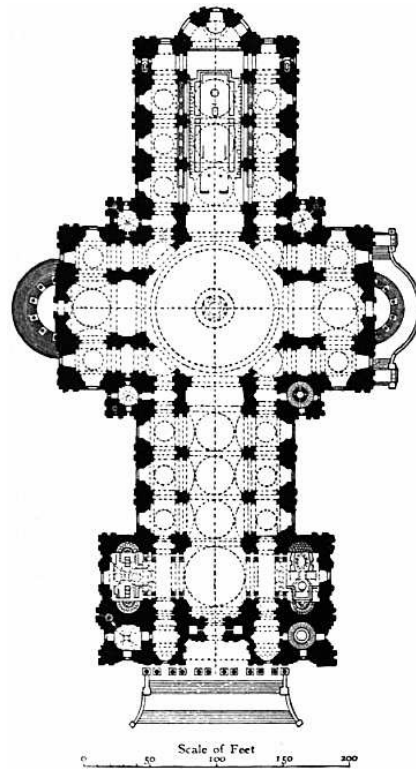
Fig. 53.—Plan of St Paul's Cathedral, London.

Sir Christopher Wren's chief monumental work was Greenwich hospital, in the arrangement of which he had to include the Queen's House, and a block already begun on the west side. His solution was of the most brilliant kind, and seen from the river the grouping of the several blocks with the colonnade and cupolas of the two central ones is admirable.

Wren's next great work was the alterations and additions to Hampton Court palace, begun in 1689, the east front facing the park (Plate VI., fig. 77), the south front facing the river, the fountain court and the colonnade opposite the great hall. Chelsea hospital (1682-1692), the south front (now destroyed) to Christ's hospital (1692), and Winchester school (1684-1687), are all examples in brick with stone quoins, cornices, door and window dressings, which show how Wren managed with simple materials to give a monumental effect. The library which he built in Trinity College, Cambridge (1678), with arcades on two storeys divided by three-quarter detached columns of the Doric and Ionic orders, is based on the same principle of design as those in the court of the Farnese palace at Rome by Sangallo, a part of the palace which is not likely to have been known by him.

The results of the Italian Revival in domestic architecture were not altogether satisfactory, for although it is sometimes claimed that the style was adapted by its architects to the traditional requirements and customs of the English people, the contrary will be found if they are compared with the work of the 16th century. The chief aim seems to have been generally to produce a great display of Classic features, which, even supposing they followed more closely the ancient models, were quite superfluous and generally interfered with the lighting of the chief rooms, which were sacrificed to them. In fact there are many cases in which one cannot help feeling how much better the effect would be if the great porticoes rising through two storeys were removed. This is specially the case in Sir John Vanbrugh's mansion, Seaton Delaval, in Northumberland (1720); his other works, Blenheim (1714) and Castle Howard (1702), are vulgarized also by the employment of the large orders. The same defect exists in Stoneleigh Abbey, Leamington, where the orders carried up through two and three storeys respectively destroy the scale of the whole structure.

Among other mansions, the principal examples are Houghton in Norfolk (1723), a fine work, the villa at Mereworth in imitation of the Villa Capra near Vicenza, and the front of old Burlington House (1718), copied from the Porto palace at Vicenza, by Colin Campbell; Holkham in Norfolk and Devonshire House, London, by William Kent; Ditchley in Oxfordshire, and Milton House near Peterborough, by Gibbs; Chesterfield House, London, by Isaac Ware; Wentworth House in Yorkshire (1740), and Woburn Abbey in Bedfordshire (1747), by Henry Flitcroft; Spencer House, London (1762), by John Vardy; Prior Park and various works in Bath by John Wood; the Mansion House, London, by George Dance; Wardour in Wiltshire, Kedleston Hall in Derbyshire, and Worksop in Nottinghamshire (1763), by James Paine; Gopsall Hall, Ely House, Dover Street, London (1772), and Heveringham Hall in Suffolk, by Sir Robert Taylor, to whose munificence we owe the Taylor Buildings at Oxford; Harewood House in Yorkshire (1760), Lytham Hall in Lancashire, and (part of) Wentworth House in Yorkshire, by John Carr; and Luton Hoo (1767), now largely reconstructed, and Sion House (1761), the best-known mansions by Robert Adam, who with his brothers built the Adelphi and many houses in London. Adam designed a type of decoration in stucco for ceilings and mantelpieces, the dies of which are still in existence and are utilized extensively in modern houses. His labours were not confined to buildings, but extended to their decoration, furniture and fittings.

The works of Sir William Chambers were of a most varied nature, but his fame is chiefly based on Somerset House in the Strand, London (1776), with its façade facing the river, a magnificent work second only to Inigo Jones's Whitehall, but infinitely more extensive and difficult to design. He was also the author of a work on *The Decorative Part of Civil Architecture*, which is still the standard work on the subject in England. His pupil, James Gandon, won the first gold medal given by the Royal Academy in 1769, and his principal work was the Custom House in Dublin (1781). Newgate prison (1770), a remarkable building now destroyed, was the chief work carried out by George Dance, jun.

Other buildings not yet mentioned are the Alcove and Banqueting Hall (Orangery) of Kensington Palace, by Wren; the Radcliffe library, Oxford, by Gibbs, an extremely fine work both externally and internally; Queen's College, Oxford, by Hawksmoor; the county hall, Northampton, by Sir Roger Norwich; the town hall, Abingdon (1677), designer unknown; the Ashmolean museum, Oxford (1677), by T. Wood; Clare College, Cambridge, and St Catherine's Hall, Cambridge (1640-1679), by Thomas and Robert Grumboll, master-masons; the custom house, King's Lynn (1681), by Henry Bell; Nottingham Castle, designed by the duke of Newcastle in 1674 and carried out by March, his clerk of works—the central portion is finely proportioned, and it is only in the pilasters at the quoins that one recognizes the amateur; two houses in Cavendish Square, London (1717), on the north side, by John James; Lord Burlington's villa (1740) at Chiswick, by William Kent, which with its internal decorations is still perfect; the celebrated Palladian Bridge at Wilton, by R. Morris; and last but not least, in consequence of its great influence on modern architecture, Sparrowe's house at Ipswich (1567-1662), the timber oriel windows of which are now so often reproduced.

(R. P. S.)

Renaissance Architecture in Germany

The classical revival does not seem to have taken root in Germany much before the middle of the 16th century, some forty to fifty years later than in France, from which country it is said to have been introduced, and in some of the early work there is a great similarity to French examples, but without the refinement and variety of detail which one finds in the châteaux of the Loire and in many of the French towns. In the rood-screen of the cathedral at Hildesheim (1546), the court of the town hall at Görlitz (1534), the portal of the Petershof at Halberstadt (1552), and the entrance gateway of the castle at Brieg (1553), one is able to recognize certain ornamental details and a similar superposition of pilasters in several storeys to that which is found in various towns in Normandy and on the Loire. In both countries the new style was engrafted on the last phase of the Gothic period, so forming at first a transitional style, which lasted about fifty years. Thus the lofty roofs which prevailed in the 15th century are developed further, but with this great divergence in the two countries. In France there are rarely gable ends, in Germany they are not only the chief characteristic feature of the main front, but are introduced in the side elevations in the shape of immense dormers with two or three storeys and rising the full height of the roof, as in the castle at Hämelschenburg near Hameln. Throughout Germany, therefore, the gable end and the dormer gable became the chief features on which they lavished all their ornamental designs, the main walls of the building being as a rule either in plain masonry, rubble masonry with stucco facing, or brick and stone. Other prominent features are the octagonal and circular oriel windows rising through two or three storeys at the corners of their buildings—rectangular bow windows in two or three storeys, which were allowed apparently to encroach on the pavement, and octagonal turrets or towers instead of circular as in France. In the vicinity of the Harz mountains, where timber was plentiful, a large proportion of the factories, houses and even public buildings, are erected in half-timber work with elaborate carving of the door and window jambs, projecting corbels, &c. At Hildesheim, Wernigerode, Goslar, &c., these structures are sometimes of immense size and richly decorated. Among early examples in stone, the porch added to the town hall of Cologne (1571), the projecting wings of the town halls at Halberstadt and Lemgo (1565), and the town halls at Posen (1550), Altenburg (1562-1567) and Rothenburg (1572-1590), are all picturesque examples more or less refined in design. In the last-named example the purer Italian style has exercised its influence in the principal doorway and in the arcaded gallery on the east front. This same influence shows itself in the courtyard of the town hall at Nuremberg, where the arcades of the two upper storeys might be taken for those of the courts of the palaces at Rome.

Amongst other 16th-century work there are two entrance gates at Danzig, the Hohe Tor (1588), a fine massive structure, and the Langgasse Tor (1600), more or less pure Italian in style. At Augsburg, the arsenal (1603-1607), by the architect Elias Holl (1573-1646), is of a bold and original design, and the town hall has magnificent ceilings and wainscotting round the walls of the principal halls. This brings us to the castle of Heidelberg (Plate VII., figs. 78, 79 and 80), which is looked upon by the Germans as the chef d'œuvre of the Renaissance in Germany. As seen from the great court it forms an interesting study, there being the work of three periods: in the centre the picturesque group of the older building (c. 1525), on the right the Otto-Heinrichs-Bau (1556-1559), and on the left the Friedrichs-Bau (1602-1607). Of the two the latter is the finer. The architect of the Otto-Heinrichs-Bau would seem to have been undecided whether to give greater prominence and projection to his pilasters and cornices or to his windows with their dressings and pediments, so he has compromised the matter by making them both about the same, and the effect is most monotonous. In the Friedrichs-Bau, which is a remarkable work, the pilasters are of great projection, with bold cornices and simple windows well set back, while the tracery of the ground-floor windows is a pleasant relief from the constant repetition of pilaster window dressings. The gables also of the Friedrichs-Bau break the horizontal sky-line agreeably. A more minute examination of the decorative details, however, betrays the advent of a peculiar rococo style of a most debased type, which throughout the 17th century spread through Germany, and the repetition of the same details suggests that it was copied from some of the pattern books which were published towards the end of the 16th century, comprising heterogeneous designs for title pages, door heads, frontispieces, and even extending to new versions of the orders, which apparently appealed to the German mason and saved him the trouble of invention. These books, compiled by de Vries and Dietterlin, emanated from the Low Countries, and their influence extended to England during the Elizabethan period. At all events in Germany it would seem to have arrested the purer Italian work, which we have already noticed, and henceforth in the gable ends one finds the most extraordinary accumulation of distorted forms which, though sometimes picturesque, disfigure the German work of the 17th century. An exception might perhaps be made in favour of the Peller'sche Haus in Nuremberg (1625), one of the best houses of modest dimensions in Germany. The façade in the Aegidien-Platz is a fine composition; inside is a very picturesque court and staircase, and the painted ceiling and the wainscotting of one of the rooms in woods of different colours, though not very pure in style, are of excellent design and execution.

Some of the most characteristic work of this type exists at Hameln, where the façades of the Rattenfängerhaus (1602), the Hochzeitshaus (1610), and many other buildings, are covered with the most extraordinary devices, leaving scarcely a foot of plain masonry as a relief. The south front of the town hall of Bremen (1612) is in the same style (Plate IV., fig. 70), relieved, however, by the fine large windows of the great hall and the arcade in front, in which there is some picturesque detail. Later in the century the degradation increases until it reaches its climax in the Zwinger palace at Dresden (1711), the most terrible rococo work ever conceived, if we except some of the Churrigueresque work in Spain.

Among the most pleasing features in Germany are the fountains which abound in every town; of these there are good examples at Tübingen, Prague, Hildesheim, Ulm, Nuremberg, already famed for its Gothic fountains, Mainz and Rothenburg. In the latter town, built on an eminence, they are of great importance for the supply of the town, and some of them are extremely picturesque and of good design.

Up to the present we have said nothing about the ecclesiastical buildings in Germany, for the reason that the period between the Reformation and the conclusion of the Thirty Years' War was not favourable to church building. The only example worth mentioning is the church of St Michael at Munich (1583-1597), and that more for its plan than for its architecture. It has a wide nave covered with a barrel vault, and a series of chapels forming semicircular recesses on each side, the walls between acting as buttresses to the great vault. The transept is not deep enough to have any architectural value, but if at the east end there had been only an apse it would have been a better termination than the long choir. The Liebfrauenkirche at Dresden (1726-1745) has a good plan, but internally is arranged like a theatre with pit, tiers of boxes, and a gallery, all in the worst possible taste, and externally the dome is far too high and destroys the scale of the lower part of the church. An elliptical dome is never a pleasing object, and in the church of St Charles Borromeo, at Vienna, there are no other features to redeem its ugliness. The Marienkirche at Wolfenbüttel (1608-1622) has a fine Italian portal; its side elevation is spoilt by the series of gable dormers, which are of no possible use, as the church (of the *Hallenkirchen* type) is

well lighted through the aisle windows. The portal of the Schlosskapelle (1555) at Dresden is a fine work in the Italian style; and lastly the church at Bückeburg, in a late debased style, is redeemed only by the fact that it is built in fine masonry and that the joints run through all the rococo details.

<div style="text-align: right">(R. P. S.)</div>

Renaissance Architecture In Belgium And Holland

The Gothic development in the 15th century in Belgium, as evidenced in her magnificent town halls and other public buildings, not only supplied her requirements in the century following, but hindered the introduction of the Classic Revival, so that it is not till the second half of the 16th century that we find in the town hall of Antwerp a building which is perhaps more Italian in design than any work in Germany. There are, however, a few instances of earlier Renaissance, such as the Salm Inn (1534) at Malines; the magnificent chimneypiece, by Conrad van Noremberger of Namur, in the council chamber of the palais de justice at Bruges (1529); and the palais de justice of Liége (1533), formerly the bishop's palace, in the court of which are features suggesting a Spanish influence. The influence of the cinque-cento style of Italy may be noticed in the tomb of the count de Borgnival (1533) in the cathedral of Breda, and in the choir stalls of the church at Enkhuisen on the borders of the Zuyder Zee, both in Holland, and in the choir stalls of the cathedral of Ypres in Belgium; the carving of these bears so close a resemblance to cinque-cento work in design and execution that one might conclude they were the work of Italian artists, but their authors are known to have been Flemish, who must, however, have studied in Italy. Again, in the stained-glass windows of the church of St Jacques at Liége, the details are all cinque-cento, with circular arches on columns, festoons of leaves and other ornament, all apparently derived from Italian sources, but necessarily executed by Flemish painters, as stained-glass windows of that type are not often found in Italian churches.

Of public buildings in Belgium, the most noted example is that of the town hall at Antwerp, designed by Cornelius de Vriendt (1564). It has a frontage of over 300 ft. facing the Grande Place, and is an imposing structure in four storeys, arcaded on the lower storey and the classic orders above, with mullioned windows between on the three other storeys, the uppermost storey being an open loggia, which gives that depth of shadow obtained in Italy by a projecting cornice. It is almost the only building in Belgium without the usual gable, the centre block being carried up above the eaves and terminated with an entablature supporting at each end a huge obelisk, and in the centre what looks like the miniature representation of a church. The only other classic building is the Renaissance portion of the town hall at Ghent, which is very inferior to the older Gothic portion.

What is wanting in the town halls, however, is amply replaced by the magnificence of the houses built for the various gilds, as for instance those of the Fishmongers at Malines (1580), of the Brewers, the Archers, the Tanners and the Cordeliers (rope-makers) at Antwerp, and, in the Grande Place at Brussels, the gilds of the Butchers, the Archers, the Skippers (the gable end of which represents the stern of a vessel with four cannons protruding), the Carpenters and others. Besides these, and especially in Antwerp, are to be found a very large series of warehouses, which in the richness of their decoration and their monumental appearance vie with the gilds in the evolution of a distinct style of Renaissance architecture—a type from which the architect of the present day might derive more inspiration than from the modest brick houses of Queen Anne's time.

In domestic architecture, the best-preserved example of the 16th and 17th centuries is the Musée Plantin at Antwerp, the earliest portion of which dates from 1535. This was bought by Ch. Plantin, who was employed by Philip of Spain to print all the breviaries and missals for Spain and the Netherlands; the fortune thus acquired enabled him and his successors to purchase from time to time adjoining properties which they rebuilt in the style of the earlier buildings. After 1637 the buildings followed the style of the period, but up to that date they were all erected in brick with stone courses and window dressings round a central court. Internally the whole of the ancient fittings are retained, including those of the old shop, the show-rooms, reception rooms and the residential portion of the house, with the wainscotting and Spanish leather on the walls above, panelled ceilings, chimney-pieces, stained glass, &c., the most complete representation of the domestic style of Belgium.

Of ecclesiastical architecture in the Renaissance style there are scarcely any examples worth noting. The tower of the church of St Charles Borromeo at Antwerp (1595-1610) is a fine composition similar in many respects to Wren's steeples, and the nave of St Anne's church at Bruges is of simple design and good proportion. The Belgian churches are noted for their immense pulpits, sometimes in marble and of a somewhat degraded style. The finest features in them are the magnificent rood-screens, in which the tradition of the Gothic examples already quoted seems to have been handed down. In the cathedral at Tournai is a fine specimen by Cornelius de Vriendt of Antwerp (1572), and there is a second at Nieuport, both similar in design to the example from Bois-le-Duc now in the Victoria and Albert Museum; and in the church of St Leonard at Léau is a tabernacle in stone, over 50 ft. high, in seven stages, with numerous figures by Cornelius de Vriendt (1550).

In Holland, nearly all the principal buildings of the Renaissance date from the time of her greatest prosperity when the Dutch threw off their allegiance to the Spanish throne (1565). With the exception of the palace at Amsterdam (1648-1655), an immense structure in stone with no architectural pretensions, there are no buildings in Holland in which the influence of the purer style of the Italian revival can be traced. Internally the great hall of the palace and the staircase in the Louis XIV. style are fine examples of that period.

The earliest Renaissance town hall is that of the Hague (1564), situated at the angle of two streets, which is an extremely picturesque building, in fact one of the few in which the architect has known how to group the principal features of his design. The Renaissance addition made to the old town hall of Haarlem is a characteristic example of the Dutch style. The walls are in red brick, the decorative portions, consisting of superimposed pilasters with mullioned and transomed windows, cornices and gable end, all being in stone. Inside this portion of the town hall, which is now a gallery and museum, is an ancient hall (not often shown to visitors) in which all the decorations and fittings date from the 17th century. There is a second example of an ancient hall in the Stadthuis at Kampen, one of the dead cities of the Zuyder Zee, which served originally as a court of justice, and retains all its fittings of the 16th century, including a magnificent chimneypiece in stone, some 25 ft. high and dated 1543.

The town hall at Bolsward in Friesland is another typical specimen of Dutch architecture, in which the red brick, alternating with stone courses running through the semi-detached columns which decorate the main front, has given variety to the usual treatment of such features. The external double flight of steps with elaborate balustrade, and the twisted columns which flank the principal doorway, are extremely picturesque, if not quite in accordance with the principles of Palladio or Vignola.

A similar flight of steps with balustrade forms the approach to the entrance doorway (on the first floor) of the town hall at Leiden, where the rich decoration of the centre block and its lofty gable is emphasized by contrast with the plain design of the chief front.

In the three chief cities in Holland, the Hague, Amsterdam and Rotterdam, there are few buildings remaining of 17th-century work, so that they must be sought in the south at Dordrecht and Delft, or in the north at Leiden, Haarlem, Alkmaar, Hoorn, Enkhuisen, or, crossing the Zuyder Zee into Friesland, in Leeuwarden, Bolsward, Kampen and Zwolle, the dead cities. In all these towns ancient buildings have been preserved, there being no reason to pull them down. Of the entrance gateways at Hoorn there is an example left, of which the lower portion might be taken for a Roman triumphal arch, so closely does it adhere to the design of those monuments, extending even to a long Latin inscription in the frieze. The tower (1531-1652), built to protect the entrance to the harbour, has no gateway. There are some old buildings in Kampen, in one

of which the entrance gateway is a simple and fine composition in brick and stone, the chief characteristics of the gateways here being the enormously high roofs of the circular towers flanking them. A finer and more picturesque grouping of roofs exists in the entrance gateway (Amsterdam Gate) at Haarlem, which is perhaps, however, eclipsed by those of the Waaghuis at Amsterdam with its seven conical roofs.

The Waaghuisen, or weighing-houses for cheeses, are, next to the town halls, the most important buildings in Holland, and in fact vie with them in richness of design. The example at Alkmaar possesses not only an imposing front with gable in three storeys, but a lofty tower with belfry. At Deventer the main building is late Gothic (1528), in brick and stone, with an external double flight of steps and balustrades added in 1643.

The Fleesch Halle (meat-market) at Haarlem, also in brick and stone, is of a very rococo style, but notwithstanding all its vagaries presents a most picturesque appearance.

The domestic architecture of Holland and the shop fronts retain more of their original dispositions than will be found in any other country. At Hoorn, Enkhuisen and other towns, there has virtually been no change during the last 200 years. In the more flourishing towns as Amsterdam and Rotterdam, the increasing prosperity of the inhabitants led them in the latter portion of the 17th and in the 18th centuries to adapt features borrowed from the French work of Louis XIV. and Louis XV., without, however, their refinement, luxuriance or variety, so that although substantial structures they are extremely monotonous in general effect.

<div style="text-align:right">(R. P. S.)</div>

<div style="text-align:center">Mahommedan Architecture</div>

Before proceeding with "modern architecture," to which the styles now discussed have gradually led us, we have still another important architectural style to describe, in Mahommedan architecture. The term "Mahommedan" has been selected in preference to "Saracenic," because it includes a much wider field, and enables us to bring in many developments which could not well come under the latter title. It was the Mahommedan religion which prescribed the plan and the features of the mosques, and it was the restriction of that faith which led to the principal characteristics of the style. The term "Saracenic" could hardly be applied to the architecture of Spain, Persia or Turkey.

The earliest mosques at Mecca and Medina, which have long since passed away, were probably of the simplest kind; there were no directions on the subject in the Koran, and, as Fergusson remarks, had the religion been confined to its native land, it is probable that no mosques worthy of the name would have ever been erected. In the first half-century of their conquest in Egypt and Syria the Mahommedans contented themselves with desecrated churches and other buildings, and it was only when they came among the temple-building nations that they seemed to have felt the necessity of providing some visible monument of their religion. The first requirement was a structure of some kind, which should indicate to the faithful the direction of Mecca, towards which, at stated times, they were to turn and pray. The earliest mosque, built by Omar at Jerusalem, no longer exists, but in the mosque of 'Amr at Cairo (fig. 54), founded in 643 and probably restored or added to at various times, we find the characteristic features which form the base of the plans of all subsequent mosques. These features consist of (*a*) a wall built at right angles to a line drawn towards Mecca, in which, sunk in the wall, was a niche indicating the direction towards which the faithful should turn; (*b*) a covered space for shelter from the sun or inclement weather, which was known as the prayer chamber; (*c*) in front of the prayer chamber, a large open court, in which there was a fountain for ablution; and (*d*) a covered approach on either side of these courts and from the entrance. The materials employed in the earlier mosque were all taken from ancient structures, Egyptian, Roman and Byzantine, but so arranged as to constitute the elements of a new style. The columns employed were not always of sufficient size, and therefore in order to obtain a greater height, above the capitals were square dies, carrying ranges of arches, all running in the direction of Mecca; to resist the thrust, wood ties were built in under the arches, so that the structure was of the lightest appearance. The same principle was observed in the mosque of Kairawan, in Tunisia (675), and in the mosque of Cordova (786-985), copied from it. Similar wooden ties are found in the mosque of El Aksa and the Dome of the Rock at Jerusalem (built 691), so that they became one of the characteristics of the style. For constructional reasons, however, this method of building was not always adhered to, and in the mosque of Tulun (fig. 55) in Cairo (879), the first mosque in Egypt, built of original materials, we find an important departure. The arcades, instead of running at right angles to the Mecca wall, are built parallel with it, on account of the great thrust of the arches, all built in brick (fig. 56). The wood ties would have been quite insufficient to resist the thrust, and in the case of this mosque were probably used to carry lanterns.
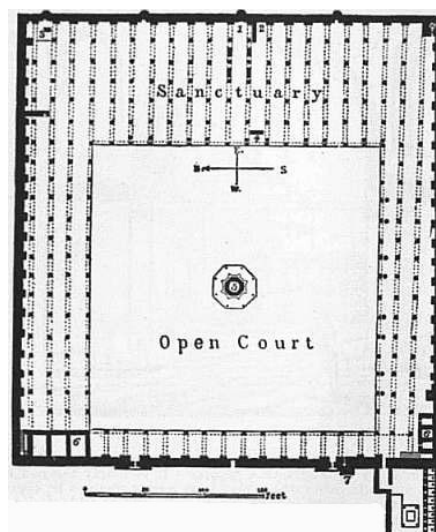
<div style="text-align:center">Fig. 54.—Plan of Mosque of 'Amr. Old Cairo.</div>

1. Kibla.	5. Fountain for Ablution
2. Mimbar.	6. Rooms built later.
3. Tomb of 'Amr.	7. Minaret.
4. Dakka.	8. Latrines.

The mosque of Tulun is the earliest example in which the pointed arch appears throughout, and it forms the leading and most characteristic constructional feature of the style in its subsequent developments in every country, except in Barbary and Spain, where the circular-headed horse-shoe arch seems to be preferred. As it is also the earliest mosque in which the decoration applied is that which was by inference laid down in the Koran, some allusion to the restrictions therein contained, and the consequent result, may not be out of place. The representation of nature in any form was absolutely forbidden, and this applied generally to foliage of all kinds, and plants, the representation of birds or animals, and above all of the human figure. The only exceptions to the rule would seem to be those found in the very conventional representations

of lions carved over the gateways of Cairo and Jerusalem and in the courts of the Alhambra. It was this restriction which produced the extremely beautiful conventional patterns which are carried round the arches of the mosque of Tulun, and are found in the friezes, string-courses and the capitals of the shafts, and when these patterns form the background of the text of the Koran in high relief, in the splendid Arabic characters, it would be difficult to find a more beautiful decorative scheme in the absence of natural forms. As the mosque of Tulun was built by a Coptic architect, and its decoration is evidently the result of many years of previous developments, it is probably to the Copts that its evolution was due. The second type of decoration is that which is given by geometrical forms, and either in pavements or wall decorations in marble, or in the framing of woodwork in ceilings, or in doorways, the most elaborate and beautiful combinations were produced. The third type of decoration is one which in a sense is found in the origin of most styles, but which, restricted as the Mahommedans were to conventional representations, received a development of far greater importance, and in one of its forms—that known as stalactite vaulting—constitutes the one feature in the style which is not found in any other, and which, from the western coast of Spain to the east of India, at once differentiates it from any other style.

A complete account, with illustrations of the origin of the stalactite will be found in the *Journal of the Royal Institute of British Architects* (1898) The earliest example is found in the tomb of Zobeide, the favourite wife of Harun al-Rashid, at Bagdad, built at the end of the 8th century. This tomb, octagonal in plan, and of modest dimensions, was vaulted over by a series of niches in nine stages or levels rising one above the other, and brought forward on the inside, so that the ninth course completed the covering of the tomb. It was built in this way to save centreing, each niche when completed being self-supporting. There is a second tomb at Bagdad, of later date—the tomb of Ezekiel,—constructed in the same way, except that in each stage the niches are built not one over the other but astride between the two, and this is the way in which in subsequent developments it always appears to have been built. Its application to the pendentives of the portals of the mosque at Tabriz and Sultaniya was the next development; and when some two centuries later it is found in Europe, in the palaces of the Ziza at Palermo, dating from about the beginning of the 11th century, it has lost its brick constructive origin, and, being cut in slabs of stone, has become simply a decorative feature. Its earliest example in Egypt is in the tomb of ash-Shafi'i at Cairo, built by Saladin about 1240. Here and in all subsequent examples throughout Egypt and Syria it is always carved in stone. In the Alhambra another material was employed, the elaborate vaults being built with a series of small moulds in stucco. In the ceilings of the mosques at Cairo it was frequently carved in wood, and consequently lost all trace of its origin.
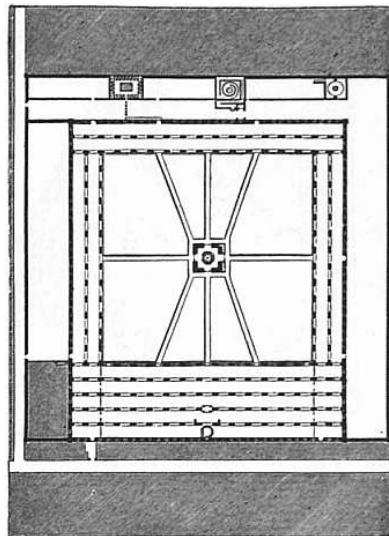
From Coste's *Architecture Arabe en Caire*.
FIG. 55.—Plan of Mosque of Tulun, Cairo.

Two other decorative features, but having a constructive origin, are (1) the alternating of courses of stone of different colour, probably derived from Byzantine work, where bands of brick were employed; and (2) the elaborate forms given to the voussoirs of the arches of the Mecca niche.

Having now described the principles which ruled the plans of the mosques and formed the *motifs* of their architectural design, it remains to take the principal examples in the various countries where the style was developed.

Although the tendency of modern research points to Persia as the country in which the first development of the art took place, and we have already referred to two tombs at Bagdad, in which the earliest examples of a stalactite vault are found, so far as remains are concerned nothing can be traced earlier than the work of Ghazan Khan (1294), whose mosque at Tabriz, half in ruins, is the earliest example.

It is to Egypt therefore we turn first. There still exist—and sometimes in good preservation—mosques and other buildings in Cairo of every period showing the development of the Mahommedan style, from the 9th to the 17th century. Owing to the magnificent material at their command—for unfortunately more of it was taken from the ancient Egyptian monuments than from the quarries—a much purer style was evolved than in Persia; and owing to the absence of rain those ephemeral structures built in brick and covered with stucco, which in other countries would long have passed away, retained the crispness of their flowing ornament, which is still as sharp and well defined as when executed. We have already referred to two of the earlier mosques, those of 'Amr in Old Cairo and of Tulun. The next in date, and built also in brick, is the mosque El Hakim (*c.* 1003). The mosque of El Azhar ("the Splendid") was founded about 970, but entirely rebuilt in 1270 and enlarged in 1470. It is the university, and its Liwan or prayer chamber is the largest in Cairo, there being 380 columns carrying its roof.

The mosque of al-Zahir (founded 1264) is now occupied as barracks. In one of its entrance porches the arches are decorated with the well-known zigzag or chevron ornament, and a second porch with cushion voussoirs, features found elsewhere only in Sicily, so that the mosque was probably built by masons brought from thence. Then follows a series of mosques: Kalaun (1287); al-Nāsir (1299-1303); Merdani (1338); all based on the same plan as those described with a large courtyard surrounded by porticoes. The mosque of al-Nāsir has a portal with clustered piers and pointed and moulded orders. This is said to have been brought over as a trophy from Acre, but it is more probable that Syrian masons were imported to carry on the style introduced by the Crusaders.
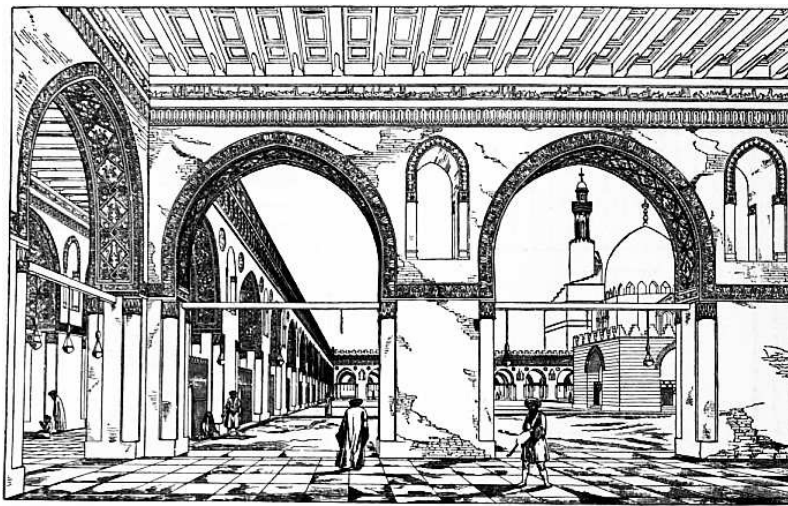
F<small>IG</small>. 56.—Court of the Mosque of Tulun, Cairo. (From Coste.)
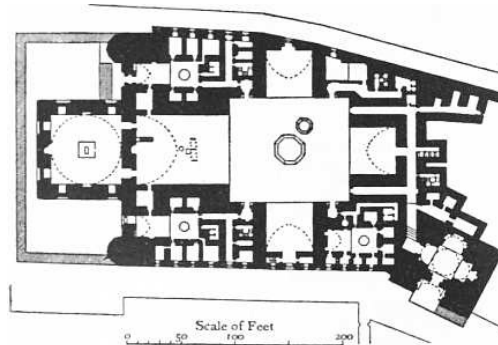

F<small>IG</small>. 57.—Plan of the Mosque of the Sultan Hasan.

   The mosque of Sultan Hasan (1357-1360) marks an important change in the scheme of its plan, which served afterwards as a future model (fig. 57). It consists of a central court, 117 ft. by 105 ft. open to the sky, and instead of the covered porticoes on each side there are immense recesses covered over with pointed vaults. The prayer chamber is 90 ft. deep, 90 ft. high to the apex of the vault and 69 ft. wide, a greater span than any Gothic cathedral, and only exceeded in dimensions by the great hall of the palace at Ctesiphon built by the Sassanian dynasty. The mosque covers a large area, and would seem to have been occupied by four religious sects, whose rooms, situated on the outer side, are lighted by windows in eight or ten storeys, giving the appearance of a factory. Its entrance portal, 60 ft. to 70 ft. high, is the finest in Egypt, and is only exceeded in dimensions by those of the Persian and Indian mosques. The vestibule is covered by a dome with stalactite pendentives, and is perhaps the most complete and perfect example in Cairo. Beyond the prayer chamber is the tomb of the founder, which is covered by a dome. This, according to Poole, was not originally a feature in Saracenic mosques. A dome, he says, has nothing to do with prayer and therefore nothing with a mosque. It is simply the roof of a tomb, and only exists when there is at least a tomb to be covered. The greater number of the mosques in and outside Cairo are mausoleums, which accounts for the large number of domes found there.

   Of the tombs of the caliphs, outside Cairo, the most important is the tomb of ash-Shafi'ī, reputed to have been built by Saladin but now quite changed by restoration. The tomb of Barkuk, in which the courtyard plan of Sultan Hasan is retained, has porticoes round it, which are of much more solid construction than those in earlier examples, and carry small domes. The two great domes on the east side and the minarets on the west are among the finest in Cairo. The tomb-mosque of Kait Bey (*c.* 1470), though comparatively small, is the finest in design and most elegant of its type in Egypt. Here the central court is covered by a cupola lantern (fig. 58), and the ceiling over the prayer chamber and other recesses is framed in timber and elaborately painted and gilded. The tomb is at the south-east corner, and is covered with a dome in stone, beautifully carved with conventional designs. In some of the mosques by the side of the portal is a fountain enclosed with bronze grilles, and above it a small room sometimes used as a school with open arcades on two sides. This feature in the mosque of Kait Bey, with the portal on its right, the lofty minaret beyond, and the great dome at the farther end, makes it the most picturesque in aspect of any Cairene mosque. (For plan see M<small>OSQUE</small>, fig. 3.)

P<small>LATE</small> VII.

Fɪɢ. 78.—HEIDELBERG CASTLE, FRIEDRICHSBAU.

Fɪɢ. 79.—HEIDELBERG CASTLE, OTTO-HEINRICHSBAU.
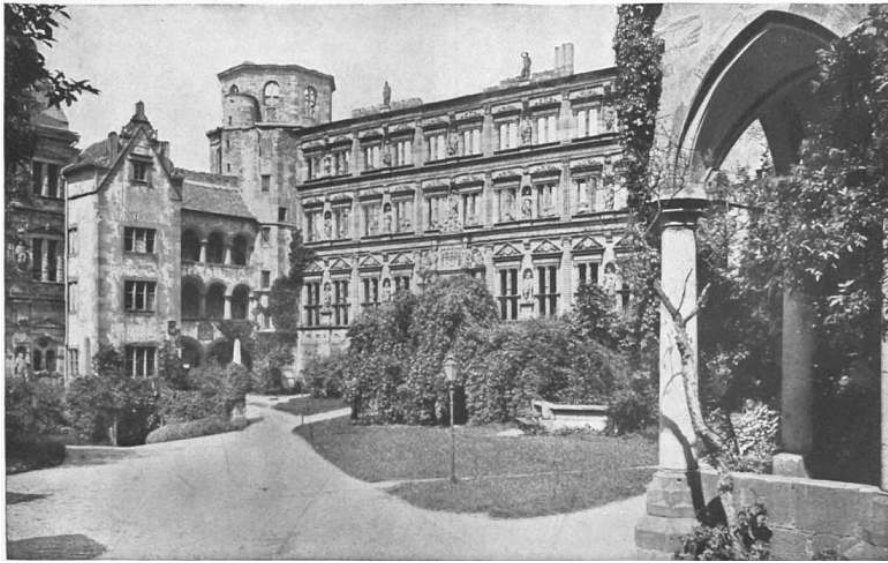
Fɪɢ. 80.—HEIDELBERG CASTLE, OTTO-HEINRICHSBAU.

Pʟᴀᴛᴇ VII.

Fɪɢ. 81.—PORCH, PETERBORO' CATHEDRAL.

Fɪɢ. 82.—ELY CATHEDRAL.

Fig. 83.—THE LOUVRE—PAVILLON HENRI II.
(*Portion of Lescot's work on left.*)

Fig. 84.—GRAND STAIRWAY, CHATEAU OF BLOIS.

It was in Egypt that the minaret received its highest development. The earliest example is that of the mosque of Tulun, which is of unusual shape, and has winding round it an inclined plane or staircase of easy ascent which can be made on horseback. The original design of this scheme was probably derived from the mosque of Samara, a town 60 m. north of Bagdad, where the minaret built *c.* 850 has a spiral ascent round it, recalling that of the Assyrian ziggurat as at Khorsabad. The general design of the Cairo minarets would seem to have been universally adhered to from the 12th century onwards, but the upper storeys are all varied in detail, there being virtually no two alike. As a rule the lower portion of the minaret forms part of the main wall of the mosque, and was carried up square a few feet above the cresting. It then became octagonal on plan, the sides decorated with niches or geometrical ornaments in bold relief. This, the first independent storey, was crowned by a stalactite cornice carrying the balcony (fig. 59), from which the *muezzin* (call-to-prayer) was chanted. In the early and fine examples the balustrade round it consisted of vertical posts with panels between, pierced with geometric ornaments, and all in stone. The second storey, also octagonal, was set back sufficiently to allow a passage round, and this was crowned by a similar stalactite cornice and balustrade. A third storey, sometimes circular on plan, completed the tower, which was crowned with a bulbous terminal. In one of the mosques, that of El Azhar, the first storey is square on plan, and the second storey has twin towers with lofty bulbous finials. The elaboration of the carved ornament on the various storeys of the minarets is of considerable beauty. Among the most remarkable, other than those already referred to, are the minarets of the mosque of al-Bordeni, of Kalaun, al-Nazir, Mu'ayyad (built on the semicircular bastion wall of the Zuwela Gate), Sultan Barkuk (1348), and numerous other mosques or tombs outside Cairo.
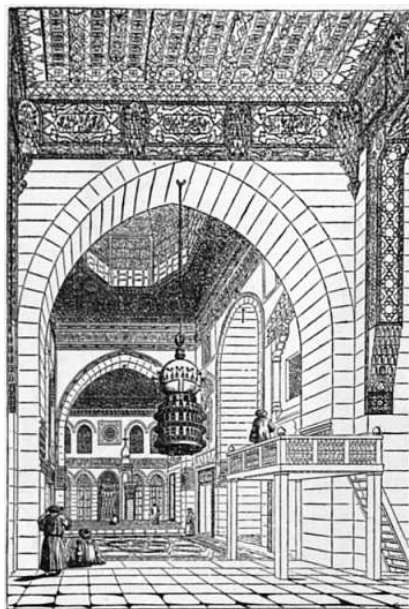

Fig. 58.—Interior of Kait Bey Mosque. (From Coste.)

The earlier domes were quite plain, hemispherical, with buttresses round the base, similar to those of St Sophia at Constantinople. In the later domes it was found that by raising the upper portion so as to take the form in section of a pointed arch, they could be built in horizontal courses of masonry up to about two-thirds of their height, the upper portion forming a lid without any thrust. It is probably owing to this method of construction that they still exist in such large numbers. The outer surfaces are decorated in various ways with geometrical designs, star patterns, chevrons, diapers, &c. Domes built in brick were covered with stucco and divided up into godroons.

We have already referred to the lofty portal of the mosque of Sultan Hasan; portals of smaller dimensions form the principal entrance to all the mosques and private houses. The recessed portion rises to twice or three times the height of the door, and its pointed or cusped head is always filled by a rich stalactite vault.

The descriptions of the disposition of plan, and the principles which have governed the plans of the Cairene mosques, apply equally to those in Syria, so that it now only remains necessary to quote the chief examples. Of these the earliest is the Dome of the Rock, incorrectly called the mosque of Omar, which was built by Abdalmalik in 691, partly with materials taken from the buildings destroyed by Chosroes. At first it consisted of a central area enclosing the sacred rock, covered

with a dome and with aisles round carried on columns and piers, and like the smaller Dome of the Chain open all round, but the climate of Syria is very different from that in Egypt, and consequently at a later period (813-833) the sultan Mamun built the walls which now enclose the whole structure. Many restorations have taken place since, and the dome with its rich internal decoration is attributed to Saladin (1189). The magnificent Persian tiles which encase the walls, the marble casing of some of the piers, and the stained glass, form part of the works of Suleiman (1520-1560).

The great mosque of Damascus occupied the site of an ancient church dedicated to St John the Baptist, which for a time was divided between the Christians and the Mahommedans. But in 705 the caliph al-Walid took possession of the whole church, which he rebuilt, retaining, however, the whole of the south wall, portions of which belonged to a Roman temple. This, which by chance happened to face south, became the Mecca wall, the niche being sunk in one of the doorways of the original temple. Its plan, therefore, is a variation of those we have already described. It consists of a transept with dome over the centre, three aisles of equal width, running both east and west, and a great court on the north side surrounded by arcades. The great transept is virtually the prayer chamber. The new building was erected by Byzantine masons sent from Constantinople, and decorated with marbles and mosaic by Greek artists. The mosque was almost entirely destroyed by fire in 1893, but has since been rebuilt.
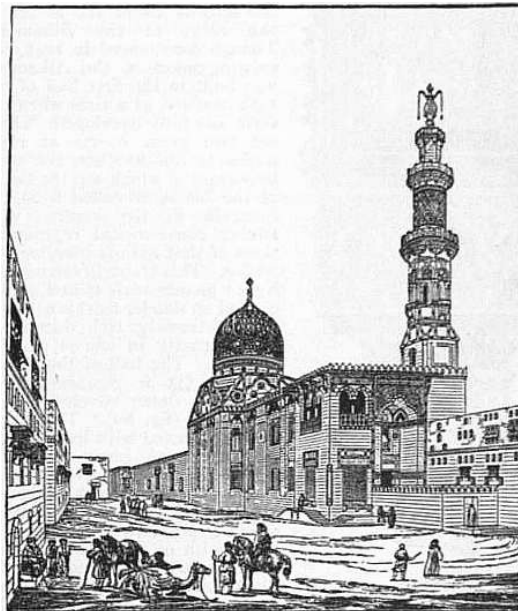
Fig. 59.—Exterior of Kait Bey Mosque, Cairo. (From Coste.)

The mosque of El Aksa in the sacred enclosure in Jerusalem, and south of the Dome of the Rock, was commenced by Abdalmalik (691), who used up materials taken from the church of St Mary, built by Justinian on Mount Sion, which had been destroyed by Chosroes. There have been so many restorations and rebuildings since, owing to destructive earthquakes and other causes, that it is difficult to give the precise dates of the various portions. The columns of the nave and aisles are extremely stunted in proportion, and their capitals are of a very debased type, copied by inferior artists from Byzantine models. They carry immense wood beams cased, and above them a range of pointed arches, among the earliest examples used throughout a mosque, and probably dating from the rebuilding (774-785). The Crusaders made various additions in the rear, but the great entrance porch is said to have been added by Saladin, after 1187, and was built probably by Christian masons who were allowed to remain in the country.

The numerous minarets at Jerusalem and Damascus in general design follow those of Egypt, but instead of the incised work are generally encased with marble in geometric patterns.

The great mosque at Mecca, from which it was thought at one time the plan of the Egyptian and other mosques was taken, is necessarily different from all others, because the Ka'ba or Holy Stone, towards which all the niches in all other mosques turn, stood in its centre. The arcades which surround the court were nearly all rebuilt in the 17th century, as the whole mosque was washed away by a torrent in 1626.

The mosque of Kairawan in Tunisia was built in 675. It occupies an area of 427 ft. deep and 225 ft. wide, with a prayer chamber at the Mecca end of 17 aisles and 11 bays deep, more than twice, therefore, that of 'Amr in Old Cairo. The columns to the prayer chamber, all taken from ancient buildings, are 22 ft. high in the central aisle and 15 ft. in all the others. They carry horse-shoe arches, which, as in the mosque of 'Amr, are all tied together by wood beams inserted at the springing of the arches.

The mosque of Cordova was built by Abdarrahman (Abd-ar-Rahman) in 786-789 in imitation of the mosque of Kairawan. There were eleven aisles of twenty-one bays, the centre one slightly wider than the other. The materials were taken from earlier buildings, and, as the columns and caps were not considered high enough, above the horse-shoe arches are built a second row of arches which carry the barrel vaults. To this mosque Hakim added twelve more bays in depth at the Mecca end (962), and in 985 Mansur added eight more aisles of thirty-three bays on the east side. Part of the open court on the north side dates from Abdarrahman's foundation (690) and part from Mansur.

In the mosque of Cordova we find the earliest example of the cusped arch, in the additions made by Hakim in 961; in order to obtain a greater height above the columns, it became necessary to employ the expedient of raising arch above arch in order to obtain the height they required for the ceilings; and as these arches formed purely decorative features, which might otherwise have become monotonous, variety was given by introducing the cusped form of arch and interlacing them one within the other. It is probably this elaborate design which suggested the plaster decorations of the screens above the arches in the court of the Alhambra. Though commenced in 1245, the existing palace of the Alhambra was built in the first half of the 14th century, at a time when the style was fully developed. There are two great courts at right angles to one another, the most important of which was the Court of the Lions, so called from the fountain in the centre, with twelve conventional representations of that animal carrying the basins. This court is surrounded by an arcade with stilted arches carried on slender marble columns with extremely rich decoration above, partly in stucco painted and gilt. The hall of the Abencerrages (35 ft. square) has a polygonal dome covered with arabesque (fig. 60). Two other halls are roofed with lofty stalactite vaults of great intricacy, richly gilded and of remarkable effect (fig. 61), but the employment of stucco instead of stone, as in Egypt,

has led to an abuse in the wealth of enrichment, which is only partly redeemed by the plain masonry of the towers and walls enclosing the palace. The Giralda at Seville is the only example of a tower, but it does not seem to have served the purpose of a minaret.

With the exception of the tombs of Zobeide and Ezekiel near Bagdad, and a hospital at Erzerum of the 12th century, built by the Seljukian dynasty, the Mahommedan style in Persia dates from the 13th century, i e. if Ghazan Khan built the mosque at Tabriz in 1294. The plan is that of a Byzantine church with a central dome, aisles and sanctuary. The portal consists of a lofty niche vaulted with semi-domes and stalactite pendentives, similar in many respects to the well-known example of Sultan Hasan in Cairo, built sixty years later. It is built in brick and covered internally and externally with glazed bricks of various colours, wrought into most intricate patterns with interlacing ornament and with Cufic inscriptions. The dazzling and perfect beauty in point of colour is not to be surpassed, but from the architectural point of view it possesses the fatal sin of not showing its construction. The bricks and tiles are only a veneer, and though in certain features (such as the portal and the dome) the construction is at least suggested, the tendency is to trust to decoration alone to produce architectural effects. (But see TABRIZ.)

The great mosque at Isfahan (1585) is a good illustration of the danger attending a too free use of surface decoration. Strip the walls of their tiles, and nothing is left except square box-like forms with pointed arched openings of different form. The interior, however, owing to the variety of its features, and the varied play of light and shade given in the hemispherical vaults of its transepts and niches and the vaulted aisles, constitutes one of the most beautiful monuments of Mahommedan art.

Apart from the great development of Mahommedan architecture in India (see INDIAN ARCHITECTURE), there remains now to be described only one other phase of the style, that found in Constantinople.

Prior to the conquest of Constantinople in 1445, two mosques were built by the Turks at Brusa in Asia Minor. The plan of Ulu Jami, the great mosque, follows the original courtyard type. Yeshil Jami, the Green mosque (1430), built on the site of a Byzantine church, is cruciform on plan. In both of them the Persian influence is shown, in the magnificent towers with which they are covered, the marble casing and the stalactite vaults.

FIG. 60.—Capital and Springing of Arch, from the Hall of Abencarrages, Alhambra.

FIG. 61.—Pendentive, from the Court of the Lions, Alhambra.

After the conquest of Constantinople, the supreme beauty of St Sophia, and the adaptability of its plan to the requirements of the Mahommedan faith, caused it to be accepted as the model on which all the new mosques were based. The first two erected were the Bayezid (1497-1515) and the Selim mosques (1520-1526). In the former the dome and its pendentives are carried on octagonal piers, and the dome, 108 ft. in diameter, is greater than in any subsequent example. The finest mosque, and the example in which we find the complete development of the Turkish style, is that erected by Suleiman the Magnificent in 1550-1555. This mosque, designed by Sinan, an Armenian architect, is still quite perfect. The plan follows very closely its model, St Sophia, and consists of a central dome, 86 ft. in diameter and 156 ft. high, carried on pendentives, resting on great arches which are slightly pointed, with great apses on the east and west sides, and three smaller apses in each, the arches of which ate all circular. The principal change in design is that found in the north and south walls, under the arches carrying the dome; in St Sophia they were subdivided into two storeys with galleries overlooking the church, but in the Suleimanic mosque the galleries are set back in the outer aisles, and the screen walls consist of a wide central and two side pointed arches, and voussoirs alternately of black and white marble. The tympana above this is pierced with eighteen windows filled with geometric tracery. Stalactite work is employed in the pendentive of the smaller apses and in the capitals of the columns carrying the pointed arches. The columns are of porphyry, the shafts, 28 ft. high, being taken from the Hippodrome and probably brought originally from Egypt. The walls are cased with marble up to the springing of the dome, but the magnificent mosaics of St Sophia are here replaced by vulgar colouring and plaster decoration of a rococo style, due probably to recent restorations. The mosque is preceded by a forecourt, surrounded by an arcade on all sides and containing a fountain, and in the garden in the rear is the tomb of the founder and his wife.

The Shah-Zadeh mosque, known as the prince's mosque, was also built by Sultan Suleiman, from the designs of Sinan, the same Armenian architect who built the Suleimanic mosque. Here, instead of confining the great apses to the east and west sides, they are introduced on the north and south sides in place of the screen, and produce a monotonous and poor effect. The same design is found in the Ahmedin mosque, built 1608, and with the same result. Externally, however, they are both fine, owing to the variety of domes, semi-domes and other curved forms of roof.

The minarets of the Turkish mosques are very inferior to those of Cairo. They are of great height, generally semicircular, with narrow balconies round the upper part, and crowned with extinguisher roofs. To a certain extent, however, they contrast very well with the domes and semi-domes of St Sophia and those of the mosques built by the Turks.

In the mosque of Osman, built 1748-1757, we find the first trace of Western influence in its rococo design, but here, as in the mosque of Mehemet Ali in Cairo, built 1837, the scheme is so good that, notwithstanding the great falling off in design, and, in the latter mosque, the construction, the effect of the interior is very fine.

Amongst other architectural features, the fountains in the courtyards of the mosques and those which decorate the public squares are extremely pleasing in design. The latter are square on plan with polygonal angles elaborate niches with stalactite heads, with overhanging eaves on each side; the ornament is very varied and the colour sometimes very attractive. The roofs have sometimes most picturesque outlines.

<div align="right">(R. P. S.)</div>

Modern Architecture

The beginning of the 19th century may be considered to mark the beginning of the modern era in architecture. The 19th century is the period *par excellence* of architectural "revivals." The great Renaissance movement in Italy already described was something more than a mere revival. It was a new spirit affecting the whole of art and literature and life, not an architectural movement only; and as far as architecture is concerned it was not a mere imitative revival. The great Italian architects of the Renaissance, as well as Wren, Vanbrugh and Hawksmoor in England, however they drew their inspiration from antique models, were for the most part original architects; they put the ancient materials to new uses of their own. The tendency of the 19th-century revivals, on the other hand, except in France, was distinctly imitative in a sense in which the architecture of the great Renaissance period was not. Correctness of imitation, in the English Gothic revival especially, was an avowed object; and conformity to precedent became, in fact, except with one or two individual architects, almost the admitted test of excellence.

Fig. 85—Bank of Ireland, Dublin.

The earliest classical London building of note in the 19th century is Soane's Bank of England, which as a matter of date belongs in fact to the end of the 18th century; but its architect lived well into the 19th century, and the bank may be classed with this section of the subject. Soane had to make something architectural out of the walls of a very extended building of only one storey, in which external windows were not admissible; and he did so by applying a classical columnar order to the walls and introducing sham window architraves. The latter are indefensible, and weaken the expression of the building; the columnar order was the received method at the time of making a building (as was supposed) "architectural," and the building has grace and dignity, and could hardly be taken for anything except a bank, although a more robust and massive treatment would have been more expressive of the function of the building, as a kind of fortress for the storage of money. It was only some years later that the Greek revival took some hold of English architects (the Bank of England is rather Roman than Greek); the impetus to it was probably given by the "Elgin marbles"; Stuart and Revett's great work on the *Antiquities of Athens* had been issued a good while previously, the three first volumes being dated respectively 1762, 1787 and 1794; but the appearance of the fourth volume in 1816 was no doubt influenced by the transportation to London of the Elgin marbles, and the sensation created by them. One of the first architectural results was the erection, at an immense cost in comparison with its size, of the church of St Pancras in London (1819-1822), designed by Inwood, who published a fine and still valuable monograph on the Erechtheum, and showed his enthusiasm for Greek architecture by copying the Erechtheum order and doorways for his façade, and erecting over it a tower composed of the Temple of the Winds with an octagonal imitation of the monument of Lysicrates imposed above it. This use of Greek monuments was architecturally absurd, though at the time it was no doubt the offspring of a genuine enthusiasm.

Classical revival in British architecture.

A better use was made of the study of Greek architecture by William Wilkins (1778-1839), who was in his way a great architect, and whose University College (1827-1828), as designed by him, was a noble and dignified building, of which he only carried out the central block with the cupola and portico. The wings were somewhat altered from his design but not materially spoiled, but the university authorities permitted the vandalism of erecting a low building as a partial return of the quadrangle on the fourth side, for the purposes of a mechanical laboratory, which ruined the appearance of the building.[4] Wilkins's other well-known work is the National Gallery (1832-1838), which he was not allowed to carry out exactly as he wished, and in which the cupola and the "pepperpots" are exceedingly poor and weak. But his details, especially the profiles of his mouldings, are admirably refined, and show the influence of a close study of Greek work. Among other prominent English architects of the classic revival in England are Sir Robert Smirke and Decimus Burton (1800-1881). To Burton we owe the Constitution Hill arch and the Hyde Park screen. The latter is a very graceful erection of its kind; the arch has never been completed by the quadriga group which the architect intended as its crowning feature, though for many years it was allowed to be disfigured by the colossal equestrian statue of Wellington, completely out of scale and crushing the structure. Smirke is kept in memory by his fine façade of the British Museum, which has been much criticized for its "useless" colonnades and the wasted space under them. The criticism is hardly just; for classic colonnades have at least some affinity with the purposes of a museum of antique art, and it conveys the impression of being a frontispiece to a building containing something of permanent value and importance. The early classic revival set its mark also, in a very fine and unmistakable manner, on the capital of the sister island. Dublin is almost a museum of fine classic buildings of the period, among which the most remarkable is the present Bank of Ireland (fig. 85), originally begun as the Parliament House. The beginning of the building belongs to the 18th century, but it was not completed in its present form till 1805, and was the work of five successive architects, only one of them, James Gandon (1743-1823), a man of the first importance; but it was Gandon who in 1790 did most to give the building its effective outline on plan, by introducing one of the curved quadrant walls, the building being subsequently finished in accordance with this suggestion. It is a remarkable combination of symmetry and picturesqueness, and as a one-storey classic building is far superior to Soane's Bank of England, with which a comparison is naturally suggested. Gandon's custom house, with its fine central cupola, is another notable example. Edinburgh too can show examples of the classic revival, and bears the title of "modern Athens" as much from her architectural experiments as from her intellectual claims; she illustrates the application of Greek architecture to modern buildings in two really fine examples, the Royal Institution by W.H. Playfair (1780-1857), and the high school by Thomas Hamilton (1784-1858). It was a pity that she added to these the collection of curiosities on the Calton Hill.

FIG. 86.—Liverpool Branch of the Bank of England. (Cockerell.)

But before we quit the classic revival in England, there are two architects to be named who came a little later in the day, living in fact into the time of the Gothic revival, who were superior to any of the earlier classic practitioners: Harvey Lonsdale Elmes and C.R. Cockerell. Elmes, who died very young, seems to have been as completely a born architectural genius as Wren, and his great work, St. George's Hall at Liverpool, has done more than any other building in the world to glorify the memory of the classic revival. Granting all that may be said as to the unsuitability of Greek architecture to the English climate, one can hardly complain of any movement in architecture which gave the opportunity for the production of so grand an architectural monument. It is true that it is badly planned and lighted, and the exterior and interior do not agree with each other (the exterior is Greek, and the great hall is Roman); but if from our present point of view it is a mistake, it is certainly one of the finest mistakes ever made in architecture. Cockerell, who completed the interior of the building after Elmes's death, was an architect permeated with the principles and feeling of Greek architecture, who brought to his work a refinement of taste and perception in regard to detail which has rarely been equalled and never surpassed. Perhaps the very best example of his scholarly taste in the application of classic architecture to modern uses is to be found in his façade to the branch Bank of England at Liverpool (fig. 86).
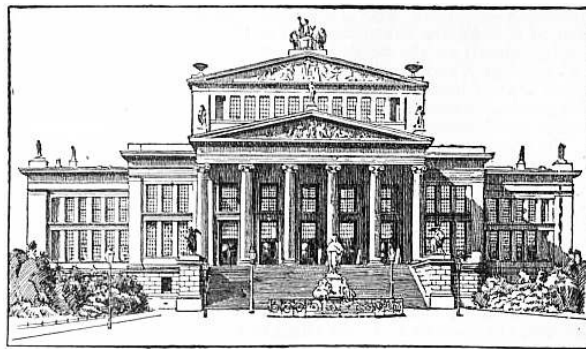
From a photo by W.A. Manseli & Co.

FIG. 87.—Royal Theatre, Berlin. (Schinkel.)

From a photograph by W.A. Manseli & Co.

FIG. 88.—Nikolai Kirche, Potsdam. (Schinkel.)

PLATE IX.
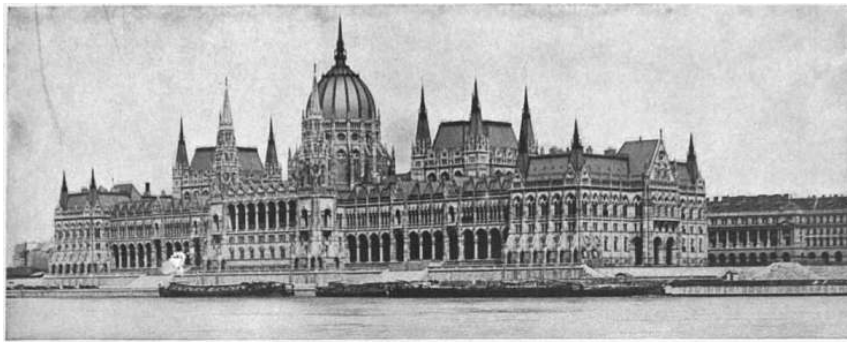
FIG. 115.—PARLIAMENT BUILDINGS, BUDAPEST. (STEINDL.)

FIG. 116.—PARLIAMENT BUILDINGS, VIENNA. (HANSEN.)

FIG. 117.—PARLIAMENT BUILDINGS, BERLIN. (WALLOT.)
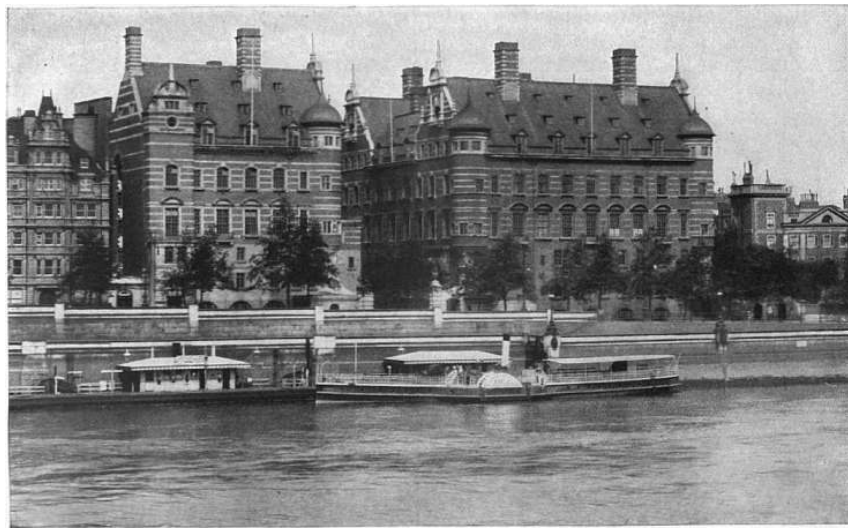
PLATE X.

FIG. 118.—HOUSES OF PARLIAMENT, LONDON. (BARRY.)

FIG. 119.—SCOTLAND YARD, LONDON. (SHAW.)

In Germany, and especially at Berlin and Munich, the Greek revival took hold of architecture in the early part of the century in a more decisive but also in a more academical spirit than in England. The movement is connected more

Classical revival in Germany.

especially with the name of one eminent architect, Karl Friedrich Schinkel, who must have been a man of genius to have so impressed his taste on his generation as he did in Berlin, where he was regarded as the great and central power in the architecture of his day; yet his buildings are marked by learning and academical correctness rather than original genius. Elmes's St George's Hall, already referred to as one great English work of the classic revival, is by no means a mere piece of academical architecture; it exhibits in some of its details a great deal of originality, and in its general design a remarkably fine feeling for architectural grouping. In particular, the solid masses and the heavy square columns at the ends of his building, which seem like Greek architecture treated with Egyptian feeling, give support to, while they form a most effective contrast with, the richer and more delicate Corinthian order of the central portion. The only work of Schinkel's which shows something of the same feeling for contrast in architectural composition is one of his smaller buildings, the Konigswache or Royal Guard-house, in which a Doric colonnaded portico is effectively flanked and supported by two great masses of plain wall. But in general Schinkel does not seem to have known what to do with the angles of his buildings, or to have realized the value of mass as a support to his colonnades. This is strikingly exemplified in his museum at Berlin, where the tall narrow piers at the angles have a very weak effect, and are quite inadequate as a support to the long open colonnade. His Royal theatre also (fig. 87), though the central portico is fine, is monotonous and weak in its two-storeyed repetition of the small order in the wings, and it has also the fault (which it shares, no doubt, with a great many theatres, large and small) that its exterior design gives no hint of the theatre form; it might just as well be a museum. His. Nikolai Kirche (1830-1837) at Potsdam (fig. 88), which has considerable celebrity, though not so merely academical in character, and in fact possessed of a certain originality, has a fault of another kind, in its entire lack of architectural unity; the dome does not seem to belong to or to have any connexion with the substructure, while the portico is quite out of scale with the great block of building in its rear, and looks like a subsequent addition. The fault of the Schinkel school of architecture is an almost total want of what may be called architectural life; it is an artificial production of the studio. The same kind of cold classicism prevailed at Munich, where Leo von Klenze (1784-1864), though a lesser man than Schinkel, played somewhat the same part as the latter played at Berlin. His Propylaea (fig. 89), in which Greek and Egyptian influences are combined, is a characteristic example of his cold and scholastic style. His well known *Ruhmeshalle*, with its boldly projecting colonnaded wings and the colossal statue of Bavaria in front of it, is in its way a fine architectural conception—perhaps finer and more consistent in its kind than any one work of Schinkel, though he evidently did not exercise so wide an influence on the German art of his day. A third eminent name in the German classic revival is that of Gottfried Semper (1803-1879), somewhat later in date (Schinkel was born in 1781), but more or less of the same school. Semper practised successively at Dresden and at Zurich, but finally settled in Vienna, where, however, he did not live to see the execution of his two most important designs, the museum and the Hofburg theatre, which were carried out by Baron Karl von Hasenauer (1833-1894) from his designs, or approximately so. Semper's theatre at Dresden, however, shows that he could recognize the practical basis of architecture, as the expression of plan, in a way that Schinkel could not; for in that building he frankly adopted the curve of the auditorium as the *motif* for his exterior design, thus producing a building which is obviously a theatre, and could not be taken for anything else, and putting some of that life into it which is so much wanting in Schinkel's rigid classicalities.
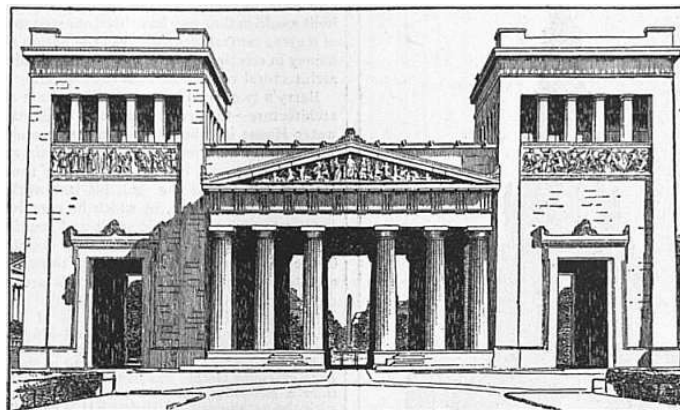
FIG. 89.—Propylaea at Munich. (Von Klenze.)

In spite of the Romanizing influence of the First Empire, the classic revival did not leave by any means so academical a stamp on French as on German architecture of the early period of the century. French architects in the

French Classicism.

main have always had too much original genius to be entirely taken captive by a general movement of this kind. There is the weak classicism of Bernard Poyet's façade to the chamber of deputies, a very poor affair;

and there are two important buildings in the guise of Roman peripteral temples, devoted respectively to business and to religion—the Bourse, by Alexandre Théodore Brongniart (1739-1813), and the Madeleine, begun under Napoleon, as a "Temple de la Gloire," by Pierre Vignon (1763-1828), and completed as a church in 1841 by Jean Jacques Huve (1783-1852). Both of these are very well carried out externally, and enable us to judge of what would be the effect of a Roman temple of the kind. It must be admitted that the plain oblong mass of the Bourse has really been very much improved by the recent addition of the two wings, carried out by Cavel, though there was a great deal of opposition at first to meddling with so celebrated a building. Unfortunately, the exterior of the Bourse is a mere piece of architectural scenery, quite unconnected with the internal object and arrangement of the building. The Madeleine is a really fine exterior in its way; if a modern church was to put on the guise of a pagan temple, the task could hardly have been better carried out; and the interior might have been as fine if properly treated, but it has little artistic relation with the noble exterior, and is spoiled by poor architectural treatment and bad ornament. The church of St Vincent de Paul, by Jacques Ignace Hittorff (1792-1867), an architect who was one of the most learned students of Greek architecture of his day, is another important example of the French classical church of the period (Plate XII., fig. 125). In this the interior is more consistent with the exterior than is the case in the Madeleine; and by adding a tower at each angle of the façade, above the colonnaded portico, the architect gave it more the expression of a church, which the Madeleine wants. In the Arc de l'Étoile, by Jean François T. Chalgrin (1739-1811), we have a really great, even sublime work, which, though suggested by the Roman triumphal arches, is no mere copy, but bears the impress of the French genius in its details as well as in François Rude's grand sculptures on the east face, while its great scale places it above everything else of the kind in the world. It is only after ascending the interior and seeing the vaults carrying the roof that one fully realizes what a stupendous piece of work this is. Under Napoleon there was at least no jerry-building.[5]

Fɪɢ. 90.—Halifax Town Hall. (Barry.)

Barry's "common-sense" style, in England. Returning to the consideration of architecture in England, we come, at about the close of the classic revival, to the name of the man who was undoubtedly the most remarkable English architect since Wren, Sir Charles Barry. To class him, as some would do, with the classic revival, would be a misapprehension. Barry was no revivalist; he never attempted to recreate Greek architecture on English soil. He adopted for most of his works what has been called, for want of a better name, the Italian style, which may really rather be called the common-sense style of a civilized society. The two first works which brought him into notice, the Travellers' and Reform clubs in London, were no doubt based on special Italian models, the Pandolfini and Farnese palaces; but a consideration of his whole career shows that he was in fact anything but a copyist. The comparison of him with Wren is justified by the fact that he was, like Wren, a born architect, in the sense that he grasped every problem presented to him from the true architect's point of view; with both of them architecture was not the dressing up of an exterior, but the fashioning of a building as a conception based on plan and section as well as on the desire to secure a certain external appearance; and, like Wren, he never failed to grasp the true requirements of a site and to adapt his architectural conception to it; a power perfectly different from that of merely producing agreeable elevations in this or that adopted style. Though very careful of his detail, he did not rely on detail, but on the general conception of an architectural scheme. This power was never so remarkably shown as in his grand scheme, unhappily never carried out, for the concentration of all the British government offices in one great architectural *ensemble*, which was to extend, on the west of Parliament Street and Whitehall, from Great George Street nearly to Charing Cross, the whole of the buildings to be carried out as one design, distributed into quadrangles, each of which was to be connected with one department of the administration, while all would have internal communication. Had this great idea been carried out we might at the present day have found some of the detail of the building unsatisfying to our taste, as we often find the detail in some of Wren's buildings, but we should have had a grand architectural achievement which would have made London pre-eminent among the capitals of the world. Nothing so great had been proposed in England since Inigo Jones's plan for Whitehall Palace, which also survives only in drawings, except the one noble bit of classic architecture known as the Banqueting House (Plate VI., fig. 75). It was one of the greatest misfortunes to London as a capital city that the government of the day could not rise to the height of Barry's ambitious scheme, in which there was nothing financially insuperable, since it was all designed to be carried out by portions at a time, as funds could be spared; but each government office built would in that way have been one step towards the completion of a great central idea; whereas the nation now spends the same money in erecting detached government buildings which have no architectural connexion with each other.

Barry's two clubs before mentioned are almost ideals of club architecture—the architecture of a civilized society; his Bridge-water House is a building on a larger scale of the same type. That he had architectural ideas less staid and sober than these is shown, however, by the remarkable tower and spire of the Halifax Town Hall (fig. 90), his last work, which he did not live to see carried out, in which he contrived with remarkable success to give the Gothic spirit and multiplicity of

effect to a tower which is nevertheless classic in detail. This tower is one of the most original and striking things in modern English architecture and shows how Barry's architectural ideas were developing up to the close of his life.

Barry's great building, the Houses of Parliament (Plate X., fig. 118), with which his name will always be more especially associated, comes accidentally, though not by natural development nor by his own choice, under the head of the Gothic revival. The style of Tudor Gothic was dictated to the competitors, apparently from a mistaken idea that the building ought to "harmonize" with the architecture of Henry VII.'s chapel adjacent to the site. Had Barry been left to himself, there is no doubt that the Houses of Parliament, with the same main characteristics of plan and grouping, would have been of a classic type of detail, and would possibly have been a still finer building than it is; and since the choice of the Gothic style in this case was not a direct consequence of the Gothic revival movement, it may be considered separately from that. The architectural greatness of the building consists, in the first place, in the grand yet simple scheme of Barry's plan, with the octagon hall in the centre, as the meeting-point for the public, the two chambers to north and south, and the access to the committee-rooms and other departments subordinate to the chambers. The plan (fig. 91) in itself is a stroke of genius, and has been more or less imitated in buildings for similar purposes all over the world; the most important example, the Parliament House of Budapest (Plate IX., fig. 115 and fig. 92), being almost a literal copy of Barry's plan. Thus, as in all great architecture, the plan is the basis of the whole scheme, and upon it is built up a most picturesque and expressive grouping, arising directly out of the plan. The two towers are most happily contrasted as expressive of their differing purposes; the Victoria Tower is the symbol of the State entrance, a piece of architectural display solely for the sake of a grand effect; the Clock Tower is a utilitarian structure, a lofty stalk to carry a great clock high in the air; the two are differentiated accordingly, and the placing of them at opposite ends of the structure has the fortunate effect of indicating, from a distance, the extent of the plan. The graceful spire in the centre offers an effective contrast to the masses of the two towers, while forming the outward architectural expression of the octagon hall, which is, as it were, the keystone of the plan.

The detail is another consideration. Barry, having had a style forced upon him (most unwisely), which he had not studied much and with which he was not much in sympathy, associated Pugin with him to design a good deal of the detail; exactly how much is not certainly known; probably Pugin was responsible for all the interior detail and fittings; the exterior detail may have been only suggested or sketched by him. On this ground absurd attempts have been made, by people who do not seem to understand what architecture in the true sense means, to claim for Pugin what they call the "artistic merit" of the Houses of Parliament. The artistic merit consists in the whole plan, conception and grouping, which are entirely Barry's, and which represent something beyond Pugin's grasp; the detail is in fact the weak element in the building. That Pugin's Gothic detail is better than Barry's would have been is very likely the case; but had Barry been left unfettered to work out the detail in his own school, the result would probably have been still better. Even as it is, however, the Houses of Parliament is one of the finest buildings in the world, ancient or modern, and it is to be regretted that Englishmen generally seem to be so little aware of this.
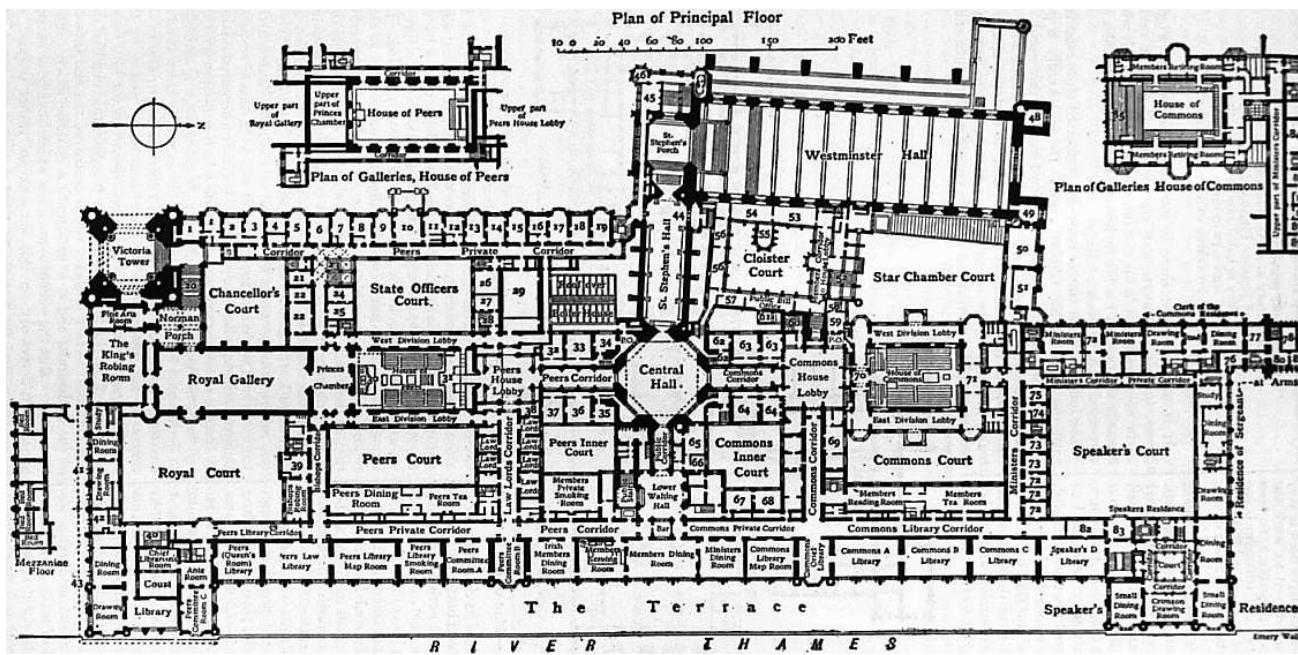
HOUSES OF PARLIAMENT, WESTMINSTER.

Fig. 91.

1. Reading Clerk.
2. Dressing Room.
3. Clerk of the Parliament.
4. Clerk Assistant's Dressing Room.
5. Clerk Assistant.
6. Clerk, House of Lords.
7. Messengers.
8. Waiting Room.
9. Lord Chancellor's Secretaries.
10. Lord Chancellor.
11. Lord Chancellor's Dressing Room.
12 Permanent Secretary.
13. Sergeant-at-Arms.
14. Yeoman Usher of the Black Rod.
15. Private Bill Office.
16. Chairman's Dressing
17. Chairman of Committees.
18. Clerk to Private Bill and Taxing Office.
19. Chairman of Committees Counsel.
20. Royal Staircase.
21. Clerk to Public Bills.
22. Minutes.
23. Peers' Staircase.
24. Inner Office.
25. Printed Papers Office.
26. Private Bills and Taxing Office.
27. Earl Marshal.
28. Strangers' and Reporters' Stairs.
29. Peers' Standing Order Committee Room.
30. The Thrones.
31. Bar of the House.
32. Leader of the Opposition in the House of Lords.
33. Premier.
34. Telegraph.
35. Solicitor-General.
36. Attorney-General.
37. Lord Advocate.
38. Resident Superintendent.
39. Archbishops.
40. Principal Stairs.
41. Residence of the Yeoman Usher of the Black Rod.
42. Sitting Room.
43. Residence of the Clerk of Parliament.
44. Members' Entrance.
45. Dining Room of the Deputy Sergeant-at-Arms.
46. Turret Room.
47. Private Stairs of the Deputy Sergeant-at-Arms.
48. Journal Office Stores.
49. Police.
50. Ministers.
51. Opposition Ministers.
52. Members' Entrance Stairs.
53. Members' Conference Room.
54. Members' Private Secretaries
55. Members' Small Conference Room.
56. Votes and Proceedings.
57. Accountant and Chief Public Bill Office.
58. Old Treasury Stairs.
59. Post Master.
60. Strangers' Stairs.
61. Cistern Tower.
62. Irish Whips.
63 Government Whips.
64. Opposition Whips.
65. Deputy Sergeant-at-Arms.
66. Clerk to Deputy Sergeant-at-Arms.
67. Speaker's Counsel.
68. Speaker's Counsel's Clerk.
69. Vote Office.
70. Bar Lobby.
71. Speaker's Lobby.
72. Ministers.
73. Clerk Assistant.
74. Train Bearers.
75. Speaker's Retiring Room.
76. Old Prison Rooms Lobby.
77. Sergeant-at-Arms' Smoking Roo
78. Clock Weight Shaft.
79. Air Shaft.
80. Smoking Room Lobby.
81. Butler.
82. Speaker's Secretary.
83. Audience Room.
84. *Times* Reporters.
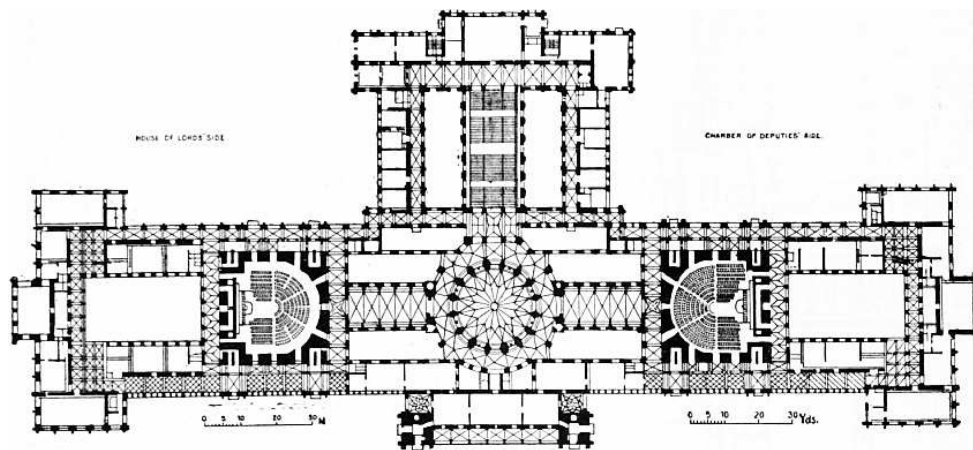85. Strangers' Gallery.
86. Waste Paper.
87. Mess.

FIG. 92.—Plan of the Parliament House, Budapest. (Steindl.)

We may now turn to consider the Gothic Revival movement itself, of which Pugin was one of the most important pioneers. New ideas, however, as to the importance of Gothic architecture had been in the air before he came on the scene, and quite early in the century John Britten's *Architectural Antiquities of Great Britain* and *Cathedral Antiquities*, with their beautiful steel engravings by Le Keux, had done much to call attention to the neglected beauty of English medieval churches; and Thomas Rickman's remarkable and (for its day) masterly analysis of the variations of style in Gothic architecture, which first appeared in 1817, and went through edition after edition in succeeding years, gave the first intelligent direction to the study of the subject. Pugin supplied to the movement not analysis, but passion. He had the merit of having perceived, when quite a youth, that one thing wanted was better craftsmanship, and that craftsmanship in the medieval period was something very different from what it was in the early Victorian period; he set up an atelier of craftsmen, and was the real pioneer of what may be called the Arts and Crafts movement in England. An enthusiast by nature, he flung his whole soul into the task of reviving, as he believed, the glory of English medieval architecture; nothing else in architecture was worth thinking of; Classic and Renaissance were only worth sarcasm. The result in his works was a curious inconsistency. Pugin was not in the true sense a great architect; his mind was not practical enough to grasp an architectural problem as a whole, plan and building combined; in fact, he was no master of plan, and does not seem to have troubled himself much about it. But he had a remarkable perception of interior effect; whenever you go into one of his churches you recognize the desire to realize the greatest effect of height, the most soaring effect of lines, possible within the actual vertical measurements. But in his passion for this soaring expression he seems to have entirely lost sight of the essential quality of solidity and genuineness of material in the medieval architecture which he was trying to emulate or to outvie. So long as he could get his effect of height, his poetic interior, he was content to have thin walls and plaster vaults and ornaments; or, in other words, he spent upon height what should first have been spent upon solid and monumental building. The result has been gently but effectively satirized by Browning in "Bishop Blougram's Apology":—

> "It's different preaching in Basilicas
> To doing duty in some masterpiece
> Like this of brother Pugin's, bless his heart.
> I doubt if they're half-baked, those chalk rosettes,
> Ciphers and stucco-twiddlings everywhere;
> It's just like breathing in a limekiln, eh?"

It is too true; and there is something pathetic in Pugin's career, in this passionate and sincere pursuit after a revival of the medieval spirit in life and in architecture—a pursuit which towards the close of his life he himself evidently more than half suspected to have been a fallacy.

The full tide of the Gothic revival is connected more especially with the name of Sir Gilbert Scott. He was hardly a pure enthusiast like Pugin; he was a shrewd man of the world, the commencement of whose professional career coincided with the rising tide of ecclesiological reform, and he had the ability to make the best of the opportunity. He appears to have had, even as a child, an inborn interest in church architecture and in Gothic detail (witness the description, in his *Memoirs*, of his astonishment and interest, at the age of eleven, at the first sight of capitals of the Early English type), and he acquired by unremitting study a knowledge of English Gothic architecture in its every detail which few architects have ever equalled. His numerous churches were, intentionally and confessedly, as close reproductions as possible of medieval architecture, generally that of the Early Decorated period; and if it were desirable that modern church architecture should consist in the reproduction of medieval churches, the task could not have been carried out with more learning and exactitude than it was by him. It was this minute and accurate knowledge of medieval church architecture which made him such a power when the idea of restoring English cathedrals became popular. He had an acquired instinct in tracing out the existence of details which had been overlaid by modern repairs or plasterwork; in going over a cathedral to decide on a scheme of restoration he seemed to know it as an anatomist knows the suggestions of a fossil skeleton; and in the course of his restorations he unearthed many points in the architectural history of the buildings which but for him would never have been elucidated. We now recognize that much of this "restoration" was a mistake, which destroyed the real interest of the cathedrals; and it is unhappily a mistake which cannot be undone. But the violent reproaches which have been heaped upon Scott's memory on this account are rather unjust. It is forgotten that he was doing what at the time every one considered to be the right thing; cathedral bodies vied with each other in restoration, and were enthusiastic in the cause; there were few if any dissenting voices; and in regard to the interiors of the cathedrals which were in modern use as places of worship, much that he did really required to be done to put them into decent condition. His churches have ceased to be interesting now, as is usually the case with copied architecture; but when they were built they were exactly what every one wanted and was asking for. And he produced at all events one original work which is a great deal better than it is now the fashion to think—the Albert Memorial. It is injured by the statue, for which the commission went to the wrong sculptor; but Scott's idea of producing, as he phrased it, "a shrine on a great scale," was really a fine one, and finely carried out. The most important objection to it is one which popular criticism does not recognize, viz. that the vault is tied by concealed iron ties, and would hardly be safe without them. But apart from that it is a fine conception, and Scott was right in regarding it as his best work.

G.E. Street, who was a pupil of Scott, was a greater enthusiast for medieval architecture (which, with him, as with Pugin, included medieval religion) than even Scott, and an architect of greater force and individuality. He was especially devoted to the early Transitional type of Gothic, and in all his buildings there is apparent the feeling for the solidity and monumental character, and the reticence in the use of ornament, which is characteristic of the Transitional period. His churches are noteworthy for their monumental character; and he had a remarkable faculty for giving an appearance of

scale and dignity to the interiors of comparatively small churches. Hence his modern-medieval churches retain their interest more than Scott's, but in respect of secular architecture his taste was hopelessly medievalized, and his great building, the law courts in London, can only be regarded as a costly failure; it is not even beautiful except in regard to some good detail; it is badly planned; and the one fine interior feature, the great vaulted hall, is rendered useless by not being on the same floor with the courts, so that instead of being a *salle des pas perdus* it is a desert. Street's career is a warning how real architectural talent and vigour may be stultified by a sentimental adherence to a past phase of architecture. No modern architect had more fully penetrated the spirit of Gothic architecture, and his nave of Bristol cathedral is as good as genuine medieval work, and might pass for such when time-worn; but that is rather archaeology than architecture.

The competition for the law courts was one of the great architectural events of the middle of the century, and made or raised the reputation even of some of the unsuccessful competitors. Edward Barry (the son of Sir Charles) gained the first place for "plan," which the advisers of the government had foolishly separated from "design" (as if the plan of a building could be considered apart from the architectural conception!), giving first marks for plan, and second for design. E. Barry therefore had really gained the competition, "design," which was awarded to Street, counting second; but Street managed to push him out, and it is a nemesis on him for this by no means loyal proceeding that the building he contrived to get entirely into his own hands has served to injure rather than benefit his reputation. William Burges (1827-1881), an ardent devotee of French early Gothic, produced a design in that style, which, though quite unsuitable practically, is a greater evidence of architectural power than is furnished by any of his executed buildings. J.P. Seddon (1828-1906), an old adherent of Rossetti and the pre-Raphaelite brotherhood, an architect of genius who never got his opportunity, produced a design which was wildly picturesque in appearance but in reality more practical than might be thought at first sight, and his proposal for a great Record tower for housing official records was a really fine and original idea.

Among the ecclesiastical buildings of the Gothic revival those of William Butterfield (1814-1900), much less numerous than those of Scott and Street, have a special interest as the work of a revival architect who was something more than a mere archaeologist. All Saints, Margaret Street (1859), is the production of an architectural artist using medieval materials to carry out a conception of his own, and hence, like Babbacombe church and others by the same hand, it has an interest for the present day which Scott's churches have not. His Keble College chapel rather failed from an exaggeration of the use of polychromatic materials, which in some of his other churches he had used with moderation and with good effect. J.L. Pearson was another distinguished architect of the later period of the Gothic revival who was able to put something of his own into modern Gothic churches. No one was more learned in medieval architecture than he was; and as of Street's nave of Bristol, so we may say of Pearson's nave of Truro, that it is as good as medieval Gothic; indeed Truro nave is finer in character than some of the ancient cathedral naves, and represents pure Gothic at its best. But in the exteriors of his churches, as at Truro and in the churches of Kilburn and Red Lion Square, Pearson evolved a Gothic of his own which is Pearsonesque and not merely archaeological. James Brooks (1825-1901) also deserves an honoured place in the chronicle of the Gothic revival for being the first to show how large town churches might be erected in brick (fig. 93), in which largeness of scale and a certain grandeur of effect could be obtained without extravagant cost, and in which it was practically demonstrated that architecture in the true Gothic spirit could be produced without depending on ornament.
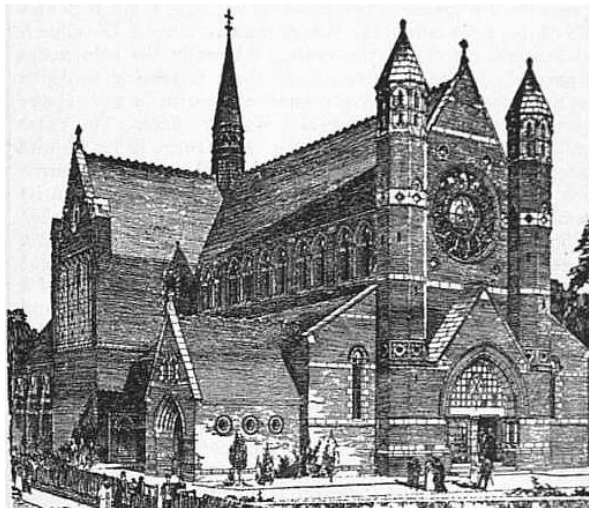

FIG. 93.—Exterior of modern English Church. (James Brooks.)

Alfred Waterhouse began his remarkable career as an adherent of the Gothic revival, and merits separate mention inasmuch as he was the only one of the Gothic revivalists who from the first set himself to adapt Gothic to secular uses and to make out of it a modern Gothic manner of his own. His first success was made with the Manchester law courts, a design more purely Gothic than his later works, and an admirably planned building (the only good point in the national law courts plan, the access to the public galleries, is taken from it); his special style was more developed in the Manchester town hall, a building typical both of the defects and merits of his secular Gothic style. This style of his received the compliment, for a good many years, of an immense amount of imitation; in fact, during that earlier period of his work it may be said to have influenced every secular building that was erected in the medieval style all over England. His Gothic detail was, however, not very refined, and he has been subject to the same kind of retrospective injustice which has fallen on Scott, critics in both instances forgetting that what they do not like *now* was what every one liked *then*, and could not have enough of. Waterhouse was a master of plan, and a man of immense business and administrative ability, without which he could not have carried out the number of great building schemes which fell into his hands, and he had much more of the qualities of a great architect than are to be found in the works of some of his latter-day critics. His later works, one or two of which will be referred to, do not come under the head of the Gothic revival.

In France, the Gothic revival, which so strongly affected the whole school of English architecture for thirty or forty years, took little hold. Its most remarkable monument is the church of Ste Clotilde at Paris, built about the middle of the century from the designs of Ballu. In size it equals a second-class cathedral, and is a fine monument,

France.

though it does not show that complete knowledge of medieval Gothic which we find in the churches of Scott, Street, Pearson and G.F. Bodley. But as with the Classic, so with the Gothic revival—the leading French architects of the period had too much personal architectural feeling to be carried along in the wake of a "movement." Two very important Paris churches, built just after the middle of the century, illustrate well this independence of spirit. The one is the domed church of St Augustin in the Boulevard Malesherbes (Plate XII., fig. 122), designed by Victor Baltard (1805-1874). It may be called a Classic church treated in a quasi-Byzantine manner. A remarkable point about it is that, standing between the divergence of two streets at an acute angle, the outer walls of the nave follow the line of the two streets, the church thus expanding towards the centre; internally the colonnades are parallel, the chapels outside of them increasing in depth from the entrance of the nave towards the centre—a very clever device for reconciling exterior and interior effect.

The other church referred to, built about the same time, is La Trinité (Plate XII., fig. 123) by Théodore Ballu (1817-1885)—a church which is Renaissance in detail and yet distinctly Gothic in its general effect and in the multiplicity of its detail, somewhat recalling in this sense Barry's Halifax tower before referred to. The sense in which there has really been a general movement in church architecture in France has been in the direction of a kind of modernized Byzantine, of which one of the earliest and best examples is the church of St Pierre de Montrouge, by Joseph Auguste E. Vaudremer (Plate XII., fig. 124). A later and more important example is the cathedral of Marseilles, by Leon Vaudoyer (1803-1872) and Henry Espérandieu (1829-1874), a mingling of Romanesque and Byzantine, and in many respects a fine building (Plate XIII., fig. 126). This modern feeling in favour of a Byzantine type of church architecture culminated in the great church of the Sacré Coeur on Montmartre, at Paris, begun in the early 'eighties from the designs of Paul Abadie (1812-1884). This grand building stands on a most effective site, and is of a monumental solidity seldom met with in modern architecture; it is more pure and consistent in style than many of the smaller churches of the same school of architecture. These latter are not for the most part very attractive; they represent in general a kind of Frenchified Byzantine detail which exhibits neither Byzantine spirit nor French grace and finish; and on the whole it may be said that church architecture is the field in which the French architects of the 19th century were least successful.

As regards secular buildings, on the other hand, the Paris of the middle portion of the 19th century can show some of the most unquestionable architectural successes of the period. The modern portions of the Palais de Justice by Louis Joseph Duc (1802-1879)—not Viollet-le-Duc, as is often mistakenly asserted in guide-books—and of the École des Beaux-Arts, by Jacques Félix Duban (1797-1870), are among the best examples of the application of classic forms of architecture to modern buildings; and the Bibliothèque Ste Geneviève (Plate XIII., fig. 128), by Henri Labrouste (1801-1875), was in its day (about 1850) a new creation in applied classic architecture; a building in which the exterior design was entirely subservient to and expressive of the requirements of a library, a large portion of the wall being left unpierced for the storage of books, windows being only inserted where they did not interfere with this object; and the manner in which these walls are treated so as to produce a decorative architectural effect without having recourse to sham colonnades and sham window openings, was entirely new at the time in modern work. It is instructive to compare this design with that of the Bank of England, as examples of the right and the wrong way of treating buildings in which much blank wall space was required. The new buildings of the Louvre (Plate XIV., fig. 129), built under Napoleon III. from the designs of Louis Tullius Joachim Visconti (1791-1853), are not to be passed over, though they have too much of the showy and flaunting character which belonged to both the society and the art of the Second Empire; a fault which also destroys some of the value of the Grand Opera house, a remarkable work by a remarkable architect (Jean Louis Charles Garnier), and typical, more than any other structure, of the epoch in which it was built. Some of its effect it owes to the admirable painting and sculpture with which it is decorated, but the grand staircase is a fine architectural conception (see GARNIER).

In England and in the United States, the last quarter of the 19th century was a period of unusual interest and activity in architectural development. While other nations have been content to carry on their architecture, for the most part, on the old scholastic lines which had been prevalent since the Renaissance, in the two countries named there has been manifest a spirit of unrest, of critical inquiry into the basis and objects of architecture; an aspiration to make new and original creations in or applications of the art, without example in any other period in the modern history of architecture. In England, the "note"—heard with increasing shrillness of *crescendo* towards the very last year of the century—was the cry for originality, for throwing off the trammels of the past, for rendering architecture more truly a direct expression of the conditions of practical requirement and of structure. This was no doubt to some extent the effect of a reaction. During the greater part of the century architectural strength, as has been already shown, had been spent in revivals of past styles. Churches indeed, up to the close of the century, continued to be built, for the most part, in revived Gothic; but this was owing to special clerical influence, which saw in Gothic a style specially consecrated to church architecture, and would be satisfied, as a rule, with nothing else. Efforts have been made by architects to modify the medieval church plan into something more practically suited to modern congregational worship, by a system of reducing the side aisles to mere narrow passages for access to the seats, thus retaining the architectural effect of the arcade, while keeping it out of the way of the seated congregation; and there have been occasional reversions to the ancient Christian basilica type of plan, or sometimes, as in the church in Davies Street, London, attempts to treat a church in a manner entirely independent of architectural precedent; but in the main, Gothic has continued to rule for churches. Apart from this special class of building, however, revived Gothic began to droop during the 'seventies. All had been copied that could be copied, and the result, to the architectural mind, was not satisfaction but satiety. Gothic began to be regarded as "played out." The immediate result, however, was not an organized attempt to think for ourselves, and make our own style, but a recourse to another class of precedent, represented in the type of early 18th-century building which became known as "Queen Anne," and which, like Gothic before it, was now to be recommended as "essentially English," as in fact it is. It can hardly, however, be called an architectural style; it would have no right to figure in any work illustrating the great architectural styles of the world. It was, in fact, the last dying phase of the English Renaissance; the architecture of the classic order reduced to a threadbare condition, treated very simply and in plain materials, in many cases shorn of its columnar features, and reflecting faithfully enough the prim rationalistic taste in literature and art of the England of the 18th century. Though not to be dignified as a *style*, it was, however, a recognizable and consistent *manner* in building; it made extensive use of brick, a material inexpensive and at the same time very well suited to the English climate and atmosphere; and it was generally carried out in very solid proportions, and with very good workmanship. To a generation tired of imitating a great style at second hand, this unpretending and simple model was a welcome relief, and led to the erection of a considerable number of modern buildings, dwelling-houses especially, the obvious aim of which was to look as like 18th-century buildings as possible. A typical example is the large London house by Norman Shaw, at the corner of Queen's Gate and Imperial Institute Road The Chelsea town hall (fig. 94), by J.M. Brydon (1840-1901), is a good example of a public building in the revived Queen Anne style.

Recent English architecture.

"Queen Anne."
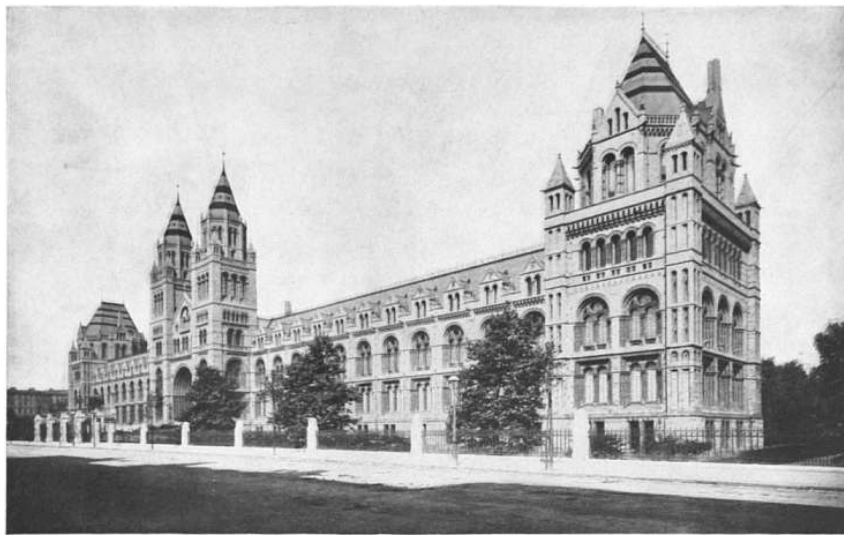
PLATE XI.

FIG. 120.—NATURAL HISTORY MUSEUM, SOUTH KENSINGTON. (WATERHOUSE.)

FIG. 121.—LAW COURTS, BRUSSELS. (POELAERT.)

PLATE XII.

FIG. 122.—CHURCH OF ST AUGUSTIN, PARIS.(BALTARD.)   FIG. 123.—CHURCH OF LA TRINITE, PARIS. (BALLU.)

FIG. 124.—CHURCH OF ST PIERRE DE MONTROUGE, PARIS.
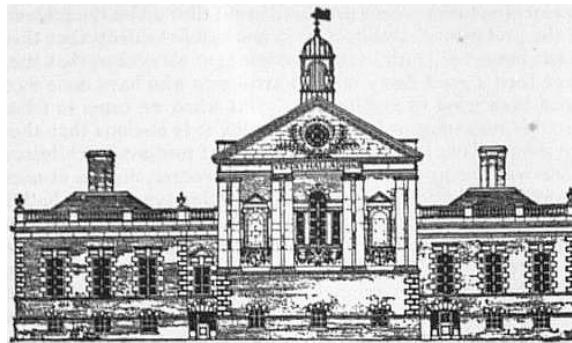(VAUDREMER.)

FIG. 125.—CHURCH OF ST VINCENT DE PAUL, PARIS.
(HITTORFF.)

FIG. 94.—Chelsea Town Hall. (J.M. Brydon.)

A change of front from copying a great style like the medieval to copying what is at best a bastard one, if a style at all, might not seem to promise very much for the emancipation of modern architecture; yet there turned out to be one element of progress in it, resting on the fact that the comparatively simple detail of the 18th-century buildings formed a kind of vernacular of building workmanship, which could be comprehended and carried out by good artisans as a recognized tradition. Now to reduce architecture to good sound building and good workmanship seemed to promise at any rate a better basis to work upon than the mere imitation of classic or medieval detail; it might conceivably furnish a new starting-point. This was the element of life in the Queen Anne revival, and it had, as we shall see, an influence beyond the circle of the special revivers of the style. But almost concurrently with, or following hard upon, the "Queen Anne" movement arose the idea of a modern architecture, founded on a free and unfettered treatment of the materials of our earlier Renaissance architecture, as illustrated in buildings of the Stuart period. This new ideal was styled "free classic," and it gave the prevailing tone to English architecture for the last fifteen years of the century, though it had its commencement in certain characteristic buildings a good many years earlier than that. In 1873, for instance, there arose a comparatively small front in Leadenhall Street, under the name of "New Zealand Chambers" (fig. 95), designed by Norman Shaw, which excited more attention, and had more influence on contemporary architecture than many a building of far greater size and importance. This represented the playful and picturesque possibilities of "free classic." Its more restrained and refined achievements were early exemplified in G.F. Bodley's design for the front of the London School Board offices on the Thames Embankment,[6] a comparatively small building which also exercised a considerable influence. There were no details here, however, but what could be found in Stuart (or, as it is more often called, Jacobean) architecture, but the building, and the prominence of its architect's name, helped to draw attention to the possibilities of the style, and it has been discovered that free classic is susceptible of a great deal of original treatment based on Renaissance elements. As an example we may cite a street front built some twenty years later by another academician-architect, viz. the offices of the Chartered Accountants in the City, by J. Belcher. More dignified and more monumental than New Zealand Chambers, more original than the School Board offices, this front contains some details and a general treatment which may be said to be absolutely new; it affords another example of a piece of street architecture which attracted a great deal of attention, and has had an effect quite disproportionate to its size and importance as a building; and it gives a general measure of the progress of the "free classic" idea. During the last decade of the century "free classic" was almost the recognized style in English architecture, and has been illustrated in many town halls and other large and important buildings, among which the Imperial Institute is a prominent example (fig. 96).
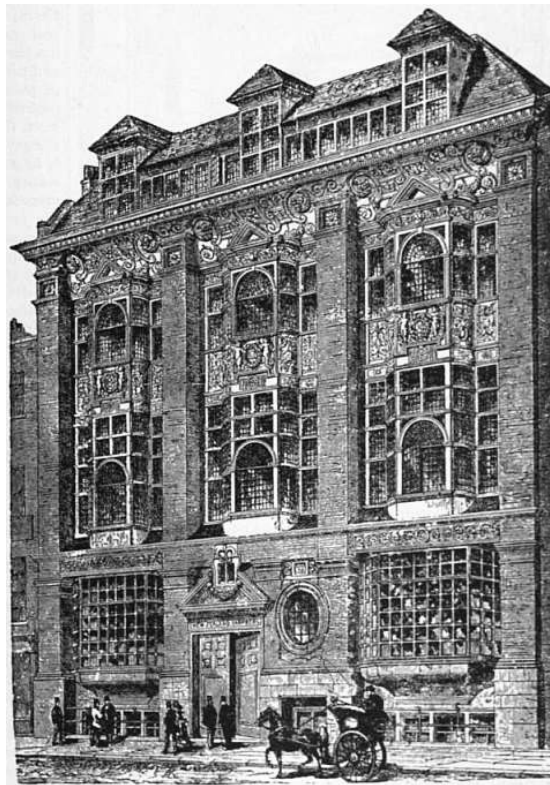
"Free classic."

F<small>IG</small>. 95.—New Zealand Chambers. (R. Norman Shaw, R.A.)

Concurrently with this tendency towards a free classic style there has arisen another movement which has had a considerable influence on English architecture, viz. an increased perception of the importance of decorative arts—sculpture, painting, mosaic, etc.—in alliance with architecture, and of the architect and the decorative artist working together and in harmony. This is no more than what has long been understood and acted on in France, but it has been a new light to modern English architecture, in which, until a comparatively recent period, decorative painting was hardly thought of, and decorative sculpture, where it was introduced, was too often, or indeed generally, the mere work of some trading firm of masons But of late years sculpture has taken a far more prominent place in connexion with architecture; it has become a habit with the best architects to rely largely on the introduction of appropriate and symbolic sculpture to add to the interest of their buildings, and to associate with them eminent sculptors, who, instead of regarding their work only in the light of isolated statues or groups for the exhibition room and the art gallery, are willing to give their best efforts to produce high-class sculpture for the decoration of an architectural design which forms the framework to it.
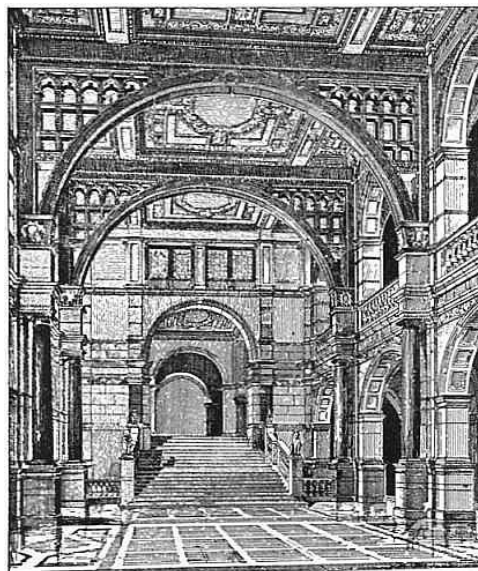
The allied arts.

436

F<small>IG</small>. 96.—Staircase, Imperial Institute. (Collcutt.)

Notice should be taken, however, of another movement in English architecture during the closing years of the 19th century. Reference has already been made to one idea which prompted the culture of the "Queen Anne" type of architecture: that it presented a simple vernacular of construction and detail, in which solid workmanship a more prominent element than elaboration of what is known as architectural style. To a small group of clever and enthusiastic architects of the younger generation it appeared that this idea of reducing architecture to the common-sense of construction might be carried still further; that as all the revivals of styles since the Renaissance had failed to give permanent satisfaction and had tended to reduce architecture to a learned imitation of the work of former epochs, the real chance for giving life to architecture as a modern art was to throw aside all the conventionally accepted insignia of architectural style—columns, pilasters, cornices, buttresses, etc.—and to begin over again with mere workmanship—wall-building and carpentry—and trust that in process of time a new decorative detail would be evolved, indebted to no precedent. The building artisans, in fact, were collectively to take the place of the architect and the form of the building to be evolved by a natural process of growth. This was a favourite idea also with William Morris, who insisted that medieval art—the only art which he recognized as of any value (Greek, Roman and Renaissance being alike contemptible in his eyes)—was essentially an art of the people, and that in fact

The craftmanship ideal.

it was the modern architects who stood in the way of our having a genuine architecture of the 19th century. Considering how much of merely formal, conventional and soulless architecture has been produced in our time under the guidance of the professional architect, it is impossible to deny that there is an element of truth in this reasoning; at all events, that there have been a good many modern architects who have done more harm than good to architecture. But when we come to follow out this reasoning to its logical results, it is obvious that there are serious flaws in it. Morris's idea that medieval architecture alone was worthy the name, we may, of course, dismiss at once; it was the prejudice of a man of genius whose sympathies, both in matters social and artistic, were narrow. Nor can we regard the medieval cathedrals as artisan's architecture. The name of "architect" may have been unknown, but that the personage was present in some guise, the very individuality and variety of our English cathedrals attest. Peterborough front was no mere mason's conception. And when we come to consider modern conditions of building, it is perfectly obvious that with the complicated practical requirements of modern building, in regard to planning, heating, ventilation, etc., the planning of the whole in a complete set of drawings, before the building is begun, is an absolute necessity. We are no longer in medieval times; modern conditions require the modern architect. The real cause of failure, as far as modern architecture is a failure, lies partly in the fact that it is practised too much as a profession or business, too little as an art; partly in the deadening effect of public indifference to art in Britain. If the public really desired great and impressive works of architecture they would have them; but neither the British public nor its mouthpiece the government, care anything about it. Their highest ambition is to get convenient and economical buildings. And as to the theory of the new school, that we should throw overboard all precedent in architectural detail, that is intellectually impossible. We are not made so that we can invent everything *de novo*, or escape the effect on our minds of what has preceded us; the attempt can only lead to baldness or eccentricity. Every great style of architecture of the past has, in fact, been evolved from the detail of preceding styles; and some of the ablest and most earnest architects of the present day are, indeed, urging the desirability of clinging to traditional forms in regard to detail, as a means of maintaining the continuity of the art. This does not by any means imply the absence of original architecture; there is scope for endless origination in the plan and the general design of a building. The Houses of Parliament is a prominent example. The detail is a reproduction of Tudor detail, but the plan and the general conception are absolutely original, and resemble those of no other pre-existing building in the world.

It is necessary to take account of all these movements of opinion and principle in English architecture to appreciate properly its position and prospects at the time with which we are here dealing. Turning now from England

United States.

to the United States, which, as already observed, is the only other important country in which there has been a general new movement in architecture, we find, singular to say, that the course of development has in America been almost the reverse of what has taken place in England. The rapidity of architectural development in America, it may be observed, since about 1875, has been something astonishing; there is no parallel to it anywhere else. Before then the currently accepted architecture of the American Republic was little more than a bad repetition of the English Gothic and Classic types of revived architecture. At the present day no nation, except perhaps France, takes so keen an interest in architecture and produces so many noteworthy buildings; and it may be observed that in the United States the public and the official authorities seem really to have some enthusiasm on the subject, and to desire fine buildings. But the stirring of the dry bones began in America where it ended in England. The first symptoms of an original spirit operating in American architecture showed themselves in domestic architecture, in town and country houses, the latter especially; and the form which the movement took was a desire to escape conventional architectural detail and to return to the simplest form of mere *building*; rock-faced masonry, sometimes of materials picked up on the site; chimneys which were plain shafts of masonry or brickwork; woodwork simply hewn and squared, but the whole arranged with a view to picturesque effect (figs. 97 and 98). This form of American house became an incident in the course of modern architecture; it even had a recognizable influence on English architects. About the same time an impetus of a more special nature was given to American architecture by a man of genius, H.H. Richardson, who, falling back on Romanesque and Byzantine types of architecture as a somewhat unworked field, evolved from them a type of architectural treatment so distinctly his own (though its *origines* were of course quite traceable) that he came very near the credit of having personally invented a style; at all events he invented a manner, which was so largely admired and imitated that for some ten or fifteen years American architecture showed a distinct tendency to become "Richardsonesque" (see also Plate XVI., fig. 137). As with all architectural fashions, however, people got tired of this, and the influence of another very able American architect, Richard M. Hunt, coupled perhaps with the proverbial philo-Gallic tendencies of the modern American, led to the American architects, during the last decade of the 19th century, throwing themselves almost entirely into the arms, as it were, of France; seeking their education as far as possible in Paris, and adopting the theory and practice of the École des Beaux-Arts so completely that it is often impossible to distinguish their designs, and even their methods of drawing, from those of French architects brought up in the strictest regime of the "École." By this French movement the Americans have, on the one hand, shared the advantages and the influence of what is undoubtedly the most complete school of architectural training in the world; but, on the other hand, they have foregone the opportunity which might have been afforded them of developing a school or style of their own, influenced by the circumstances of their own requirements, climate and materials. Figs. 133 and 134, Plate XV., show examples of recent American architecture of the European classic type. Thus, in the two countries which in this period have shown the most activity and restlessness in their architectural aspirations, and given the most original thought to the subject, England has constantly tended towards throwing off the yoke of precedent and escaping from the limits of a scholastic style; while America, commencing her era of architectural emancipation with an attempt at first principles and simple but picturesque building, has ended by a pretty general adoption of the highly-developed scholastic system of another country. The contrast is certainly a curious one. Only one original contribution to the art has been made by America in recent days—one arising directly out of practical conditions, viz. the "high buildings" in cities; a form of architecture which may be said to have originated in the fact that New York is built on a peninsula, and extension of the city is only possible vertically and not horizontally. The tower-like buildings (see Plate XV., fig. 131, and Steel Construction, Plate II., figs. 3 and 4), served internally by lifts, to which this condition of things has given rise, form a really new contribution to architecture, and have been handled by some of the American architects in a very effective manner; though, unfortunately, the rage for rapid building in the cities of the United States has led to the adoption of the false architectural system of running up such structures in the form of a steel framing, cased with a mere skin of masonry or terra-cotta, for appearance' sake, which in reality depends for its stability on the steel framing. It must be admitted, however, to be a new contribution to architecture, and renders New York, as seen from the harbour, a "towered city" in a sense not realized by the poet.
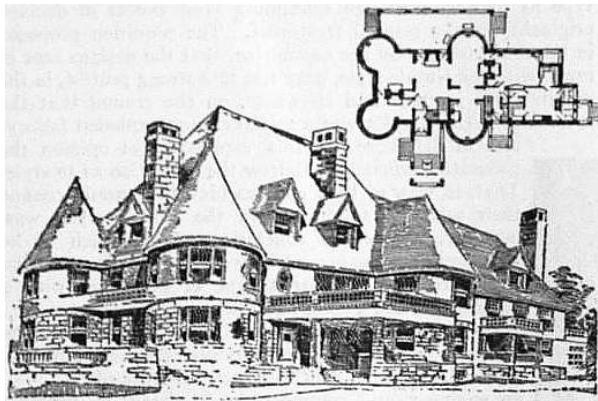
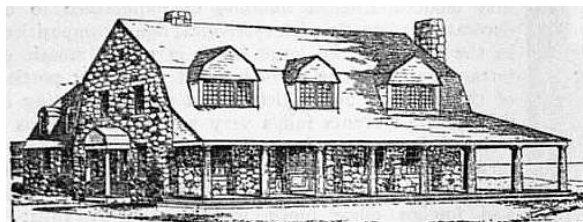FIG. 97.—American Type of Country-House Architecture.

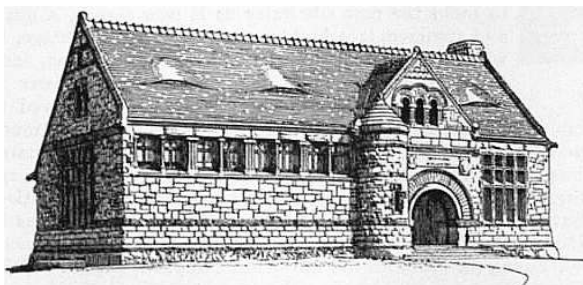FIG. 98.—American Seaside Villa. (Bruce Price.)

FIG. 99.—Crane Public Library, Quincy, Mass. (H.H. Richardson.)

Some sketch of the state of recent architectural thought or endeavour in England seemed essential to the subject, since it is there that what may be called the philosophy of architecture has been most debated, and that thought has had the most obvious and most direct effect on architectural style and movement. That this has been the case has no doubt been largely due to the influence of Ruskin, who, though his architectural judgment was on many points faulty and absurd in the extreme, had at any rate the effect of setting people thinking —not without result. In other countries architecture continued to pursue, up to the close of the century, the scholastic ideal impressed upon it by the Renaissance, without exciting doubt or controversy unless in a very occasional and partial manner, and without any changes save those minor ones arising from changing habits of execution and use of material. In Germany there appears to be a certain tendency to a greater freedom in the use of the materials of classic architecture, a certain relaxation of the bonds of scholasticism; but it has hardly assumed such proportions as to be ranked as a new movement in architecture.

English progress.

The last years of the 19th century witnessed the progress to an advanced stage of the most remarkable piece of English church architecture of the period, the Roman Catholic cathedral at Westminster, by J.H. Bentley (1839-1902), a building which is not a Gothic revival, but goes back to earlier (Byzantine) precedents; not, however, without a considerable element of novelty and originality in the design, especially in some of the exterior detail. The interior was intended for decoration in applied marble and mosaic, yet even as a shell of brickwork, with its solid domes and the immense masses of the piers, it is one of the most impressive and monumental interiors of modern date.

English churches.

438

F<small>IG</small>. 100.—Interior, St Clare's, Liverpool. (Leonard Stokes.)

In ordinary church architecture, though there is still a good deal of mere imitation medieval work carried out, England has not been without examples of a new and original application of Gothic materials. The interior of the church of St Clare, Liverpool, by Mr Leonard Stokes (fig. 100), is a good example of the modified treatment of the three-aisled medieval plan already referred to, the side aisles being reduced to passages; and also of the tendency in recent years to simplify the treatment of Gothic, in contrast to the florid and over-carved churches of the Gothic revival. The churches of James Brooks, as already noted, have shown many examples of a solid plain treatment of Gothic, yet with a great deal of character; and J.D. Sedding (1838-1891) built some showing great originality, among which the interior of his church of the Holy Redeemer, Clerkenwell, affords also an interesting example of the modern free treatment of forms derived from classic architecture.

The event of most importance in English church architecture at the beginning of the 20th century was the commencement of a modern cathedral at Liverpool. In the early 'eighties the proposal for a cathedral had led to an important competition between three sets of invited architects, Sir William Emerson, Messrs Bodley and Garner and James Brooks. Nothing, however, resulted, except the production of three very fine sets of drawings. Subsequently the subject was taken up again with more energy, and a sketch competition invited for a cathedral on a new site (the one originally intended being no longer available); from among the sketch competitors five were invited to join in a final competition, viz. Messrs Austin and Paley, C.A. Nicholson, Gilbert Scott (grandson of Sir Gilbert Scott), Malcolm Stark and W.J. Tapper. Mr Scott's design was selected (May 1903) and the building of it commenced not long after. It is a design in revived Gothic, of the orthodox type as to detail, though containing some points of decided originality in the general treatment. The condition proposed in the first instance by the committee, that the designs sent in must be in the Gothic style, gave rise to a strong protest, in the architectural journals and elsewhere, on the ground that the revival of ancient styles was a mistaken and exploded fallacy; and in deference to this expression of opinion the committee officially withdrew the limitation as to style. That, in view of their obvious bias, they would confine their selection to designs in the Gothic style, was, however, a foregone conclusion. It is much to be regretted that the opportunity was not taken to evolve a modern and Protestant type of cathedral, with a central area and a dome as its principal feature.

In the architecture of public buildings one of the earliest incidents in this latest period was the completion of the Albert Hall, which, though the work of an engineer, and commonplace in detail, is in the main a fine and novel architectural conception, and a practical success (considering its abnormal size) as a building for musical performances. Had its constructor been bold enough to roof it with a solid masonry dome, with an "eye" in the centre (as in the Pantheon) instead of a huge dish-cover of glass and iron, there would have been little to find fault with in its general conception. It was also the first modern English building of importance to be decorated externally with symbolical figure composition, in the shape of the large frieze in coarse mosaic of terra-cotta, which is carried round the upper portion of the exterior, and which, if not very interesting in detail, at all events fulfils very well its purpose as a piece of decorative effect. The subject of the government offices in London forms in itself an important chapter in recent architectural history. The home and foreign office block was finished in 1874; a sumptuous, but weak and ill-planned building designed by Scott, *invita Minerva*, in a style alien to his own predilections. In 1884 took place the great competition for the war and admiralty offices conjointly, won by a commonplace but admirably drawn design, presenting some good points in planning. The building was to stand between Whitehall and St James's Park, with a front both ways. The competition came to nothing, and the successful architects were eventually employed to build the new admiralty as it now stands, a mean and commonplace building with no street frontage, in which economy was the main consideration, and totally discreditable to the greatest naval power in the world. In 1898-1899 it was at last resolved to a war office and other government offices much needed, and an irregular site opposite the Horse Guards was selected for the war office and one in Great George Street for the others. In this case there was no competition, but the government selected two architects after inquiry as to their works ("classic" architecture being a *sine qua non*); W. Young (d. 1900) for the war office, and J.M. Brydon for the Great George Street block. The war office site is inadequate and totally unsymmetrical, the boundary of the building being settled by the boundary of the street curb, and the inner courtyards are of very mean proportions compared with the great courtyard of the home and foreign office. Both architects produced grandiose designs, but in regard to the war office at least the government threw away a great opportunity.

English public buildings.

P<small>LATE</small> XIII.

FIG. 126.—CATHEDRAL, MARSEILLES. (VAUDOYER AND ESPERANDIEU.)

FIG. 127.—MAIRIE, Xth ARRONDISSEMENT, PARIS. (ROUYER.)
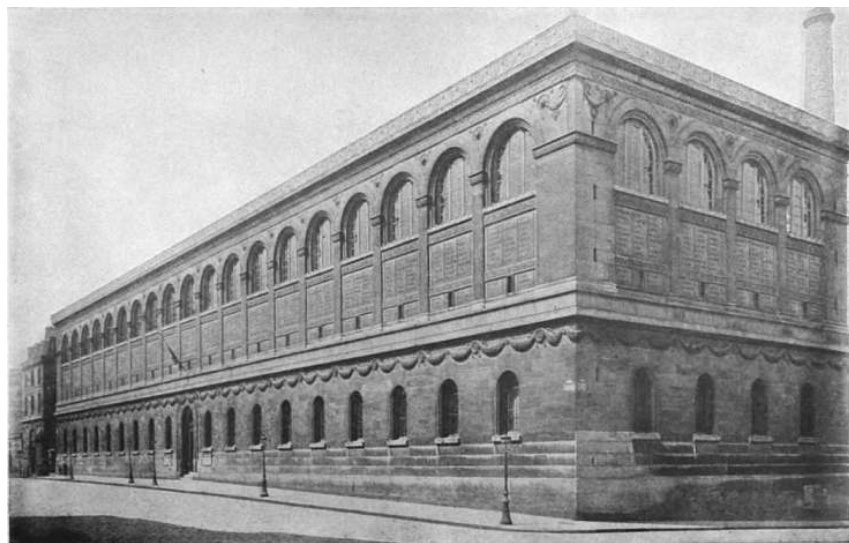
FIG. 128.—BIBLIOTHÈQUE STE GENEVIÈVE, PARIS. (LABROUSTE.)

PLATE XIV.

FIG. 129.—PAVILLON RICHELIEU, THE LOUVRE, PARIS. (VISCONTI.)

Fig. 130.—PETIT PALAIS, PARIS. (GIRAULT.)

There can only be further enumerated a few of the more important buildings erected in England during the later years of the 19th century, and mention made of the general course which architecture has taken in regard to special classes of buildings. The Natural History Museum (Plate XI., fig. 120), completed in 1881 by Alfred Waterhouse, may stand as a type of the taste for the employment of terra-cotta, with all its dangerous facilities in ornamental detail, of which that architect specially set the example. Detail is certainly overdone here, but the building is strikingly original; a point not to be overlooked in these days of architectural copying. The Imperial Institute, the result of a competition among six selected architects, represents also a type of architecture which its architect, T.E. Collcutt, maybe said to have matured for himself, and which has been extensively imitated; a refined variety of free classic, always quiet and delicate in detail, though perhaps rather wanting in architectonic force. The next great architectural competition was that for the completion of the South Kensington Museum, the bare brick exterior of which, waiting for architectural completion, had long been a national disgrace. The competition produced some fine and striking designs, some of them perhaps more so than the selected one by Sir Aston Webb, whose fine plan, however, justified the selection. Another competition which excited general interest was that in 1894, for the rebuilding on a country site of Christ's Hospital schools, also gained by Aston Webb (in collaboration with Ingress Bell), by a design which, in its arrangement of schoolhouses in detached blocks (fig. 101), but in a symmetrical grouping, opened up a new idea in public-school planning, and struck a blow at the picturesque but insanitary quadrangle system. Among notable public buildings of the period ought to be mentioned Norman Shaw's New Scotland Yard, built in a style neither classic nor Gothic, but partaking of the elements of both (Plate X., fig. 119). A competition in 1908 for the design of the new county hall for the London County Council, to be "English Renaissance" in style, was won by a young architect, till then unknown, Mr Ralph Knott.
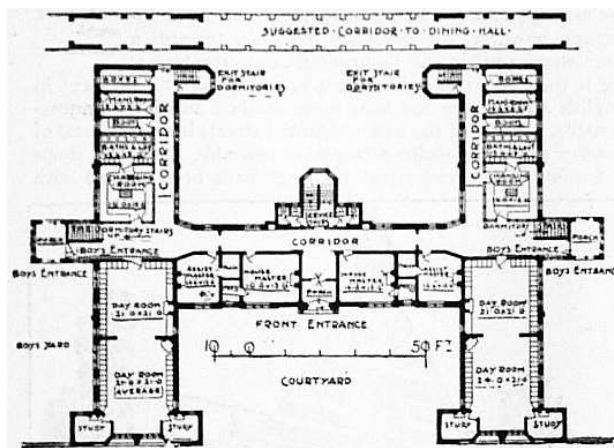

Fig. 101.—Plan of a Master's House, New Christ's Hospital. (Webb and Bell.)

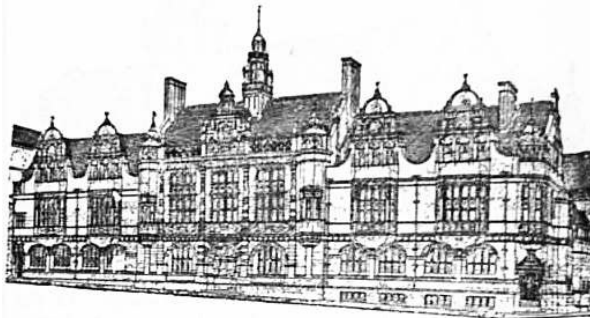F<small>IG</small>. 102.—Sheffield Town Hall. (Mountford.)

F<small>IG</small>. 103.—Oxford Town Hall. (Hare.)

In recent years there has been a great movement for building town halls; towns rather vying with each other in this way. Of late nearly all of these have been carried out in some variety of free classic. Among the more important in point of scale is that of Sheffield, by E.W. Mountford (1856-1908) (fig. 102); among smaller ones, those of Oxford, by H.T. Hare (fig. 103); and Colchester, by John Belcher, are particularly good examples of recent architecture of this class, the former distinguished also by an exceptionally good plan. The merit of excellent planning also belongs to Aston Webb and Ingress Bell's Birmingham law courts, one of the modern terra-cotta buildings of somewhat too florid detail, though picturesque as a whole. Among public halls the M'Ewan Hall at Edinburgh, completed in 1898 from the designs of Sir Rowand Anderson, deserves mention as one of the most original and most carefully designed of recent buildings in Great Britain.

The various new buildings erected in connexion with the university of Oxford, those by T.G. Jackson (b. 1835) especially, form an important incident in modern English architecture. Mr Jackson succeeded to a remarkable degree in designing new buildings which are in harmony with the old architecture of the university city; sometimes perhaps a little too imitative of it, but at any rate he has the credit of having added rather extensively to Oxford without spoiling it; while his school buildings in different parts of the country have a refinement and domesticity of feeling which is the true note of school architecture. Among buildings of an educational class, the move in technical education has led to the erection of a good many large polytechnic and similar institutions, which in many cases have been well treated architecturally; the Northampton Institute at Clerkenwell (fig. 104), by Mountford, being perhaps one of the boldest and most effective of recent public buildings. In the building of hospitals and asylums much has been done, and great progress made in the direction of hygienic and practical planning and construction, but the tendency has been (perhaps rightly) towards making this practical efficiency the main consideration and reducing architectural treatment to the simplest character. St Thomas's hospital at Lambeth exemplifies the treatment of hospital architecture at the commencement of the last quarter of the 19th century; the separate pavilion system had been already adopted on practical grounds, but the building is treated in a sumptuous architectural style, as if representing so many detached mansions—a treatment which would now be deprecated as an expenditure foreign to the main purpose of the building. One recent hospital, however, that at Birmingham, by W. Henman, combining architectural effect with the latest hygienic improvements, was the first large hospital in Great Britain in which the system of mechanical ventilation was completely and consistently carried out.

F<small>IG</small>. 104.—Northampton Institute, Clerkenwell. (Mountford.)
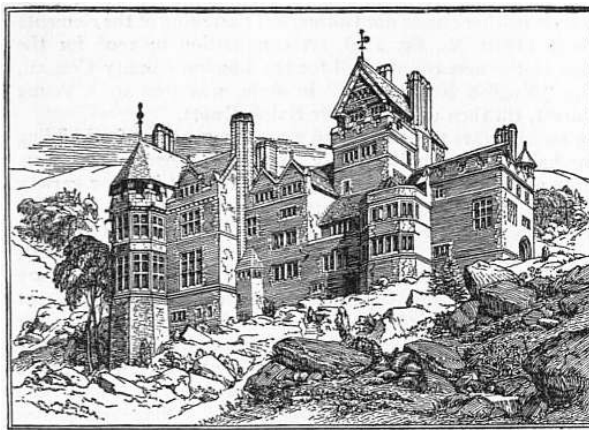
F<small>IG</small>. 105.—Cragside. (R. Norman Shaw.)

In theatre building there has been an immense improvement in regard to planning, ventilation and fireproof construction, but little to note in an architectural sense, since theatres in England are never designed by eminent architects, the financial and practical aspects being alone considered.

F<small>IG</small>. 106.—London City & Midland Bank, Ludgate Hill Branch. (Collcutt.)

In domestic architecture the tendency has been to quit picturesque irregularity for a more formal and more dignified treatment. Such a house as Norman Shaw's "Cragside," built in the earlier part of our period (fig. 105), however its picturesque treatment may still be admired, would hardly be built now on a large scale; its architect himself has of late years shown a preference for a symmetrical and regular treatment of house architecture sometimes to the extent of making the mansion look too like a barrack. In street architecture, however, the tendency has been towards a more characteristic and more picturesque treatment; nor is there any class of building in which the improvement in English architecture has been more marked and more unquestionable. Many of the new residential streets in the west end of London present a really picturesque *ensemble*, and many shops and other commercial street buildings have been erected with admirable fronts from the designs of some of the best architects of the day. Norman Shaw's building at the corner of St James's Street and Pall Mall was one of the first, and is still one of the best examples of modern street architecture, though surpassed by the same architect's more recent building opposite, at the south-west angle of St James's Street—one of the finest and most monumental examples of street architecture in London. Among other examples may be cited T.E. Collcutt's London City & Midland Bank in Ludgate Hill (fig. 106) and R. Blomfield's narrow house-front in Buckingham Gate (fig. 107). The introduction of sculpture in street fronts is also beginning to receive attention; and a simple house-front recently erected in Margaret Street, London, from the design of Beresford Pite (fig. 108), is an excellent example of the use of sculpture in connexion with ordinary street architecture. It is significant of the increased attention accorded to street architecture, that the most important architectural event in England at the very close of the 19th century, was the outlay of £2000 by the London County Council, in fees to eight architects for designs for the front of the proposed new streets of Kingsway and Aldwych. The idea was to treat these streets as comprehensive architectural designs with a certain unity of effect. Unfortunately this idea was abandoned for merely commercial reasons, it being feared that there would be a difficulty in letting the sites if tenants were required to conform their frontages to a general design. In the case of Aldwych, which is a crescent street, this decision was fatal. A crescent loses all its effect unless treated as a complete and symmetrical architectural design.

English domestic and street architecture.

Fɪɢ. 107.—House in Buckingham Gate, London. (R. Blomfield.)

The competition for the Queen Victoria Memorial, consisting of a processional road from Whitehall to Buckingham Palace, culminating in a sculptural trophy in front of the palace, attracted a great deal of attention in 1901. Of the five invited competitors—Sir Aston Webb (b. 1849), T.G. Jackson, Ernest George (b. 1839), Sir Thomas Drew (b. 1838), and Sir Rowand Anderson (b. 1834) the two latter representing Ireland and Scotland respectively,—Sir Aston Webb's design was selected, and unquestionably showed the best and most effective manner of laying out the road, as well as a very pleasing architectural treatment of the semicircular forecourt in front of the palace, with pavilions and fountain-basins symmetrically spaced; but some of this was subsequently sacrificed on grounds of economy. The building, a triumphal arch flanked by pavilions, forming the entry to the processional road from Whitehall, is a dignified design.

In France, still the leading artistic nation of the world, the art of architecture has been in a most flourishing and most active state in the most recent period. It is true that there is not the same variety as in modern English architecture, nor have there been the same discussions and experiments in regard to the true aim and course of architecture which have excited so much interest in England; because the French architects, unlike the English, know exactly what they want. They have a "school" of architecture; they adhere to the scholastic or academic theory of architecture as an art founded on the study of classic models; and on this basis their architects receive the most thorough training of any in the world. This predominance of the academic theory deprives their architecture, no doubt, of a good deal of the element of variety and picturesqueness; a French architect *pur sang*, in fact, never attempts the picturesque, unless in a country residence, and then the results are such that one wishes the attempt had not been made. But, on the other hand, modern French architecture at its best has a dignity and style about it which no other nation at present reaches, and which goes far to atone for a certain degree of sameness and repetition in its motives; and living under a government which recognizes the importance of national architecture, and is willing to spend public money liberally on it (with the full approbation of its public), the French architects have opportunities which English ones but seldom enjoy— the predominant aim with a British government being to see how little they can spend on a public building. The two great Paris exhibitions of 1889 and 1900 may be regarded as important events in connexion with architecture, for even the temporary buildings erected for them showed an amount of architectural interest and originality which could be met with nowhere else, and which in each case left its mark behind it, though with a difference; for while in the 1889 exhibition the main object was to treat temporary structures—iron and concrete and terra-cotta—in an undisguised but artistic manner, in those of the 1900 exhibition the effort was to create an architectural *coup d'œil* of apparently monumental structures of which the actual construction was disguised. In spite of some eccentricities the amount of invention and originality shown in these temporary buildings was most remarkable; but fortunately the exhibition left something more permanent behind it in the

Recent French architecture.

Fɪɢ. 108.—House in Margaret Street, London. (Beresford Pite.)

shape of the two art-palaces and the new bridge over the Seine. The two palaces are triumphs of modern classic architecture; the larger one (by MM. Thomas, Louvet and Deglane) is to some extent spoiled by the apparently unavoidable glass roof, the smaller one, by M. Girault, escapes this drawback, and, still more refined than its greater opposite, is one of the most beautiful buildings of modern times; the central portion is shown in Plate XIV., fig. 130. The architectural pylons, with their accompanying sculpture, which flank the entries to the bridge, are worthy of the best period of French Renaissance. Thus much, at least, has the 1900 exhibition done for architecture.

FIG. 109.—Plan of Hôtel de Ville, Paris.

A, Salle des Fêtes.   H, Prefect.
B, Salle à manger.   K, Committee Rooms.
C, Salons de Réception.   L, Public Works.
D, Council Chamber.   M, Corridor.
E, Grand Staircase.   N, President of Council.
F, Salle des Cariatides.   O, Library.
G, General Secretary.   P, Refreshment Room.

At the beginning of the last quarter of the 19th century stands one of the most important of modern French buildings, the Paris hotel de ville, commenced shortly after the war, from the designs of MM. Ballu and Deperthes, planned on an immense scale, and on the stateliest and most monumental lines: the plan is given in fig. 109. The central block is, externally, a restoration of the old hotel de ville, the remainder carried out in an analogous but somewhat more modern style. The interior has been the scene of sumptuous pictorial decoration, in which all the first artists of the day were employed—unfortunately in too scattered a manner and on no predominant or consistent scheme. One of the most characteristic architectural efforts of the French has consisted in the erection of the various smaller hôtels-de-ville or mairies, in the city and suburban districts of the capital; as at Pantin, Lilas, Suresnes and in various arrondissements within the city proper (Plate XIII., fig. 127). Nothing shows the quality of modern French architecture better, or perhaps more favourably, than this series of district town halls; all have a distinctly municipal character and a certain family resemblance of style amid their diversity of details; all are refined specimens of pre-eminently civilized architecture. Among the greater architectural efforts of France is the immense block of the new Sorbonne, by M. Nénot, a building sufficient in itself for an architectural reputation. Among smaller French buildings of peculiar merit may be mentioned the Musée Galliera, in the Trocadéro quarter of Paris, designed by M. Ginain—a work of pure art in architecture such as we should nowadays look for in vain out of France; the École de Médecine, by the same refined architect (fig. 110); and the chapel in rue Jean Goujon (Guilbert), erected as a memorial to the victims of the bazaar fire, again a notable instance of a work of pure thought in architecture—a new conception out of old materials. The new Opéra Comique (Bernier) should also be mentioned, the rather disappointing result of a competition which excited great interest at the time. Street architecture has been carried out of late in Paris in a sumptuous style, with great stone fronts and a profusion of carved ornament, such as we know nothing of in England; and though there is a rather monotonous repetition of the same style and character throughout the new or newly built streets, it is impossible to deny the effect of palatial dignity they impart to the city. In the matter of country houses the French architect is less fortunate; when he attempts what he regards as the rural picturesque, his good taste seems entirely to desert him, and the *maison de campagne* is generally a mere riot of gimcrack bargeboards and finials. In Paris, the taste for the contortions of what is called *art nouveau* has led to the erection, here and there, of ugly and eccentric fronts with preposterous ornamental details; but the invasion of this element is only partial and will probably not prove other than a passing phase.
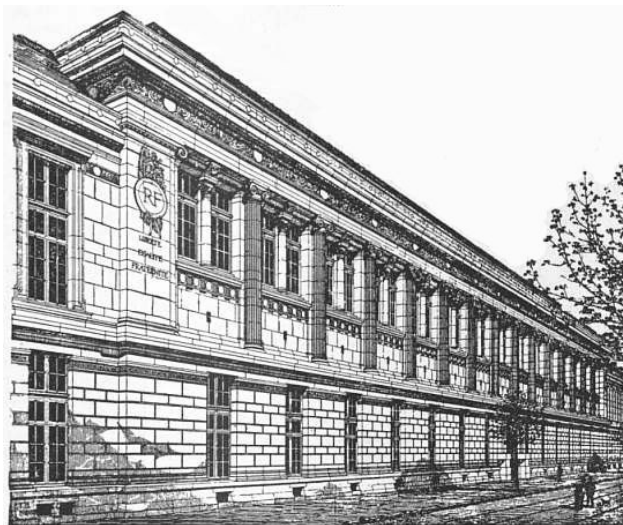

FIG. 110.—École de Médecine, Paris. (Ginain.)

The great military success of Germany in 1870, and the founding of the German empire, gave, as is usual in such crises, a decided impetus to public architecture, of which the central and most important visible sign is the German Houses of Parliament (Plate IX., fig. 117), by Paul Wallot (b. 1841), whose design was selected in a competition.

Germany. There is something essentially German in the quality of this national building; classic architecture minus its refinement. The detail is coarse; the finish of the end pavilions of the principal front absolutely unmeaning— mere architectural rodomontade; the central cupola of glass and iron, on a square plan, probably the ugliest central feature on any great building in Europe; and yet there is undeniable power about the whole thing; it is the characteristic product of a conquering nation not reticent in its triumph. The new cathedral at Berlin, by Julius Raschdorff

(b. 1823), is the other most important German work of the period (fig. 111); a building very striking and unusual in plan, but absolutely commonplace in its architectural detail; school classic of the most ordinary type, without even any of those elements of originality which are to be found in the Houses of Parliament. A curious feature in the plan (fig. 112) is that the building, alone of any cathedral we can recall, has its principal general entrance at the side, the end entrance being reserved for a special imperial cortège on special occasions, the cathedral also serving the second purpose of an imperial mausoleum. Theatre building has been carried on very largely in Germany, and among its productions the Lessing theatre at Berlin (fig. 113) (Hermann von der Hude and Julius Hennicke, d. 1892) is a favourable example of German classic at its best, besides being, like most modern German theatres, very well planned (fig. 114). Hamburg has had its new municipal buildings (Grotjan), a florid Renaissance building with a central tower, showing in its general effect and grouping a good deal of Gothic feeling Mention may also be made of the Imperial law courts (Reichsgerichtsgebaude) at Leipzig, designed by Ludwig Hoffmann (b. 1852) and finished in 1895, a building with no more charm about it, externally, than the Berlin Parliament Houses, but with some good interior effects. The new post offices in Germany have been an important undertaking, and are, at all events, buildings of more mark than those in England. There has also been a great deal of new development in street architecture, which shows an immense variety, and a constantly evident determination to do something striking, but we find in it neither the dignity of Parisian street architecture nor the refinement of modern London work; there is an element of the bombastic about it.
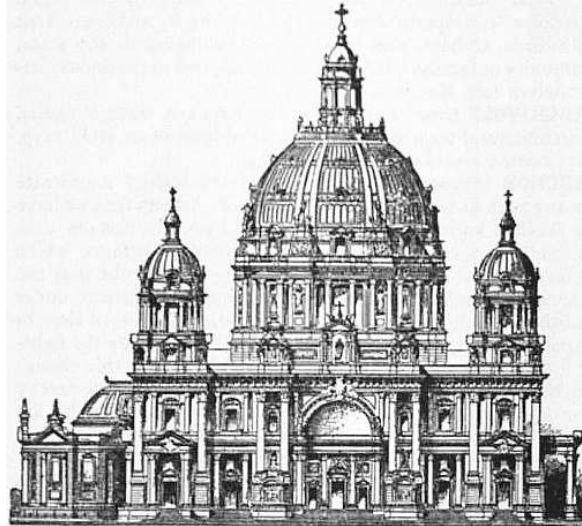

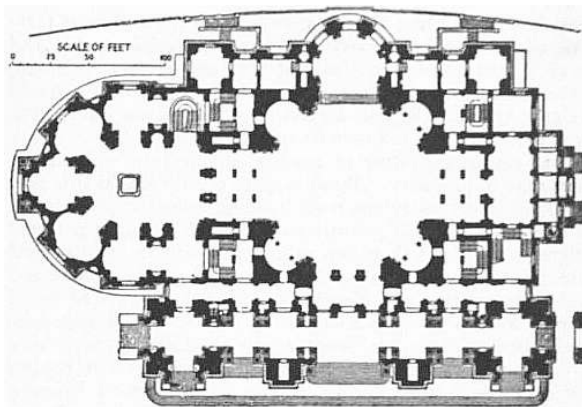FIG. 111.—Cathedral at Berlin. (Raschdorff.)

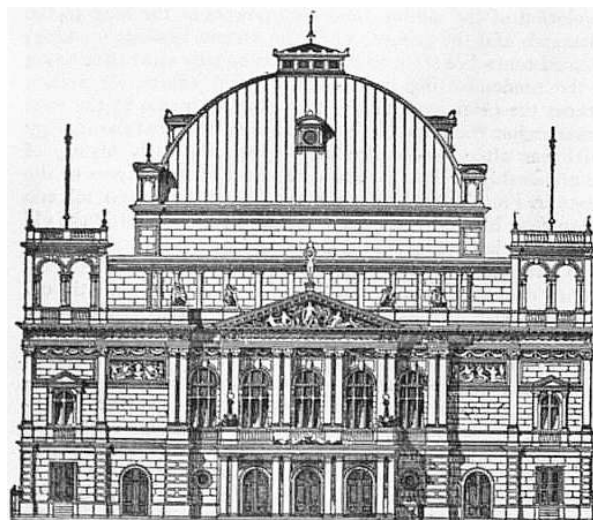
FIG. 112.—Plan of Cathedral at Berlin.

FIG. 113—Lessing Theatre, Berlin. (Von der Hude and Hennicke.)

No modern building on the European continent is more remarkable than the Brussels law courts (Plate XI., fig. 121) from the designs of Joseph Poelaert (1816-1879), an original genius in architecture, who had the good fortune to be

appreciated and given a free hand by his government. The design is based on

classic architecture, but with a treatment so completely individual as to remove it almost entirely from the category of imitative or revival architecture; somewhat fantastic it may be, but as an original architectural creation it stands almost alone among modern public buildings. In Vienna the scholastic classic style has been retained with much more purity and refinement than in the German capital, and the Parliament Houses (Plate IX., fig. 116), by Theophil Hansen (1813-1891), if they show no originality of detail, have the merit of original and very effective grouping. Budapest, on the other hand, which has almost sprung into existence since 1875 as the rival of the Austrian capital, has erected a great Parliament building of florid character (Plate IX., fig. 115), in a style in which the Gothic element is prevalent, though the central feature is a dome. The plan (see fig. 92) is obviously based on that of the Westminster building, the exterior design, however, has the merit of clearly indicating the position of the two Chambers as part of the architectural design, the want of which is the one serious defect of Barry's noble structure. In Italy modern architecture is at a very low ebb; the one great work of this period was the building of the façade to the Duomo at Florence, from the design of de Fabris, who did not live to see its completion. As the completion in modern times of a building of world-wide fame, it is a work of considerable interest, and, on the whole, not unworthy of its position; that it should harmonize quite satisfactorily with the ancient structure was hardly to be expected. It was probably the completion of this façade which led the city of Milan to start a great architectural competition, in

Fig. 114.—Plan of Lessing Theatre, Berlin.

the early 'eighties, for the erection of a new façade to its celebrated cathedral, not because the façade had never been completed, but because it had been spoiled and patched with bad 18th-century work. The ambition was a legitimate one, and the competition, open to all the world, excited the greatest interest; but the young Italian architect, Brentano, to whom the first premium was awarded, died shortly afterwards, and other causes, partly financial, led to the postponement of the scheme, though it is understood that there is still an intention of carrying out Brentano's design under the direction of the official architectural department of the city.

In summing up the present position of modern architecture, it may be said that architecture is now a more cosmopolitan

art than it has been at any previous period. The separate development of a national style has become in the present day almost an impossibility. Increased means of communication have brought all civilized nations into close touch with each other's tastes and ideas, with the natural consequence that the treatment of a special class of building in any one country will not differ very materially from its treatment in another; though there are nuances of local taste in detail, in manner of execution, in the materials used. And the civilized countries have almost with one consent returned, in the main, to the adoption of a school of architecture based on classic types. The taste for medievalism is dying out even in Great Britain, which has been its chief stronghold.

What course the future of modern architecture will take it is not easy to prophesy. What is quite certain is that it is now an individual art, each important building being the production, not of an unconsciously pursued national style, but of a personal designer. As far as there is a ruling consensus in architectural taste, this will tend to become, like dress and manners, more and more cosmopolitan; and it seems probable that it will be based more or less on the types left us by Classic and Renaissance architecture. There are, however, two influences which may have a definite effect on the architecture of the near future. One of these is the possible greater *rapprochement* between architecture and engineering, of which there are already some signs to be seen; architects will learn more of the kind of structural problems which are now almost the exclusive province of the engineer, and there will be a demand that engineering works shall be treated, as they well may be, with some of the refinement and expression of architecture. The other influence lies in the closer connexion, which is already taking place, between architecture and the allied arts, so that an important building will be regarded and treated as a field for the application of decorative sculpture and painting of the highest class, and as being incomplete without these. It is in this closer union of architecture with the other arts that there lies the best hope for the architecture of the future.
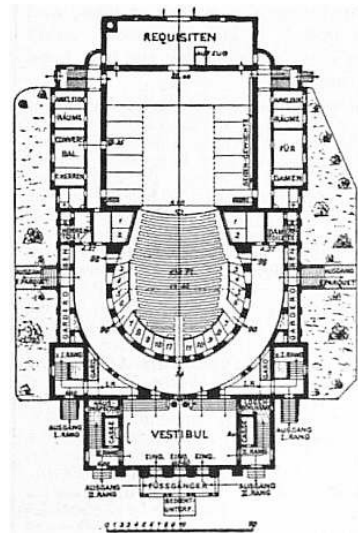
Plate XV.

Fig. 132.—A NEWPORT, R.I., "COTTAGE": "THE BREAKERS."
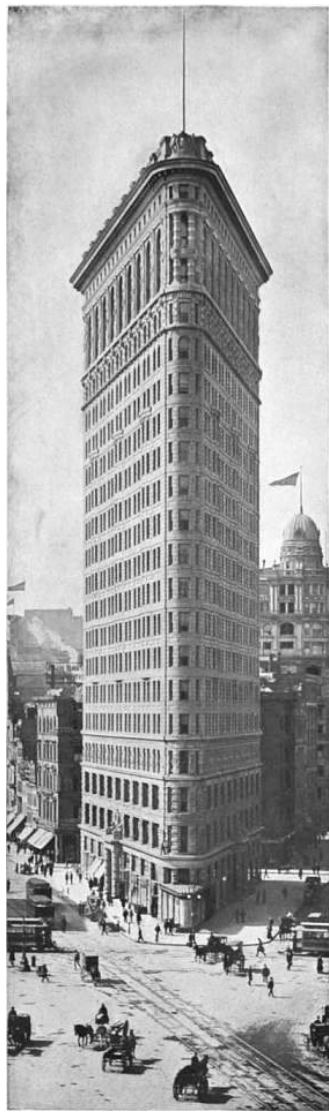
Copyright 1903 by Detroit Photographic Co.
Fig. 131.—"FLAT-IRON" BUILDING, NEW YORK.
(For method of construction, see Steel Construction, and Plate II., Fig. 4,
of that article.)

Fig. 133.—THE METROPOLITAN CLUB, NEW YORK.
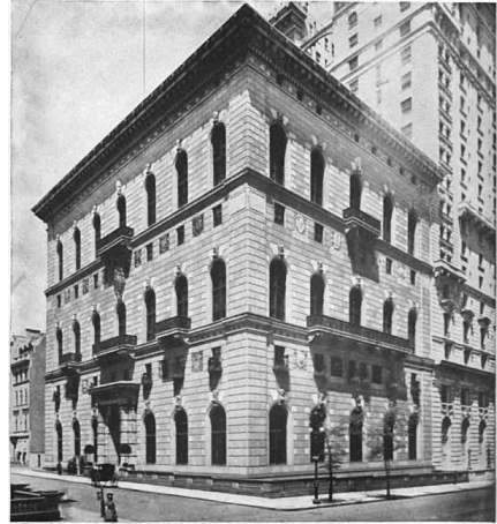
Copyright 1905 by Detroit Publishing Co.
Fig. 134.—THE UNIVERSITY CLUB, NEW YORK.

Plate XVI.

Photo, Detroit Publishing Co.
Fig. 135.—PUBLIC LIBRARY, BOSTON. (McKIM, MEAD &
WHITE.)

Photo, Geo. P. Hall & Son.
Fig. 136.—PUBLIC LIBRARY, NEW YORK. (CARRÈRE &
HASTINGS.)

Photo, Elmer Chickering.
Fɪɢ. 137.—TRINITY CHURCH, BOSTON. (H.H. RICHARDSON.)

Copyright 1906 by Detroit Publishing Co.
Fɪɢ. 138.—STATE CAPITOL, HARTFORD, CONNECTICUT.

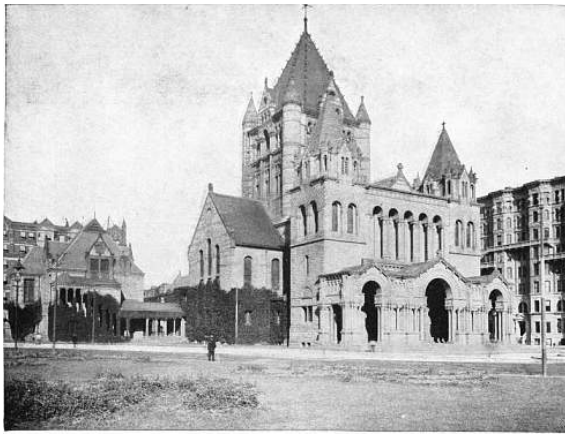Aᴜᴛʜᴏʀɪᴛɪᴇs.—The literature of architecture as a modern art is limited, the most important publications of recent times being mainly devoted to the study and illustration of ancient architecture. The following, however, may be named:—James Fergusson, *History of Modern Architecture* (2nd ed., London, 1873); T.G. Jackson, *Modern Gothic Architecture* (London, 1873); J.T. Micklethwaite, *Modern Parish Churches* (London, 1874); E.R. Robson, *School Architecture* (London, 1874); J.J. Stevenson, *House Architecture* (London, 1880); E.E. Viollet-le-Duc, *How to Build a House* (London, 1874); *Lectures on Architecture* (London, 1881); H.C. Burdett, *Hospitals and Asylums of the World* (London, 1892-1893); Professor Oswald Kuhn, *Krankenhauser* (Stuttgart, 1897); E.O. Sachs, *Modern Opera-Houses and Theatres* (London, 1897-1899); E. Wyndham Tarn, *The Mechanics of Architecture* (London, 1893); R. Norman Shaw, R.A., T.G. Jackson, R.A., and others, *Architecture, a Profession or an Art* (London, 1892); W.H. White, *The Architect and his Artists* (London, 1892); *Architecture and Public Buildings in Paris and London* (London, 1884); H.H. Statham, *Architecture for General Readers* (London, 1895); *Modern Architecture* (London, 1898); Herrmann Muthesius, *Die englische Baukunst der Gegenwart* (Berlin and Leipzig, 1900); Der Architekten Verein zu Berlin, *Berlin und Seine Bauten* (Berlin, 1896). The real literature of modern architecture, however, is to be found mainly in the articles and illustrations in the best periodical architectural publications of various countries. Among these Italy has none worth mention, and France, with all her architectural enthusiasm, has had no first-class architectural periodical since the extinction, about 1890, of the *Revue générale de l'architecture*, conducted for more than fifty years by the late César Daly, and in its day the first periodical of its class in the world. Among the best periodical publications are: *The Architectural Record* (quarterly), (New York); *The Architectural Review* (monthly), (Boston); the *Allgemeine Bauzeitung* (quarterly), (Vienna); the *Berlin Architekturwelt* (monthly), (Berlin); *The Builder* (weekly), (London); *La Construction moderne* (weekly), (Paris).

(H. H. S.)

1   For the various chronological systems proposed see Eɢʏᴘᴛ: *Chronology*.

2   Except, possibly, the earliest of those at Sparta (*q.v.*).—ED.

3   Article "Architecture," *Ency. Brit.*, 9th ed.

4   Wilkins made two designs for the whole building; one leaving the quadrangle entirely open on the fourth side, towards the street the other showing a low open colonnaded screen connecting the ends of the two wings. He never for a moment contemplated closing in the quadrangle by buildings on the fourth side.

5   A remarkable instance of this is shown by the railway viaduct at Passy, a large and monumental piece of work in itself, which is built along the centre of the roadway of Napoleon's bridge. It was' at first proposed to have a steel railway viaduct parallel with the old bridge, but it was found that the latter, both in respect of solidity and spacious dimensions, would fully bear the erection of the railway viaduct along its centre.

6   The western half of the present front; the design was duplicated afterwards, on the extension of the building, but Bodley originated it.

ARCHITRAVE (from Lat. *arcus*, an arch, and *trabs, trabem*, a beam), an architectural term for the chief beam which carries the superstructure and rests immediately on the columns. In the ordinary entablature it is the lowest of the three divisions, the other two being the frieze and the cornice (see Oʀᴅᴇʀ). The term is also applied to the moulded frame of a doorway.

ARCHIVE (Lat. *archivum*, a transliteration of Gr. ἀρχεῖον, an official building), a term (generally used in the plural "archives"), properly denoting the building in which are kept the records, charters and other papers belonging to any state, community or family, but now generally applied to the documents themselves (see Rᴇᴄᴏʀᴅ).

ARCHIVOLT (from Lat. *arcus*, an arch, and *volta*, a vault), an architectural term applied to the mouldings of an architrave, when carried round an arched opening.

ARCHON (ἄρχων, ruler), the title of the highest magistrate in many ancient Greek states. It is only in Athens that we have any detailed knowledge of the office, and even in this one case the evidence presents problems of the first importance which are incapable of decisive solution. There is no doubt that the archons represented the ancient kings, whose absolutism, under conditions which we can only infer, yielded in process of time to the power of the noble families, supported no doubt by the fighting force of the state. As to the process by which this change was effected there are two accounts. Traditionally, the monarchy after the death of Codrus (? 1068 B.C.) gave place to the life archon whose tenure of office was limited afterwards to ten years and then to one year. Aristotle's *Constitution of Athens* (*q.v.*) speaks of five stages: (1) the institution of the polemarch who took over the military duties of the king; (2) the institution of *the* archon to relieve the king of his civil duties; (3) the tenure of office was reduced to ten years (? 752 B.C.); (4) the office was taken from the "royal" clan and thrown open to all Eupatridae (? 712 B.C.); (5) office was made annual, and to the existing three offices were added the six thesmothetae whose duty it was to record judicial decisions. The value of this latter account is, of course, debatable, but it is at least compatible with the general trend of development from hereditary absolutism, civil, military and religious, in the person of the "king," to a constitutional oligarchy. The change was clearly effected by the devolution of the military and civil powers of the king to the polemarch and the archon, while the archon basileus (or king) retained control of state religion. It is equally clear that owing to the predominating importance of civil affairs, *the* archon became the chief state official and gave his name to the year (hence archon eponymus). It should be noticed that the analogy which has often been suggested between the early history of the archonship at Athens, and such cases as the mayors of the palace in French history, or the tycoon (shogun) and mikado in Japanese history, is misleading. In these cases it is the old royal house that retains the royal title and the semblance of power, while the real authority passes into new hands. In Athens, the new civil office is vested in the old royal family, while the old title along with its religious functions is transferred. The early history of the thesmothetae is not clear, but this much is certain that there is no adequate reason for supposing, as many historians do, that in early times, they, with the three chief archons, constituted a collective or collegiate magistracy. It is true Thucydides (i. 126) states that, in the time of the Cylonian conspiracy (? 632 B.C.), "the nine archons were (*i.e.* collectively) the principal officials," but at the same time the responsibility for the action then taken attached to the Alcmaeonidae alone, because one of their number, Megacles, was at that time *the* archon (*i.e.* responsibility was personal, not collective). Again, the *Constitution of Athens* says that down to Solon's time the archons had no official residence, but that afterwards they used the Thesmotheteion. It is a reasonable inference from this statement that the thesmothetae had previously sat together apart from the superior archons and that it was only after Solon that collegiate responsibility began.

Evolution of the Office.—The history of the democratization of the archonship is beset with equal difficulty. In the early days, the importance of the office (confined as it was to the highest class) must have been immense; there was no audit, no written law, no executive council. The popular assembly was ill-organized and probably summoned by the archons themselves. The only control came from the Areopagus which elected them and would generally be favourably disposed, and from the fact that the military and civil powers were not vested in the same hands. Although the institution of the popular courts by Solon had within it the germ of democratic supremacy, it is clear that the immediate result was small; thus, in the next decade *anarchia* was continuous and Damasias held the archonship for more than two years in defiance of the new constitution; the prolonged dissension in this matter shows that the office of archon still retained its supreme importance. Gradually, however, the archonship lost its power, especially in judicial matters, until it retained merely the right of holding the preliminary investigation and the formal direction of the popular courts. Its administrative powers, save those wielded by the polemarch (see below and cf. STRATEGUS), dwindled away into matters of routine. We know that Peisistratus ruled by controlling the archonship, which was always held by members of his family, and the archonship of Isagoras was clearly an important party victory; we know further the names of three important men who held the office between Cleisthenes' reform and the Persian War (Hipparchus, Themistocles (*q.v.*), Aristides) from which we infer that the office was still the prize of party competition. On the other hand, after 487 B.C. the list of archons contains no name of importance. Presumably this is due to the growing importance of the Strategus and to the institution of sortition (see below), which, whether as cause or effect, is presumably by the 5th century indicative of diminished importance. There can, on these assumptions, be no doubt that, from the early years of the 5th century B.C., the archonship was of practically no importance. Furthermore we find that (probably after the Persian War) the office is thrown open to the second class, and finally in 457 B.C. we meet an archon, Mnesitheides, of the third, or Zeugite, class. Plutarch (*Aristides*, 22) says that after the great struggle of the Persian War Aristides threw open the office to all the citizens. But in fact the members of the fourth class were not formally admitted even in the 4th century (though by a fiction they were allowed to pose for the time as Zeugites). Furthermore it is not till 457 that even a Zeugite archon is known, according to the *Constitution of Athens* (*c.* 26), which dates the change as five years after the death of Ephialtes and does not connect it with Aristides.

Sortition.—The next question constitutes perhaps the most important problem in Greek political development. At what date was election by lot, or sortition, introduced for the archonship? From the *Constitution of Athens* (*c.* 22) we gather that from the fall of the Tyranny to 487 B.C. the archons were αἱρετοί, not κληρωτοί (*i.e.* chosen by vote, not by lot), and that in 487, limited sortition was introduced, whereby fifty candidates were elected by each tribe, and from these the archons and their "secretary" were chosen by lot. But against this must be set the statement by the same authority that this double method was part of the Solonian reform. The solution of the dilemma is a matter of inference. Three indications favour the former view: (1) the "anarchia" which occurred so often between Solon and Peisistratus shows that the office was at that time a question of party (*i.e.* elective); (2) the statement that Solon invented sortition for the office is put as the basis of a comparison (ὅθεν, σημεῖον) and, therefore, may fairly be regarded as a hypothesis; (3) there is no indication that the change made in 487 B.C. was a return to an obsolete method, and on the same argument it is odd that Solon's alleged system should not have been revived at the end of the Tyranny. On the other hand Herodotus (vi. 109) states that, in 490, before the battle of Marathon, the polemarch was chosen by lot. If this be true, it follows that the office of polemarch must have lost its military importance, which was not the case, inasmuch as the polemarch at Marathon gave the casting vote in favour of immediate battle. Whether, therefore, Solon or Aristides was the first to introduce sortition, it is perfectly clear that the lot was not used between the Tyranny and 487 B.C. and that after 487 the lot was always used (see J.E. Sandys, *Constitution of Athens* c. 8 note 1, c. 22 § 5, note); in fact, at a date not known the mixed system of Aristides gave place to double sortition, in which the first nomination also was by lot. To enter here into the theory of the lot is impossible. It should, however, be observed that in the somewhat material atmosphere of constitutional Athens the religious significance of the lot had vanished; no important office in the 5th and 4th centuries was entrusted to its decision. The real effect of sortition was to equalize the chances of rich and poor without civil strife. Now it is perfectly clear that it could not have been this object which impelled Solon to introduce sortition; for in his time the archonship was not open to the lower classes, and, therefore, election was more democratic than sortition, whereas later the case was reversed. It should further be mentioned that, before the discovery of the Aristotelian *Constitution* in 1891, Grote, C.F. Hermann, Busolt and others had maintained that the lot was not used in Athens before the time of Cleisthenes; and in spite of the treatise, it must be admitted that there is no satisfactory evidence, historical or inferential, that their theory was unsound.

Qualifications and Functions.—It remains to give a brief analysis of the qualifications and functions of the archons after the year 487 B.C. After election (in the time of Aristotle in the month Anthesterion; in the 3rd century in Munychion) a short time had to elapse before entering on office to allow of the *dokimasia* (examination of fitness). In this the whole life of the nominee was investigated, and each had to prove that he was physically without flaw. Failure to pass the scrutiny involved a certain loss of civic rights (*e.g.* that of addressing the people). The successful candidate had to take an oath to the people (that he would not take bribes, &c.) and to go through certain preliminary rites. Any citizen could bring an impeachment

(*eisangelia*) against the archons. Any delinquency involved a trial before the Heliaea. Finally an examination took place at the end of the year of office, when each archon had to answer for his actions with person and possessions; till then he could not leave the country, be adopted into another family, dispose of his property, nor receive any "crown of honour." A similar investigation took place with regard to the assessors (*paredri*) whom the three senior archons chose to assist them. The archons at the end of their year of office (some say on entering upon office) became members of the Areopagus, which was, therefore, a body composed of ex-archons of tried probity and wisdom. The archons as a body retained some duties such as the appointment of jurymen, the sortition of the *athlothetae*, &c. (but see Gilbert's *Antiquities*, Eng. trans., p. 251, n. 1). On entering upon office the archon (*archon eponymus*) made proclamation by his herald that he would not interfere with private property. His official residence was the Prytaneum where he presided over all questions of family, *e.g.* the protection of parents against children and *vice versa*, protection of widows, wardship of heiresses and orphans, divorce; in religious matters he superintended the Dionysia, the Thargelia, the processions in honour of Zeus the Saviour and Asclepius. The archon basileus superintended the holy places, the mysteries, the Lampadephoria (Torch race), &c., questions of national religion and certain cases of bloodguiltiness. His official residence was the Stoa Basileios, and his wife, as officially representing the wife of Dionysus, was called Basilinna. The polemarch, who was at any rate titular commander down to about 487 B.C. (see above; and Herod, vi. 109, ἐνδέκατος ψηφιδοφόρος), became in the 5th century a sort of consul who watched over the rights of resident aliens (*metoeci*) in their family and legal affairs. He offered sacrifices to Artemis Agrotera and Enyalios, superintended *epitaphia* and arranged for the annual honours paid to the tyrannicides. His official residence was the Epilyceum (formerly called the Polemarcheion).

BIBLIOGRAPHY.-G. Gilbert, *Constitutional Antiquities* (Eng. trans., 1895); Eduard Meyer's *Geschichte des Alterthums*, ii. sect. 228; A.H.J. Greenidge, *Handbook of Greek Constitutional Hist.* (1895); J.W. Headlam, *Election by Lot in Athens* (Camb., 1891); and authorities quoted under GREECE: *History, ancient*, and ATHENS: *History*.

(J. M. M.)

ARCHPRIEST (Lat. *archipresbyter*, Gr. ἀρχιπρεσβύτερος), in the Christian Church, originally the title of the chief of the priests in a diocese. The office appears as early as the 4th century as that of the priest who presided over the presbyters of the diocese and assisted the bishop in matters of public worship, much as the archdeacon helped him in administrative affairs. Where, as in Germany, the dioceses were of vast extent, these were divided into several archpresbyterates. Out of these developed the rural deaneries, the office of archpriest being ultimately merged in that of rural dean, with which it became synonymous. It thus became strictly subordinate to the jurisdiction of the archdeacon. In Rome itself, as the office of archdeacon grew into that of cardinal-camerlengo, so that of archpriest of St Peter's developed into that of the cardinal-vicar. In England from 1598 until the appointment of a vicar-apostolic in 1623 the Roman Catholic clergy were placed by the pope under an "archpriest" as superior of the English mission. In the Lutheran Church in Germany the title archpriest (*Erzpriester*) was in some cases long retained as the equivalent of that of superintendent, sometimes also still called dean (*Dechant*), his functions being much the same as those of the rural dean.

ARCHYTAS (*c.* 428-347 B.C.), of Tarentum, Greek philosopher and scientist of the Pythagorean school, famous as the intimate friend of Plato, was the son of Mnesagoras or Histiaeus. Equally distinguished in natural science, philosophy and the administration of civic affairs, he takes a high place among the versatile savants of the ancient Greek world. He was a man of high character and benevolent disposition, a fine flute-player, and a generous master to his slaves, for whose children he invented the rattle. He took a prominent part in state affairs, and, contrary to precedent, was seven times elected commander of the army. Under his leadership, Tarentum fought with unvarying success against the Messapii, Lucania and even Syracuse. After a life of high intellectual achievement and uninterrupted public service, he was drowned (according to a tradition suggested by Horace, *Odes*, i. 28) on a voyage across the Adriatic, and was buried, as we are told, at Matinum in Apulia. He is described as the eighth leader of the Pythagorean school, and was a pupil (not the teacher, as some have maintained) of Philolaus. In mathematics, he was the first to draw up a methodical treatment of mechanics with the aid of geometry; he first distinguished harmonic progression from arithmetical and geometrical progressions. As a geometer he is classed by Eudemus, the greatest ancient authority, among those who "have enriched the science with original theorems, and given it a really sound arrangement." He evolved an ingenious solution of the duplication of the cube, which shows considerable knowledge of the generation of cylinders and cones. The theory of proportion, and the study of acoustics and music were considerably advanced by his investigations. He was said to be the inventor of a kind of flying-machine, a wooden pigeon balanced by a weight suspended from a pulley, and set in motion by compressed air escaping from a valve.[1] Fragments of his ethical and metaphysical writings are quoted by Stobaeus, Simplicius and others. To portions of these Aristotle has been supposed to have been indebted for his doctrine of the categories and some of his chief ethical theories. It is, however, certain that these fragments are mainly forgeries, attributable to the eclecticism of the 1st or 2nd century A.D., of which the chief characteristic was a desire to father later doctrines on the old masters. Such fragments as seem to be authentic are of small philosophical value. It is important to notice that Archytas must have been famous as a philosopher, inasmuch as Aristotle wrote a special treatise (not extant) *On the Philosophy of Archytas*. Some positive idea of his speculations may be derived from two of his observations: the one in which he notices that the parts of animals and plants are in general rounded in form, and the other dealing with the sense of hearing, which, in virtue of its limited receptivity, he compares with vessels, which when filled can hold no more. Two important principles are illustrated by these thoughts, (1) that there is no absolute distinction between the organic and the inorganic, and (2) that the argument from final causes is no explanation of phenomena. Archytas may be quoted as an example of Plato's perfect ruler, the philosopher-king, who combines practical sagacity with high character and philosophic insight.

See G. Hartenstein, *De Arch. Tar. frag.* (Leipzig, 1833); O.F. Gruppe, *Über d. Frag. d. Arch.* (1840); F. Beckmann, *De Pythag. reliq.* (Berlin, 1844, 1850); Egger, *De Arch. Tar. vit., op. phil.*; Ed. Zeller, *Phil. d. Griech.*; Theodor Gomperz, *Greek Thinkers*, ii. 259 (Eng. trans. G.G. Berry, Lond., 1905); G.J. Allman, *Greek Geometry from Thales to Euclid* (1889); Florian Cajori, *History of Mathematics* (New York, 1894); M. Cantor, *Gesch. d. gr. Math.* (1894 foll.). The mathematical fragments are collected by Fr. Blass, *Mélanges Graux* (Paris, 1884). For Pythagorean mathematics see further PYTHAGORAS.

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[1]   If this be the proper translation of Aulus Gellius, *Noctes Atticae*, x. 12., 9, "... simulacrum columbae e ligno ... factum; ita erat scilicet libramentis suspensum et aura spiritus inclusa atque occulta concitum." (See AERONAUTICS.)

ARCIS-SUR-AUBE, a town of eastern France, capital of an arrondissement in the department of Aube, on the left bank of the Aube, 23 m. N. of Troyes on the Eastern railway to Châlons-sur-Marne. Pop. (1906) 2803. Fires in 1719, 1727 and 1814 destroyed the ancient buildings, and it is now a town built in modern style with wide and regular streets. A château of the 18th century occupies the site of an older one in which Diana of Poitiers, mistress of Henry II., resided. The only other building of interest is the church, which dates from the 15th century. In front of it there is a statue of Danton, a native of the town. Arcis-sur-Aube has a tribunal of first instance. Its industries include important hosiery manufactures, and it carries on trade in grain and coal. The town communicates with Paris by means of the Aube, which becomes navigable at this point.

A battle was fought here on the 20th and 21st of March 1814 between Napoleon and the Austro-Russian army under Schwarzenberg (see Napoleonic Campaigns).

ARCOLA, a village of northern Italy, 16 m. E.S.E. of Verona, on the Alpone stream, near its confluence with the Adige below Verona. The village gives its name to the three days' battle of Arcola (15th, 16th and 17th of November 1796), in which the French, under General Napoleon Bonaparte, defeated the Austrians commanded by Allvintzy (see French Revolutionary Wars).

ARCOS DE LA FRONTERA, a town of southern Spain, in the province of Cadiz; on the right bank of the river Guadalete, which flows past Santa Maria into the Bay of Cadiz. Pop. (1900) 13,926. The town occupies a ridge of sandstone, washed on three sides by the river, and commanding fine views of the lofty peak of San Cristobál, on the east, and the fertile Guadalete valley, celebrated in ancient Spanish ballads for its horses. At the highest point of the ridge is a Gothic church with a fine gateway, and a modern tower overlooking the town. The fame of its ten bells dates from the wars between Spaniards and Moors in which "Arcos of the Frontier" received its name. After its capture by Alphonso the Wise of Castile (1252-1284), the town was a Christian stronghold on the borders of Moorish territory. Another church contains several Moorish banners, taken in 1483 at the battle of Záhara, a neighbouring village. The ruined citadel, the theatre, and the palace of the dukes of Arcos are the only other noteworthy buildings. Roman remains have been found in the vicinity, and the ridge of Arcos is honeycombed with rock-hewn chambers, said to be ancient cave-dwellings.

See *Galeria de Arcobricenses illustres* (Arcos, 1892), and *Riqueza y cultura de Arcos de la Frontera* (Arcos, 1898); both by M. Mancheño y Olivares.

ARCOSOLIUM (from Lat. *arcus*, arch, and *solium*, a sarcophagus), an architectural term applied to an arched recess used as a burial place in a catacomb (*q.v.*).

ARCOT, the name of a city and two districts of British India in the presidency of Madras. Arcot city is the principal town in the district of North Arcot. It occupies a very prominent place in the history of the British conquest of India, but it has now lost its manufactures and trade and preserves only a few mosques and tombs as traces of its former grandeur. It is a station on the line of railway from Madras to Beypur, but has ceased to be a military cantonment. The most famous episode in its history is the capture and defence of Arcot by Clive. In the middle of the 18th century, during the war between the rival claimants to the throne of the Carnatic, Mahommed Ali and Chanda Sahib, the English supported the claims of the former and the French those of the latter. In order to divert the attention of Chanda Sahib and his French auxiliaries from the siege of Trichinopoly, Clive suggested an attack upon Arcot and offered to command the expedition. His offer was accepted; but the only force which could be spared to him was 200 Europeans and 300 native troops to attack a fort garrisoned by 1100 men. The place, however, was abandoned without a struggle and Clive took possession of the fortress. The expedition produced the desired effect; Chanda Sahib was obliged to detach a large force of 10,000 men to recapture the city, and the pressure on the English garrison at Trichinopoly was removed. Arcot was afterwards captured by the French; but in 1760 was retaken by Colonel Coote after the battle of Wandiwash. It was also taken by Hyder Ali when that invader ravaged the Carnatic in 1780, and held by him for some time. The town of Arcot, together with the whole of the territory of the Carnatic, passed into the hands of the British in 1801, upon the formal resignation of the government by the nawab, Azim-ud-daula, who received a liberal pension.

The district of North Arcot is bounded on the N. by the districts of Cuddapah and Nellore; on the E. by the district of Chingleput; on the S. by the districts of South Arcot and Salem; and on the W. by the Mysore territory. The area of North Arcot is 7386 sq. m., and the population in 1901 was 2,207,712, showing an increase of 4% in the decade. The aspect of the country, in the eastern and southern parts, is flat and uninteresting; but the western parts, where it runs along the foot of the Eastern Ghats, as well as all the country northwards from Trivellam to Tripali and the Karkambadi Pass, are mountainous, with an agreeable diversity of scenery. The elevated platform in the west of the district is comparatively cool, being 2000 ft. above the level of the sea, with a mean maximum of the thermometer in the hottest weather of 88°. The hills are composed principally of granite and syenite, and have little vegetation. Patches of stunted jungle here and there diversify their rugged and barren aspect; but they abound in minerals, especially copper and iron ores. The narrow valleys between the hills are very fertile, having a rich soil and an abundant water-supply even in the driest seasons. The principal river in the district is the Palar, which rises in Mysore, and flows through North Arcot from west to east past the towns of Vellore and Arcot, into the neighbouring district of Chingleput, eventually falling into the sea at Sadras. Although a considerable stream in the rainy season, and often impassable, the bed is dry or nearly so during the rest of the year. Other smaller rivers of the district are the Paini, which passes near Chittore and falls into the Palar, the Sonamukhi and the Chayaur. These streams are all dry during the hot season, but in the rains they flow freely and replenish the numerous tanks and irrigation channels. The administrative headquarters are at Chittore, but the largest towns are Vellore (the

military station), Tirupati (a great religious centre), and Wallajapet and Kalahasti (the two chief places of trade).

The district of South Arcot is bounded on the N. by the districts of North Arcot and Chingleput; on the E. by the French territory of Pondicherry and the Bay of Bengal; on the S. by the British districts of Tanjore and Trichinopoly; and on the W. by the British district of Salem. It contains an area of 5217 sq. m.; and its population in 1901 was 2,349,894, showing an increase of 9% in the decade. The aspect of the district resembles that of other parts of the Coromandel coast. It is low and sandy near the sea, and for the most part level till near the western border, where ranges of hills form the boundary between this and the neighbouring district of Salem. These ranges are in some parts about 5000 ft. high, with solitary hills scattered about the district. In the western tracts, dense patches of jungle furnish covert to tigers, leopards, bears and monkeys. The principal river is the Coleroon which forms the southern boundary of the district, separating it from Trichinopoly. This river is abundantly supplied with water during the greater part of the year, and two irrigating channels distribute its waters through the district. The other rivers are the Vellar, Pennar, and Gadalum, all of which are used for irrigation purposes. Numerous small irrigation channels lead off from them, by means of which a considerable area of waste land has been brought under cultivation. Under the East India Company, a commercial resident was stationed at Cuddalore, and the Company's weavers were encouraged by many privileges. The manufacture and export of native cloth have now been almost entirely superseded by the introduction of European piece goods. The chief seaport of the district of South Arcot is Cuddalore, close to the site of Fort St David. The principal crops in both districts are rice, millet, other food grains, oil-seeds and indigo.

ARCTIC (Gr. Ἄρκτος, the Bear, the northern constellation of Ursa Major), the epithet applied to the region round the North Pole, covering the area (both ocean and lands) where the characteristic polar conditions of climate, &c., obtain. The Arctic Circle is drawn at 66° 30′ N. (see Polar Regions).

ARCTINUS, of Miletus, one of the earliest poets of Greece and contributors to the epic cycle. He flourished probably about 744 B.C. (Ol. 7). His poems are lost, but an idea of them can be gained from the *Chrestomathy* written by Proclus the Neo-Platonist of the 5th century or by a grammarian of the same name in the time of the Antonines. The *Aethiopis* Αἰθιοπίς, in five books, was so called from the Aethiopian Memnon, who became the ally of the Trojans after the death of Hector. As the opening shows, it took up the narrative from the close of the *Iliad*. It begins with the famous deeds and death of the Amazon Penthesileia, and concludes with the death and burial of Achilles and the dispute between Ajax and Odysseus for his arms. The title thus only applied to part of the poem. The *Sack of Troy* (Ἰλίου Πέρσις) gives the stories of the wooden horse, Sinon, and Laocoon, the capture of the city, and the departure of the Greeks under the wrath of Athene at the outrage of Ajax on Cassandra. The *Little Iliad* (Ἰγιὰς μικρά) of Lesches formed the transition between the *Aethiopis* and the *Sack of Troy*.

Kinkel, *Epicorum Graecorum Fragmenta* (1877); Welcker, *Der epische Cyclus*; Müller, *History of the Literature of Ancient Greece*; Lang, *Homer and the Epic* (1893); Monro, *Journal of Hellenic Studies* (1883); T.W. Allen in *Classical Quarterly*, April 1908, pp. 82 foll.

ARCTURUS, the brightest star in the northern hemisphere, situated in the constellation Boötes (*q.v.*) in an almost direct line with the tail (ζ and η) of the constellation Ursa Major (Great Bear); hence its derivation from the Gr. ἄρκτος, bear, and οὖρος, guard. Arcturus has been supposed to be referred to in various passages of the Hebrew Bible; the Vulgate reads Arcturus for stars mentioned in Job ix. 9, xxxvii. 9, xxxviii. 31, as well as Amos v. 8. Other versions, as also modern authorities, have preferred, *e.g.*, Orion, the Pleiades, the Scorpion, the Great Bear (of. *Amos* in the "International Critical Comment" series, and G. Schiaparelli, *Astronomy in the O.T.*, Eng. trans., Oxford, 1905, ch. iv.). According to one of the Greek legends about Arcas, son of Lycaon, king of Arcadia, he was killed by his father and his flesh was served up in a banquet to Zeus, who was indignant at the crime and restored him to life. Subsequently Arcas, when hunting, chanced to pursue his mother Callisto, who had been transformed into a bear, as far as the temple of Lycaean Zeus; to prevent the crime of matricide Zeus transported them both to the heavens (Ovid, *Metam*. ii. 410), where Callisto became the constellation Ursa Major, and Areas the star Arcturus (see Lycaon and Callisto).

ARCUEIL, a town of northern France, in the department of Seine, on the Bièvre, 2½ m. N.E. of Sceaux on the railway from Paris to Limours. Pop. (1906) 8660. The town has an interesting church dating from the 13th to the 15th century. It takes its name from a Roman aqueduct, the *Arcus Juliani* (Arculi), some traces of which still remain. In 1613-1624 a bridge-aqueduct over 1300 ft. long was constructed to convey water from the spring of Rungis some 4 m. south of Arcueil, across the Bièvre to the Luxembourg palace in Paris. In 1868-1872 another aqueduct, still longer, was superimposed above that of the 17th century, forming part of the system conveying water from the river Vanne to Paris. The two together reach a height of about 135 ft. Bleaching, and the manufacture of bottle capsules, patent leather and other articles are carried on at Arcueil; and there are important stone quarries.

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